Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements — **Beaver Valley Unit 2**

Fire Compartment - 2-SB-3

Compliance Statement: Complies
Complies by Previous Approval

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.3 - Fire barrier penetrations

Compliance Basis:

Fire Dampers: Complies by Previous Approval

The following are deviations from BTP CMEB 9.5-1 related to 2-CV-1: C.5.a(4) Modified fire dampers (Duct penetrations are provided with two 1 1/2 - hour fire-rated dampers in series); C.5.a(4) Ventilation ductwork is wrapped with 1-hour fire-wrap material to extend the fire barriers in lieu of fire dampers at the barriers. The SSERs concluded both deviations are acceptable.

Fire Doors: Complies

Fire doors are 3 hr fire rated and separate 2-SB-3 from adjacent fire compartments. Doors are inspected by procedure.

Licensing Actions

- 03 Conduits/Penetration Seals & Penetration Seal Design - BTP C.5.a(3)
- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

- None

References

- 1/2-ADM-1900, Rev. 28, "Fire Protection Program"
- 1/2PMP-33FP-FIRE DOORS-1M, Rev. 9, "Periodic Inspection of Fire Doors"
- 1/2PMP-75VS-VNT-4M, Rev. 13, "Ventilation System Fire Damper Maintenance and Trip Check"
- 10080-RA-0006A, Sht. 1, Rev. 30, "Door Schedule"
- 10080-RB-0034A, Rev. 9, "Ventilation Service Building"
- 10080-RB-0034B, Rev. 11, "Ventilation Arrangement SB"
- 10080-RB-0034C, Rev. 3, "Ventilation Service Building"
- 10080-RB-0035A, Sht. 1, Rev. 10, "Ventilation Service Building"
- 10080-RB-0035B, Sht. 2, Rev. 11, "Ventilation Service Building"
- 10080-RB-0035C, Sht. 3, Rev. 10, "Ventilation Service Building"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- 87-05-05, "BV2 SSER "
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet

Fire Protection Features

Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-SB-3

Compliance Statement: Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.4 - Through Penetration Fire Stops

Compliance Basis:

Complies with use of EEEE

The penetration seal designs are based on typical tested and approved fire seals. BV2 contains some penetrations between fire areas where it is often impossible to achieve an exact duplication of the specific test configuration of penetration seal designs for fire protection requirements. GL 86-10, evaluations have been completed and documented to justify penetration seals installed to untested seal designs.

Licensing Actions

- 03 Conduits/Penetration Seals & Penetration Seal Design - BTP C.5.a(3)
- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

10080-DEC-0188 R0 A0

10080-DMC-0054 Rev.2 A4

8700-DMC-2840 Rev. 0 Eval #4

References

- 1/2-PIP-M16, Rev. 9, "Penetration Seals"
- 2601.337-844-083, Rev. B, "Internal Conduit Fire Seals EC-1 thru 6"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- B-240, Rev. 0, "Fire Seal Eval Untested Design"
- 10080-DMC-0054, Rev. 2, "Untested Seal Design"
- 2BVS-0844, Rev. 0, "Index Only Fire Stops and Seals"
- 87-05-05, "BV2 SSER "
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet

Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements — **Beaver Valley Unit 2**

Fire Compartment - 2-SB-3

Compliance Statement: Complies
Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: ERFBS

SubSection: 3.11.5 - ERFBS

Compliance Basis:

ERFBS in compartment SB-3 for conduits and cable trays consist of TSI thermo-Lag and 3M Interam wrap used to protect electrical power and control cables for systems and components used for achieving and maintaining safe shutdown conditions. Thermo-Lag installations involve cable in conduits, electrical junction boxes and pull boxes. 3M fire wrap and not Thermo-Lag was utilized for protection of cable tray applications.
Procedure verify on an 18 month frequency, by visual inspection that the exposed surfaces of all fire rated assemblies i.e. fire wrapped conduit, cable trays, ductwork and cable are in operable condition. Fire wraps with indications of degradation are entered into the Corrective Action Program with the applicable compensatory measure implemented by procedure.

Complies

The 3M Interam E 50 series one-hour fire wrap installed on cable trays, conduit and air drops is bound by fire tests. The 3M Interam E-50 series blanket assemblies *provide a one hour fire resistance for the ductwork and a 2 hour fire resistance for protection of the 1-1/2 hour fire dampers. The 3M material was installed in* accordance with the manufacturer's installation manuals and the Sergeant Electric installation details for 3M.

Complies with the use of Evaluations

BV-2 through a series of evaluations concluded Thermo-Lag panels and conduit sections having 0.50 inch nominal thickness with pre-buttered or post-buttered joint construction were upgraded to be equivalent to a 1-hour fire rating by achieving a 1 inch thickness.

Licensing Actions

- None

Supporting EEEEs

10080-DEC-0184 R1 A0
10080-DEC-0190 R1 A0
10080-DEC-0191 R0 A0
12241-B-226 R0 A0

References

- 1/2-ADM-1900, Rev. 28, "Fire Protection Program"
- 10080-DEC-0190, Rev. 1, "Thermo-Lag JB Misc Design"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- 10080-DEC-0184, Rev. 1, "3M Fire Wrap"
- 10080-DEC-0191, Rev. 0, "Thermo-Lag Conduit Eval."
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"

Open Items and VFDRs

-None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-SB-4

Compliance Statement: Complies
Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Detection

SubSection: 3.8.2 - Detection

Compliance Basis:

Fire Compartment SB-4 consists of the Normal Switchgear Room located on elevation 760'-6" of the Service Building. The following critical attributes of the fire detection system were evaluated in respect to NFPA 72E-1978 and NFPA 72D-1975.

Complies

Items 1 through 10 comply with the exception of item 3.

1. Verified all detectors are mounted to the concrete ceiling.

2. Verified there are no significant platforms as defined by NFPA 72E, paragraph 2-6.6.

3. Verified detector spacing meets required spacing for single beam with smooth concrete ceiling construction in most of the compartment. Spacing was evaluated on several detectors as acceptable by the use of an EEEE. See Complies by EEEE below.

4. Verified detectors periodically tested annually.

5. Verified there are no air duct detectors.

6. Verified detectors are not used to release fire doors.

7. Verified detectors are tested to verify a control room alarm is received and supervised circuits generate an alarm while in the trouble condition. Detectors send a signal to Data Gathering Panel (DGP) 2DGP-4 for annunciation in the main Control Room'

8. Verified circuits are tested by either removing a detector or lifting leads in the detector circuit to verify a trouble alarm is received in the Control Room.

9. Confirmed that all control panels are provided with primary and secondary power sources. The power supplies for the main fire detection and alarm panel in the control room are described in the NFPA 805 Chapter 3 record 3.8.1.

10. Confirmed that the compensatory measure are appropriate for the level of importance of this system.

Complies with use of EEEE

3. Verified existing detector spacing is adequate for the hazard based on the control of transient combustibles by procedure, detector coverage, location of detectors, and alternative indication through normal plant equipment alarms in FPPCE 13-045.

Licensing Actions

- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)

Supporting EEEEs

10080-DMC-0054 Rev.2 A4

FPPCE 13-045 Rev.0

References

- 1/2-ADM-1900, Rev. 28, "Fire Protection Program"
- 10080-RC-0009E, Rev. 7, "Floor Plan and Det El 780-6 Service Building"
- 10080-RE-0011T, Rev. 19, "Wiring Diag 120/208V AC PNL ESSBS2-5B & 5C"
- 10080-RE-0064AH, Rev. 11, "WD Fire Det System Misc Detail"
- 10080-RE-0064AV, Rev. 3, "Cable Block Diag Fire Det system"
- 10080-RE-0064F, Rev. 4, "CND Plan FD SB El 760-6"
- 10080-TLD-33D-005-02, Rev. 5, "TLD Station FD Zone 5 SB"
- 2OST-33.16, Rev. 9, "Early Warning Smoke Detection Instrumentation Test"
- B-81, Rev. 0, "Early Warning System For Service Building"
- 10080-RA-0001F, Sht. 4, Rev. 12, "Floor Plan - Service Building"
- 10080-RC-0009F, Rev. 6, "Floor Plan El 780 6 Service Building"
- 10080-RE-0064AD, Rev. 4, "WD Fire Det 2DGP-4 Ser Bldg"
- 10080-RE-0064AJ, Rev. 5, "WD - fire Det Sys Misc Detail"
- 10080-RE-0064AX, Rev. 3, "Cable Block Diagram FD 2DGP-3 2DGP-4"
- 10080-TLD-33D-005-01, Rev. 5, "TLD Station Fire Det Zone 5 SB"
- 10080-TLD-33D-005-03, Rev. 6, "TLD- Station FD Zone 5 SB"
- 85/10, "BV 2 UFSAR SER"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"

Open Items and VFDRs

-None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-SB-4

Compliance Statement: Complies by Previous Approval
Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.2 - Fire barriers

Compliance Basis:

The fire barriers separating SB-4 from adjacent compartments consist of the following: The perimeter concrete walls are 2 ft. thick. The floor and ceiling are concrete on concrete beam. The thickness varies from 3 ft. for the ceiling to 2 ft. for the floor. The interior barriers separating 2-SB-4 from 2-SB-10 and 2-S-8 are 12 inches thick. All floor, wall, and ceiling penetrations are sealed with a material having a rating equivalent to the barrier rating. The building construction provides fire barriers in excess of the required ratings determined by the fire loadings except as discussed below.

Complies by Prior Approval

Ventilation duct penetrations between 2-SB-4 and all adjacent fire areas are provided with two 1 1/2 hour fire-rated dampers in series except for the ductwork associated with the battery room exhaust system which is wrapped with a 1 hour fire rated material. A deviation for fire damper modifications has been documented and accepted in the SER.

Complies with use of EEEE

Evaluation DEC-0184 evaluates the acceptability of 3M Interam E-50 series blanket assemblies that provide a one hour fire resistance for the ductwork use during a fire for ventilation and a 2 hour fire resistance for the protection of the 1-½ hour fire dampers.

Licensing Actions

- 03 Conduits/Penetration Seals & Penetration Seal Design - BTP C.5.a(3)
- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

10080-DEC-0184 R1 A0
10080-DEC-0196 R1 A0

References

- 10080-RA-0001E, Sht. 3, Rev. 9, "Floor Plan - Service Building"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"
- 10080-RA-0006A, Sht. 1, Rev. 30, "Door Schedule"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- NUREG-1057 Supplement 5, "Beaver Valley 2 SSER 5"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements

Fire Compartment - 2-SB-4

Compliance Statement: Complies by Previous Approval

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.3 - Fire barrier penetrations

Compliance Basis:

Fire Dampers:

The SSERs indicated the installation of two 1 1/2 hr. fire dampers in series in lieu of one 3 hr. fire damper was used in various ducts. The SSERs concluded the dampers in series are an acceptable deviation.

Fire Doors:

SSERs stated there are number of security modifications that have been made to fire doors. Modifications were made in accordance with recommendations supplied by UL. The SSERs concluded the security modifications are an acceptable deviation.

Licensing Actions

- 03 Conduits/Penetration Seals & Penetration Seal Design - BTP C.5.a(3)
- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

- None

References

- 1/2PMP-33FP-FIRE DOORS-1M, Rev. 9, "Periodic Inspection of Fire Doors"
- 10080-RA-0006A, Sht. 1, Rev. 30, "Door Schedule"
- 10080-RB-0034A, Rev. 9, "Ventilation Service Building"
- 10080-RB-0034C, Rev. 3, "Ventilation Service Building"
- 10080-RB-0035E, Rev. 13, "Ventilation Service Building"
- 87-05-05, "BV2 SSER "
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"
- 1/2PMP-75VS-VNT-4M, Rev. 13, "Ventilation System Fire Damper Maintenance and Trip Check"
- 10080-RB-0014A, Rev. 15, "Vent Arrangement Primary Plant"
- 10080-RB-0034B, Rev. 11, "Ventilation Arrangement SB"
- 10080-RB-0035C, Sht. 3, Rev. 10, "Ventilation Service Building"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-SB-4

Compliance Statement: Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.4 - Through Penetration Fire Stops

Compliance Basis:

Complies with use of EEEE

The penetration seal designs are based on typical tested and approved fire seals. BV2 contains some penetrations between fire areas where it is often impossible to achieve an exact duplication of the specific test configuration of penetration seal designs for fire protection requirements. GL 86-10, evaluations have been completed and documented to justify penetration seals installed to untested seal designs.

Licensing Actions

- 03 Conduits/Penetration Seals & Penetration Seal Design - BTP C.5.a(3)
- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

10080-DEC-0188 R0 A0

10080-DMC-0054 Rev.2 A4

8700-DMC-2840 Rev. 0 Eval #4

References

- 1/2-PIP-M16, Rev. 9, "Penetration Seals"
- 2601.337-844-083, Rev. B, "Internal Conduit Fire Seals EC-1 thru 6"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- B-240, Rev. 0, "Fire Seal Eval Untested Design"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"
- 10080-DMC-0054, Rev. 2, "Untested Seal Design"
- 2BVS-0844, Rev. 0, "Index Only Fire Stops and Seals"
- 87-05-05, "BV2 SSER "
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"

Open Items and VFDRs

-None

Fire Compartment - 2-SB-4

Compliance Statement: Complies
Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: ERFBS

SubSection: 3.11.5 - ERFBS

Compliance Basis:

ERFBS in compartment SB-4 for conduits and cable trays consist of TSI thermo-Lag and 3M Interam wrap used to protect electrical power and control cables for systems and components used for achieving and maintaining safe shutdown conditions. Thermo-Lag installations involve cable in conduits, electrical junction boxes and pull boxes. 3M fire wrap and not Thermo-Lag was utilized for protection of cable tray applications.
Procedure verify on an 18 month frequency, by visual inspection that the exposed surfaces of all fire rated assemblies i.e. fire wrapped conduit, cable trays, ductwork and cable are in operable condition. Fire wraps with indications of degradation are entered into the Corrective Action Program with the applicable compensatory measure implemented by procedure.

Complies

The 3M Interam E 50 series one-hour fire wrap installed on cable trays, conduit and air drops is bound by fire tests. The 3M Interam E-50 series blanket assemblies provide a one hour fire resistance for the ductwork and a 2 hour fire resistance for protection of the 1-1/2 hour fire dampers. The 3M material was installed in accordance with the manufacturer's installation manuals and the Sergeant Electric installation details for 3M.

Complies with the use of Evaluations

BV-2 through a series of evaluations concluded Thermo-Lag panels and conduit sections having 0.50 inch nominal thickness with pre-buttered or post-buttered joint construction were upgraded to be equivalent to a 1-hour fire rating by achieving a 1 inch thickness.

Licensing Actions

- None

Supporting EEEEs

10080-DEC-0184 R1 A0
10080-DEC-0190 R1 A0
10080-DEC-0191 R0 A0
12241-B-239 Rev. 0

References

- 1/2-ADM-1900, Rev. 28, "Fire Protection Program"
- 10080-DEC-0190, Rev. 1, "Thermo-Lag JB Misc Design"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- 10080-DEC-0184, Rev. 1, "3M Fire Wrap"
- 10080-DEC-0191, Rev. 0, "Thermo-Lag Conduit Eval."
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"

Open Items and VFDRs

-None

Fire Compartment **-** 2-SB-5

Compliance Statement: Complies
Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Detection

SubSection: 3.8.2 - Detection

Compliance Basis:

Fire Compartment SB-5 consists of elevation 780'-6" of the Service Building. The compartment is provided with ionization smoke detectors. The following critical attributes of the smoke detection system were evaluated to ensure functionality and reliability in respect to NFPA 72E-1978 and NFPA 72D-1975.

Complies

2. Confirmed there are no significant platforms.

3. Confirmed the current detector spacing meets required spacing for steel deck on steel beam ceiling construction.

4. Confirmed detectors are tested annually by procedure.

5. Confirmed there are no air duct detectors.

6. Confirmed detectors are not used to release fire doors.

7. Confirmed that each zone of detectors send fire alarm to main control room upon actuation of detector(s), and trouble alarm upon fault in the detector circuit.

8. Confirmed that all circuits required for fire detection alarms are electrically supervised with trouble alarms back to main control room.

9. Confirmed that all control panels are provided with primary and secondary power sources. The power supplies for the main fire detection and alarm panel in the control room are described in the NFPA 805 Chapter 3 record 3.8.1.

10. Confirmed procedure requires a minimum number of detectors be operable. The procedure also requires that a compensatory measure be implemented when two adjacent detectors in the same system are inoperable. For less than the required number of detectors operable a compensatory measure is required.

Complies with use of EEEE

1. All detectors are mounted below the ceiling at a level equal to the bottom of the beams and was found to be acceptable

Licensing Actions **Supporting EEEEs**

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements

Beaver Valley Unit 2

Licensing Actions

- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)

Supporting EEEEs

FPPCE 13-074 Rev.0

References

- 1/2-ADM-1900, Rev. 28, "Fire Protection Program"
- 10080-RE-0011T, Rev. 19, "Wiring Diag 120/208V AC PNL ESSBS2-5B & 5C"
- 10080-RE-0064AH, Rev. 11, "WD Fire Det System Misc Detail"
- 10080-RE-0064AV, Rev. 3, "Cable Block Diag Fire Det system"
- 10080-RE-0064F, Rev. 4, "CND Plan FD SB El 760-6"
- 10080-TLD-33D-007-01, Rev. 5, "TLD Station FD System SB Zone 7"
- 10080-TLD-33D-007-03, Rev. 5, "TLD Station FD System SB Zone 7"
- 85/10, "BV 2 UFSAR SER"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- FPSSR, Add. 37, "BVPS-2 Fire Protection Safe Shutdown Report"
- 10080-RA-0002D, Rev. 8, "Elevations Service Building"
- 10080-RE-0064AD, Rev. 4, "WD Fire Det 2DGP-4 Ser Bldg"
- 10080-RE-0064AJ, Rev. 5, "WD - fire Det Sys Misc Detail"
- 10080-RE-0064AX, Rev. 3, "Cable Block Diagram FD 2DGP-3 2DGP-4"
- 10080-RS-0007A, Rev. 10, "Roof Plan and Detail SB"
- 10080-TLD-33D-007-02, Rev. 5, "TLD Station FD System SB Zone 7"
- 2OST-33.16E, Rev. 0, "EARLY WARNING SMOKE DET. INSTR. TEST SERVICE BLDG AND SAFEGUARDS"
- B-81, Rev. 0, "Early Warning System For Service Building"
- FPPCE 13-074, Rev. 0, "Engineering Evaluation of Smoke Detector Spacing in 2-SB-5"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet

Fire Protection Features

Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-SB-5

Compliance Statement: Complies by Previous Approval
Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.2 - Fire barriers

Compliance Basis:

The roof of 2-SB-5 is steel framed with a built up insulated roof on 1½ metal deck. The walls are a combination of steel frame with metal siding or 12 inch concrete block. The floor is 3 ft. thick concrete on concrete beam. The building construction provides fire barriers in excess of the required ratings determined by the fire loadings except as discussed below.

Complies by Prior Approval

The roof of 2-SB-5 is steel framed with a built up insulated roof on 1½ metal deck. The walls are a combination of steel frame with metal siding or 12 inch concrete block. The floor is 3 ft. thick concrete on concrete beam. The building construction provides fire barriers in excess of the required ratings determined by the fire loadings. Structural steel located in 2-SB-5 was not fire proofed based on low combustible loading (less than ½ hour). Ventilation duct penetrations between 2-SB-5 and all adjacent fire areas are provided with two 1 ½ hour fire-rated dampers in series or wrapped with a 1 hr fire rated material. The SSER states the fire wrap on ductwork is an acceptable deviation.

Complies with use of EEEE

Evaluation DEC-0184 compared the installed configurations for 3M E-50 Series Interam fire wrap material to test configurations to demonstrate that the installed barrier provides a fire barrier equal to one hour when used to protect metal ducts and up to 2 hours when protecting fire dampers.

Licensing Actions

- 03 Conduits/Penetration Seals & Penetration Seal Design - BTP C.5.a(3)
- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

- None

References

- 10080-RA-0001F, Sht. 4, Rev. 12, "Floor Plan - Service Building"
- 87-05-05, "BV2 SSER "
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"

References

- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"

Open Items and VFDRs

-None

Fire Compartment - 2-SB-5

Compliance Statement: Complies by Previous Approval
Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.3 - Fire barrier penetrations

Compliance Basis:

Complies via Previous Approval & Complies with use of Evaluation

Fire Dampers:

The SSERs indicated the installation of two 1 1/2 hr. fire dampers in series in lieu of one 3 hr. fire damper was used in various ducts. The SSERs concluded the dampers in series are an acceptable deviation.

An evaluation supports maintaining fire dampers 2GSS-DMPF23A and 23B in the open position due to operability and maintenance issues caused by environmental conditions.

Complies via Previous Approval

Fire Doors:

SSERs stated there are number of security modifications that have been made to fire doors. Modifications were made in accordance with recommendations supplied by UL. The SSERs concluded the security modifications are an acceptable deviation.

Licensing Actions

- 03 Conduits/Penetration Seals & Penetration Seal Design - BTP C.5.a(3)
- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

10080-DEC-0184 R1 A0

FPPCE 06-043 BV2 R0

References

- 1/2-ADM-1900, Rev. 28, "Fire Protection Program"
- 1/2PMP-75VS-VNT-4M, Rev. 13, "Ventilation System Fire Damper Maintenance and Trip Check"
- 1/2PMP-33FP-FIRE DOORS-1M, Rev. 9, "Periodic Inspection of Fire Doors"
- 10080-RA-0006A, Sht. 1, Rev. 30, "Door Schedule"

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements

References

- 10080-RB-0034A, Rev. 9, "Ventilation Service Building"
- 10080-RB-0035D, Sht. 4, Rev. 13, "Ventilation Service Building"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- 10080-RB-0034C, Rev. 3, "Ventilation Service Building"
- 10080-RB-0035E, Rev. 13, "Ventilation Service Building"
- 87-05-05, "BV2 SSER "
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"

Open Items and VFDRs

-None

Fire Compartment - 2-SB-5

Compliance Statement: Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.4 - Through Penetration Fire Stops

Compliance Basis:

Complies with use of EEEE

The penetration seal designs are based on typical tested and approved fire seals. BV2 contains some penetrations between fire areas where it is often impossible to achieve an exact duplication of the specific test configuration of penetration seal designs for fire protection requirements. GL 86-10, evaluations have been completed and documented to justify penetration seals installed to untested seal designs.

Licensing Actions

- 03 Conduits/Penetration Seals & Penetration Seal Design - BTP C.5.a(3)
- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

10080-DMC-0054 Rev.2 A4

References

- 1/2-PIP-M16, Rev. 9, "Penetration Seals"
- 2601.337-844-083, Rev. B, "Internal Conduit Fire Seals EC-1 thru 6"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- B-240, Rev. 0, "Fire Seal Eval Untested Design"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"
- 10080-DMC-0054, Rev. 2, Add. 3, "Analysis of Untested Seal Designs"
- 2BVS-0844, Rev. 0, "Index Only Fire Stops and Seals"
- 87-05-05, "BV2 SSER "
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"

Open Items and VFDRs

-None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-SB-6

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Detection

SubSection: 3.8.2 - Detection

Compliance Basis:

Fire Compartment SB-6 consists of Battery Room 2-1. The room is provided with ionization smoke detectors. The following critical attributes of the smoke detection system were evaluated to ensure functionality and reliability in respect to NFPA 72E-1978 and NFPA 72D-1975.

1. Confirmed ionization detectors are mounted to the concrete ceiling of the battery room.

2. Confirmed there are no significant platforms.

3. Confirmed the current detector spacing using two detectors meets required spacing.

4. Confirmed detectors are tested annually by procedure.

5. Confirmed there are no air duct detectors.

6. Confirmed detectors are not used to release fire doors.

7. Confirmed detectors are tested to verify a control room alarm is received and supervised circuits generate an alarm while in the trouble condition. Detectors send a signal to Data Gathering Panel for annunciation in the main Control Room.

8. Confirmed that all circuits required for fire detection alarms are electrically supervised in accordance with NFPA 72D with trouble alarms back to main control room.

9. Confirmed that all control panels are provided with primary and secondary power sources. The power supplies for the main fire detection and alarm panel in the control room are described in the NFPA 805 Chapter 3 record 3.8.1.

10. Confirmed procedure requires a minimum number of detectors be operable.For less than the required number of detectors operable a compensatory measure is required.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)

Supporting EEEEs

- None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements

Beaver Valley Unit 2

Licensing Actions

- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)

Supporting EEEEs

References

- 1/2-ADM-1900, Rev. 28, "Fire Protection Program"
- 10080-RA-0001C, Sht. 1, Rev. 10, "Floor Plan - Service Building"
- 10080-RE-0064AD, Rev. 4, "WD Fire Det 2DGP-4 Ser Bldg"
- 10080-RE-0064AH, Rev. 11, "WD Fire Det System Misc Detail"
- 10080-RE-0064AX, Rev. 3, "Cable Block Diagram FD 2DGP-3 2DGP-4"
- 10080-TLD-33D-003-01, Rev. 4, "Test Loop Diagram Zone 3"
- 10080-TLD-33D-003-03, Rev. 4, "Test Loop Diagram Zone 3"
- 85/10, "BV 2 UFSAR SER"
- UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- 10080-B-0221, Rev. 0, "Evaluation of Detector Locations for the Early Warning Fire Detector System"
- 10080-RE-0011T, Rev. 19, "Wiring Diag 120/208V AC PNL ESSBS2-5B & 5C"
- 10080-RE-0064AG, Rev. 5, "WD DRP-2 and Fire Alarm Horn"
- 10080-RE-0064AV, Rev. 3, "Cable Block Diag Fire Det system"
- 10080-RE-0064E, Rev. 5, "Cnd Plan FD Service Bldg el 730 745"
- 10080-TLD-33D-003-02, Rev. 4, "Test Loop Diagram Zone 3"
- 2OST-33.16E, Rev. 0, "EARLY WARNING SMOKE DET. INSTR. TEST SERVICE BLDG AND SAFEGUARDS"
- FPSSR, Add. 37, "BVPS-2 Fire Protection Safe Shutdown Report"

Open Items and VFDRs

-None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements

Beaver Valley Unit 2

Fire Compartment - 2-SB-6

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.2 - Fire barriers

Compliance Basis:

Battery room 2-SB-6 is entirely contained within 2-SB-1. The battery room is enclosed by 3-hour rated walls and ceiling. The floor is concrete on grade.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

- None

References

- 10080-RA-0001C, Sht. 1, Rev. 10, "Floor Plan - Service Building"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- NUREG 1057, Supp 3 11/86, "NRC SER - NUREG 1057, Supp No. 3 dated November 1986"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"
- NUREG 1057, Supp 5 5/87, "NRC SER - NUREG 1057, Supp No. 5 dated May 1987"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet

Fire Protection Features

Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-SB-6

Compliance Statement: Complies by Previous Approval

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.3 - Fire barrier penetrations

Compliance Basis:

Fire Dampers:

The SSERs indicated the installation of two 1 1/2 hr fire dampers in series in lieu of one 3 hr fire damper was used in various ducts. The SSERs concluded the dampers in series are an acceptable deviation.

Fire Doors:

SSERs stated there are number of security modifications that have been made to fire doors. Modifications were made in accordance with recommendations supplied by UL. The SSERs concluded the security modifications are an acceptable deviation.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

- None

References

- 1/2-ADM-1900, Rev. 28, "Fire Protection Program"
- 1/2PMP-75VS-VNT-4M, Rev. 13, "Ventilation System Fire Damper Maintenance and Trip Check"
- 10080-RB-0034A, Rev. 9, "Ventilation Service Building"
- 10080-RB-0035A, Sht. 1, Rev. 10, "Ventilation Service Building"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"
- NUREG 1057, Supp 5 5/87, "NRC SER - NUREG 1057, Supp No. 5 dated May 1987"
- 1/2PMP-33FP-FIRE DOORS-1M, Rev. 9, "Periodic Inspection of Fire Doors"
- 10080-RA-0006A, Sht. 1, Rev. 30, "Door Schedule"
- 10080-RB-0034C, Rev. 3, "Ventilation Service Building"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- NUREG 1057, Supp 3 11/86, "NRC SER - NUREG 1057, Supp No. 3 dated November 1986"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet

Fire Protection Features

Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-SB-6

Compliance Statement: Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.4 - Through Penetration Fire Stops

Compliance Basis:

Complies with use of EEEE

The penetration seal designs are based on typical tested and approved fire seals. BV2 contains some penetrations between fire areas where it is often impossible to achieve an exact duplication of the specific test configuration of penetration seal designs for fire protection requirements. GL 86-10, evaluations have been completed and documented to justify penetration seals installed to untested seal designs.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

- None

References

- 1/2-PIP-M16, Rev. 9, "Penetration Seals"
- 2601.337-844-083, Rev. B, "Internal Conduit Fire Seals EC-1 thru 6"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- NUREG 1057, Supp 3 11/86, "NRC SER - NUREG 1057, Supp No. 3 dated November 1986"
- 10080-DMC-0054, Rev. 2, "Untested Seal Design"
- 2BVS-0844, Rev. 0, "Index Only Fire Stops and Seals"
- B-240, Rev. 0, "Fire Seal Eval Untested Design"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"
- NUREG 1057, Supp 5 5/87, "NRC SER - NUREG 1057, Supp No. 5 dated May 1987"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet

Fire Protection Features

Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements — **Beaver Valley Unit 2**

Fire Compartment - 2-SB-7

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Detection

SubSection: 3.8.2 - Detection

Compliance Basis:

Fire Compartment SB-7 consists of Battery Room 2-3. The room is provided with ionization smoke detectors. The following critical attributes of the smoke detection system were evaluated to ensure functionality and reliability in respect to NFPA 72E-1978 and NFPA 72D-1975.
Items 1 through 10

1. Confirmed ionization detectors are mounted to the concrete ceiling of the battery room.

2. Confirmed there are no significant platforms.

3. Confirmed current detector spacing using two detectors meets required spacing.

4. Confirmed detectors periodically tested by procedure.

5. Confirmed there are no air duct detectors.

6. Confirmed detectors are not used to release fire doors.

7. Confirmed detectors are tested to verify a control room alarm is received and supervised circuits generate an alarm while in the trouble condition. Detectors send a signal to Data Gathering Panel for annunciation in the main Control Room.

8. Confirmed that all circuits are tested by either removing a detector or lifting leads in the detector circuit to verify a trouble alarm is received in the Control Room.

9. Confirmed that all control panels are provided with primary and secondary power sources. The power supplies for the main fire detection and alarm panel in the control room are described in the NFPA 805 Chapter 3 record 3.8.1.

10. Confirmed procedure requires a minimum number of detectors be operable. For less than the required number of detectors operable a compensatory measure is required.

Licensing Actions

- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)

Supporting EEEEs

- None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

References

- 1/2-ADM-1900, Rev. 28, "Fire Protection Program"
- 10080-RA-0001C, Sht. 1, Rev. 10, "Floor Plan - Service Building"
- 10080-RE-0064AD, Rev. 4, "WD Fire Det 2DGP-4 Ser Bldg"
- 10080-RE-0064AH, Rev. 11, "WD Fire Det System Misc Detail"
- 10080-RE-0064AX, Rev. 3, "CABLE BLOCK FD 2DGP-3 & 4"
- 10080-TLD-33D-003-01, Rev. 4, "Test Loop Diagram Zone 3"
- 10080-TLD-33D-003-03, Rev. 4, "Test Loop Diagram Zone 3"
- 85/10, "BV 2 UFSAR SER"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- 10080-B-0221, Rev. 0, "Evaluation of Detector Locations for the Early Warning Fire Detector System"
- 10080-RE-0011T, Rev. 19, "Wiring Diag 120/208V AC PNL ESSBS2-5B & 5C"
- 10080-RE-0064AG, Rev. 5, "WD DRP-2 and Fire Alarm Horn"
- 10080-RE-0064AV, Rev. 3, "Cable Block Diag Fire Det system"
- 10080-RE-0064E, Rev. 5, "Cnd Plan FD Service Bldg el 730 745"
- 10080-TLD-33D-003-02, Rev. 4, "Test Loop Diagram Zone 3"
- 2OST-33.16E, Rev. 0, "EARLY WARNING SMOKE DET. INSTR. TEST SERVICE BLDG AND SAFEGUARDS"
- B-81, Rev. 0, "Early Warning System For Service Building"
- FPSSR, Add. 37, "BVPS-2 Fire Protection Safe Shutdown Report"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-SB-7

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.2 - Fire barriers

Compliance Basis:

Battery room 2-SB-7 is entirely contained within 2-SB-1. The battery room is enclosed by 3-hour rated barriers. The floor is concrete on grade.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

- None

References

- 10080-RA-0001C, Sht. 1, Rev. 10, "Floor Plan - Service Building"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- NUREG 1057, Supp 3 11/86, "NRC SER - NUREG 1057, Supp No. 3 dated November 1986"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"
- NUREG 1057, Supp 5 5/87, "NRC SER - NUREG 1057, Supp No. 5 dated May 1987"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-SB-7

Compliance Statement: Complies by Previous Approval

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.3 - Fire barrier penetrations

Compliance Basis:

Fire Dampers:

The SSERs indicated the installation of two 1 1/2 hr fire dampers in series in lieu of one 3 hr fire damper was used in various ducts. The SSERs concluded the dampers in series are an acceptable deviation.

Fire Doors:

SSERs stated there are number of security modifications that have been made to fire doors. Modifications were made in accordance with recommendations supplied by UL. The SSERs concluded the security modifications are an acceptable deviation.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

- None

References

- 1/2-ADM-1900, Rev. 28, "Fire Protection Program"
- 1/2PMP-75VS-VNT-4M, Rev. 13, "Ventilation System Fire Damper Maintenance and Trip Check"
- 10080-RA-0006A, Sht. 1, Rev. 30, "Door Schedule"
- 10080-RB-0034C, Rev. 3, "Ventilation Service Building"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"
- 1/2PMP-33FP-FIRE DOORS-1M, Rev. 9, "Periodic Inspection of Fire Doors"
- 10080-RA-0001C, Sht. 1, Rev. 10, "Floor Plan - Service Building"
- 10080-RB-0034A, Rev. 9, "Ventilation Service Building"
- 10080-RB-0035A, Sht. 1, Rev. 10, "Ventilation Service Building"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"

Open Items and VFDRs

-None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-SB-7

Compliance Statement: Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.4 - Through Penetration Fire Stops

Compliance Basis:

Complies with use of EEEE

The penetration seal designs are based on typical tested and approved fire seals. BV2 contains some penetrations between fire areas where it is often impossible to achieve an exact duplication of the specific test configuration of penetration seal designs for fire protection requirements. GL 86-10, evaluations have been completed and documented to justify penetration seals installed to untested seal designs.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

- None

References

- 1/2-PIP-M16, Rev. 9, "Penetration Seals"
- 2601.337-844-083, Rev. B, "Internal Conduit Fire Seals EC-1 thru 6"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- NUREG 1057, Supp 3 11/86, "NRC SER - NUREG 1057, Supp No. 3 dated November 1986"
- 10080-DMC-0054, Rev. 2, "Untested Seal Design"
- 2BVS-0844, Rev. 0, "Index Only Fire Stops and Seals"
- B-240, Rev. 0, "Fire Seal Eval Untested Design"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"
- NUREG 1057, Supp 5 5/87, "NRC SER - NUREG 1057, Supp No. 5 dated May 1987"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-SB-8

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Detection

SubSection: 3.8.2 - Detection

Compliance Basis:

Fire Compartment SB-8 consists of Battery Room 2-2. The room is provided with ionization smoke detectors. The following critical attributes of the smoke detection system were evaluated to ensure functionality and reliability in respect to NFPA 72E-1978 and NFPA 72D-1975.

1. Confirmed ionization detectors are mounted to the concrete ceiling of the battery room.

2. Confirmed there are no significant platforms.

3. Confirmed the current detector spacing using two detectors meets required spacing.

4. Confirmed detectors are tested annually by procedure.

5. Confirmed there are no air duct detectors.

6. Confirmed detectors are not used to release fire doors.

7. Confirmed detectors are tested to verify a control room alarm is received and supervised circuits generate an alarm while in the trouble condition. Detectors send a signal to Data Gathering Panel for annunciation in the main Control Room.

8. Confirmed circuits are tested by either removing a detector or lifting leads in the detector circuit to verify a trouble alarm is received in the Control Room.

9. Confirmed that all control panels are provided with primary and secondary power sources. The power supplies for the main fire detection and alarm panel in the control room are described in the NFPA 805 Chapter 3 record 3.8.1.

10. Confirmed procedure requires a minimum number of detectors be operable. For less than the required detectors operable a compensatory measure is required.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)

Supporting EEEEs

- None

References

- 1/2-ADM-1900, Rev. 28, "Fire Protection Program"
- 10080-RA-0001C, Sht. 1, Rev. 10, "Floor Plan - Service Building"
- 10080-RE-0064AD, Rev. 4, "WD Fire Det 2DGP-4 Ser Bldg"
- 10080-RE-0064AH, Rev. 11, "WD Fire Det System Misc Detail"
- 10080-RE-0064AX, Rev. 3, "CABLE BLOCK FD 2DGP-3 & 4"
- 10080-TLD-33D-003-01, Rev. 4, "Test Loop Diagram Zone 3"
- 10080-TLD-33D-003-03, Rev. 4, "Test Loop Diagram Zone 3"
- 85/10, "BV 2 UFSAR SER"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- 10080-B-0221, Rev. 0, "Evaluation of Detector Locations for the Early Warning Fire Detector System"
- 10080-RE-0011T, Rev. 19, "Wiring Diag 120/208V AC PNL ESSBS2-5B & 5C"
- 10080-RE-0064AG, Rev. 5, "WD DRP-2 and Fire Alarm Horn"
- 10080-RE-0064AV, Rev. 3, "Cable Block Diag Fire Det system"
- 10080-RE-0064E, Rev. 5, "Cnd Plan FD Service Bldg el 730 745"
- 10080-TLD-33D-003-02, Rev. 4, "Test Loop Diagram Zone 3"
- 2OST-33.16E, Rev. 0, "EARLY WARNING SMOKE DET. INSTR. TEST SERVICE BLDG AND SAFEGUARDS"
- B-81, Rev. 0, "Early Warning System For Service Building"
- FPSSR, Add. 37, "BVPS-2 Fire Protection Safe Shutdown Report"

Open Items and VFDRs

-None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements — **Beaver Valley Unit 2**

Fire Compartment - 2-SB-8

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.2 - Fire barriers

Compliance Basis:

Fire compartment 2-SB-8 consists of Battery Room 2-2 located within the Service Building Emergency Switchgear Room fire compartment 2-SB-2. The fire barriers associated with 2-SB-8 are 3 hr fire rated. The concrete walls are 12 inch thick. The ceiling is concrete slab 9 inches thick. The floor is concrete on grade.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

- None

References

- 10080-RA-0001C, Sht. 1, Rev. 10, "Floor Plan - Service Building"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- NUREG 1057, Supp 3 11/86, "NRC SER - NUREG 1057, Supp No. 3 dated November 1986"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"
- NUREG 1057, Supp 5 5/87, "NRC SER - NUREG 1057, Supp No. 5 dated May 1987"

Open Items and VFDRs

-None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements

Beaver Valley Unit 2

Fire Compartment - 2-SB-8

Compliance Statement: Complies by Previous Approval

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.3 - Fire barrier penetrations

Compliance Basis:

Fire Dampers:

The SSERs indicated the installation of two 1 1/2 hr fire dampers in series in lieu of one 3 hr fire damper was used in various ducts. The SSERs concluded the dampers in series are an acceptable deviation.

Fire Doors:

SSERs stated there are number of security modifications that have been made to fire doors. Modifications were made in accordance with recommendations supplied by UL. The SSERs concluded the security modifications are an acceptable deviation.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

- None

References

- 1/2-ADM-1900, Rev. 28, "Fire Protection Program"
- 1/2PMP-75VS-VNT-4M, Rev. 13, "Ventilation System Fire Damper Maintenance and Trip Check"
- 10080-RB-0034A, Rev. 9, "Ventilation Service Building"
- 10080-RB-0035A, Sht. 1, Rev. 10, "Ventilation Service Building"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- NUREG 1057, Supp 5 5/87, "NRC SER - NUREG 1057, Supp No. 5 dated May 1987"
- 1/2PMP-33FP-FIRE DOORS-1M, Rev. 9, "Periodic Inspection of Fire Doors"
- 10080-RA-0006A, Sht. 1, Rev. 30, "Door Schedule"
- 10080-RB-0034C, Rev. 3, "Ventilation Service Building"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- NUREG 1057, Supp 3 11/86, "NRC SER - NUREG 1057, Supp No. 3 dated November 1986"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements — **Beaver Valley Unit 2**

Fire Compartment - 2-SB-8

Compliance Statement: Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.4 - Through Penetration Fire Stops

Compliance Basis:

Complies with use of EEEE

The penetration seal designs are based on typical tested and approved fire seals. BV2 contains some penetrations between fire areas where it is often impossible to achieve an exact duplication of the specific test configuration of penetration seal designs for fire protection requirements. GL 86-10, evaluations have been completed and documented to justify penetration seals installed to untested seal designs.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

- None

References

- 1/2-PIP-M16, Rev. 9, "Penetration Seals"
- 2601.337-844-083, Rev. B, "Internal Conduit Fire Seals EC-1 thru 6"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- NUREG 1057, Supp 3 11/86, "NRC SER - NUREG 1057, Supp No. 3 dated November 1986"
- 10080-DMC-0054, Rev. 2, "Untested Seal Design"
- 2BVS-0844, Rev. 0, "Index Only Fire Stops and Seals"
- B-240, Rev. 0, "Fire Seal Eval Untested Design"
- NUREG 1057, Supp 5 5/87, "NRC SER - NUREG 1057, Supp No. 5 dated May 1987"

Open Items and VFDRs

-None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements

Beaver Valley Unit 2

Fire Compartment - 2-SB-9

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Detection

SubSection: 3.8.2 - Detection

Compliance Basis:

Fire Compartment SB-9 consists of Battery Room 2-4. The room is provided with ionization smoke detectors. The following critical attributes of the smoke detection system were evaluated to ensure functionality and reliability in respect to NFPA 72E-1978 and NFPA 72D-1975.

1. Confirmed ionization detectors are mounted to the concrete ceiling of the battery room.

2. Confirmed there are no significant platforms.

3. Confirmed the current detector spacing using two detectors meets required spacing.

4. Confirmed detectors are tested annually by procedure.

5. Confirmed there are no air duct detectors.

6. Confirmed detectors are not used to release fire doors.

7. Confirmed detectors are tested to verify a control room alarm is received and supervised circuits generate an alarm while in the trouble condition. Detectors send a signal to Data Gathering Panel for annunciation in the main Control Room.

8. Confirmed that all circuits are tested by either removing a detector or lifting leads in the detector circuit to verify a trouble alarm is received in the Control Room.

9. Confirmed that all control panels are provided with primary and secondary power sources. The power supplies for the main fire detection and alarm panel in the control room are described in the NFPA 805 Chapter 3 record 3.8.1.

10. Confirmed procedure requires a minimum number of detectors be operable. For less than the required detectors operable a compensatory measure is required.

Licensing Actions

- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)

Supporting EEEEs

- None

References

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

References

- 1/2-ADM-1900, Rev. 28, "Fire Protection Program"
- 10080-RA-0001C, Sht. 1, Rev. 10, "Floor Plan - Service Building"
- 10080-RE-0064AD, Rev. 4, "WD Fire Det 2DGP-4 Ser Bldg"
- 10080-RE-0064AH, Rev. 11, "WD Fire Det System Misc Detail"
- 10080-RE-0064AX, Rev. 3, "CABLE BLOCK FD 2DGP-3 & 4"
- 10080-TLD-33D-003-01, Rev. 4, "Test Loop Diagram Zone 3"
- 10080-TLD-33D-003-03, Rev. 4, "Test Loop Diagram Zone 3"
- 85/10, "BV 2 UFSAR SER"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- 10080-B-0221, Rev. 0, "Evaluation of Detector Locations for the Early Warning Fire Detector System"
- 10080-RE-0011T, Rev. 19, "Wiring Diag 120/208V AC PNL ESSBS2-5B & 5C"
- 10080-RE-0064AG, Rev. 5, "WD DRP-2 and Fire Alarm Horn"
- 10080-RE-0064AV, Rev. 3, "Cable Block Diag Fire Det system"
- 10080-RE-0064E, Rev. 5, "Cnd Plan FD Service Bldg el 730 745"
- 10080-TLD-33D-003-02, Rev. 4, "Test Loop Diagram Zone 3"
- 2OST-33.16E, Rev. 0, "EARLY WARNING SMOKE DET. INSTR. TEST SERVICE BLDG AND SAFEGUARDS"
- B-81, Rev. 0, "Early Warning System For Service Building"
- FPSSR, Add. 37, "BVPS-2 Fire Protection Safe Shutdown Report"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements

Beaver Valley Unit 2

Fire Compartment - 2-SB-9

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.2 - Fire barriers

Compliance Basis:

Fire compartment 2-SB-9 consists of Battery Room 2-4 located within the Service Building Emergency Switchgear Room fire compartment 2-SB-2. The fire barriers associated with this compartment are 3 hr fire rated. The concrete walls are 12 inch thick. The ceiling is concrete slab 9 inches thick. The floor is concrete on grade.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

- None

References

- 10080-RA-0001C, Sht. 1, Rev. 10, "Floor Plan - Service Building"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- NUREG 1057, Supp 3 11/86, "NRC SER - NUREG 1057, Supp No. 3 dated November 1986"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"
- NUREG 1057, Supp 5 5/87, "NRC SER - NUREG 1057, Supp No. 5 dated May 1987"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements — **Beaver Valley Unit 2**

Fire Compartment - 2-SB-9

Compliance Statement: Complies by Previous Approval

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.3 - Fire barrier penetrations

Compliance Basis:

Fire Dampers:

The SSERs indicated the installation of two 1 1/2 hr fire dampers in series in lieu of one 3 hr fire damper was used in various ducts. The SSERs concluded the dampers in series are an acceptable deviation.

Fire Doors:

SSERs stated there are number of security modifications that have been made to fire doors. Modifications were made in accordance with recommendations supplied by UL. The SSERs concluded the security modifications are an acceptable deviation.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

- None

References

- 1/2-ADM-1900, Rev. 28, "Fire Protection Program"
- 1/2PMP-75VS-VNT-4M, Rev. 13, "Ventilation System Fire Damper Maintenance and Trip Check"
- 10080-RB-0034A, Rev. 9, "Ventilation Service Building"
- 10080-RB-0035A, Sht. 1, Rev. 10, "Ventilation Service Building"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- NUREG 1057, Supp 5 5/87, "NRC SER - NUREG 1057, Supp No. 5 dated May 1987"
- 1/2PMP-33FP-FIRE DOORS-1M, Rev. 9, "Periodic Inspection of Fire Doors"
- 10080-RA-0006A, Sht. 1, Rev. 30, "Door Schedule"
- 10080-RB-0034C, Rev. 3, "Ventilation Service Building"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- NUREG 1057, Supp 3 11/86, "NRC SER - NUREG 1057, Supp No. 3 dated November 1986"

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet

Fire Protection Features

Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-SB-9

Compliance Statement: Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.4 - Through Penetration Fire Stops

Compliance Basis:

Complies with use of EEEE

The penetration seal designs are based on typical tested and approved fire seals. BV2 contains some penetrations between fire areas where it is often impossible to achieve an exact duplication of the specific test configuration of penetration seal designs for fire protection requirements. GL 86-10, evaluations have been completed and documented to justify penetration seals installed to untested seal designs.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

- None

References

- 1/2-PIP-M16, Rev. 9, "Penetration Seals"
- 2601.337-844-083, Rev. B, "Internal Conduit Fire Seals EC-1 thru 6"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- 10080-DMC-0054, Rev. 2, "Untested Seal Design"
- 2BVS-0844, Rev. 0, "Index Only Fire Stops and Seals"
- B-240, Rev. 0, "Fire Seal Eval Untested Design"

Open Items and VFDRs

-None

Fire Compartment - 2-SG-1N

Compliance Statement: Complies
Complies with Clarification

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Detection

SubSection: 3.8.2 - Detection

Compliance Basis:

Fire Compartment 2-SG-1N consists of the North Safeguards Area, elevations 718'-6" and 737'-6". The compartment is provided with ionization smoke detectors. The following critical attributes of the smoke detection system were evaluated to ensure functionality and reliability in respect to NFPA 72E-1978 and NFPA 72D-1975.

Complies

Items 1 through 10 comply with the exception of item 3.

1. Confirmed detectors are mounted to the ceiling.

2. Confirmed there are no significant platforms in the area.

4. Confirmed detectors are tested on an annual basis by procedure.

5. Confirmed there is one duct mounted detector for the leak collection filters.

6. Confirmed there are no detectors used for releasing fire doors.

7. Confirmed detectors are tested annually by procedure. The test verifies a control room alarm is received for each smoke detector; the supervised circuits generate an alarm while in the trouble condition, audible alarms actuate and detectors are operable thru the use of a test gas and trouble alarm upon fault in the detector circuit.

8. Confirmed that all circuits required for fire detection alarm are electrically supervised with trouble alarms back to main control room. Circuit supervision is verified operable by removing a detector from the circuit or lifting leads. Fire and trouble signals terminate in the Control Room.

9. Confirmed that all control panels are provided with primary and secondary power sources. The power supplies for the main fire detection and alarm panel in the control room are described in the NFPA 805 Chapter 3 record 3.8.1.

10. Confirmed procedure lists the minimum operable detectors for SG-1. The procedure also requires a compensatory measure when two adjacent detectors are inoperable and for less than the required number of detectors operable.

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements — **Beaver Valley Unit 2**

Complies with Clarification

3. The recirculation spray pump cubicle and hydrogen recombiner cubicle on elevation 737' 6" do not contain or present a fire hazard. For this reason fire detection was not provided in this portion of 2-SG-1N. The PRA for this Fire Compartment also used the partial area coverage as installed. The FRE concluded that partial detection in this area along with the DFM and PRA that the current fire detection system coverage is acceptable.

Licensing Actions

- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)

Supporting EEEEs

TER-012608 R0

References

- 1/2-ADM-1900, Rev. 28, "Fire Protection Program"
- 10080-RC-0032B, Rev. 7, "Safeguards Area Roof"
- 10080-TLD-033D-026-01, Rev. 4, "FD Zone 26 SG Bldg SD"
- 10080-TLD-033D-028-01, Rev. 4, "FD Zone 28 SG Bldg SD"
- 2OST-33.16E, Rev. 0, "EARLY WARNING SMOKE DET. INSTR. TEST SERVICE BLDG AND SAFEGUARDS"
- B-221, Rev. 0, "Evaluation of Detector Locations for Early Warning FD System"
- 10080-RC-0032A, Rev. 11, "Structural Steel Safeguards"
- 10080-RS-0832A, Rev. 1, "Structural Steel Safeguards"
- 10080-TLD-033D-026-02, Rev. 4, "FD Zone 26 SG Bldg SD"
- 10080-TLD-033D-028-02, Rev. 4, "FD Zone 28 SG Bldg SD"
- 85/10, "BV 2 UFSAR SER"

Open Items and VFDRs

-None

Fire Compartment - 2-SG-1N

Compliance Statement: Complies
Complies by Previous Approval
Will Comply with the Use of Commitment

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Water-Based Suppression

SubSection: 3.9.1 - NFPA Standards

Compliance Basis:

Complies

2. The water spray density for this system (0.25gpm) meets the minimal acceptable criteria for this hazard per the design standard.

3. Piping and fittings are designed for a working pressure of 175 psig cold water working pressure.

4. Piping and fittings are galvanized or otherwise protected from corrosion.

6. A mainline pipe strainer is installed on the water-based suppression line for this location.

7. Nozzles visually verified during walkdown to be standard ½ inch orifice deluge nozzles.

8. Low fire severity of the area does not present a significant direct flame exposure to the gasketed fittings. Furthermore, once the system actuates, waterflow in pipes provides cooling to the gasketed fittings preventing burn, while active water-suppression of the hazard takes place.

10. Automatic detection equipment is electrically supervised to result in positive notification of an abnormal condition of any devices or equipment upon which the system actuation is dependent.

12. The compensatory measures established in procedure ½-ADM-1900 are appropriate for the level of importance of the system for this area.

Complies with use of Commitment

1. Review/confirm hydraulic calculations including discharge of all systems designed to operate simultaneously and with required fire hose streams.
- Hydraulic calculations for this system require additional verification. See Attachment S for details.

5. Review/confirm spray nozzles are of approved makes and types (para. 2041).
   - Additional documentation is needed to confirm the make and type of nozzles. See Attachment S for details.

9. The heat detection system is designed to cause actuation of the control valve within 30 seconds under the expected fire condition.
   - The procedures will be updated to include verification of heat detection activation time in accordance with NFPA 15. See Attachment S for details.

Complies by Previous Approval
11. The primary power supply for the DC panels comes from the normal offsite power supply with the secondary supply being a non-safety diesel generator. The power supply arrangement was reviewed and found acceptable by the NRC in SER dated 10-1985.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 1/2-PIP-M14, Rev. 10, "Pipe Classes For Use On BV-1 And BV-2"
- 10080-TLD-033C-022-01, Rev. 3, "TLD FP AFP 2FWE*P23B"
- 2BVS-173, Rev. 0, "SPRINKLER AND WATER SPRAY FIRE PROTECTION SYSTEMS"
- 2OST-33.13I, Rev. 11, "Water Suppression System Heat Detector Test"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"
- 10080-RM-0433-001A, Rev. 22, "Valve Oper. No. Diagram - Fire Prot Wtr Distribution Network"
- 2BVS-0914, Rev. 4, "Specification for Interior Fire Protection System"
- 2DBD-33B, Rev. 10, "Fire Protection System"
- 2OST-33.3A, Rev. 5, "FP System Supv Circuit Test"
- NUREG 1057 10/85, "NRC SER - NUREG 1057 dated October 1985"

Open Items and VFDRs

Item Number	BV2-1314	**Item Title:** BV2 Procedure Update 2OST-33.13I
Item Number	BV2-1369	**Item Title:** BV2 Hydraulic Calculations

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements — **Beaver Valley Unit 2**

Fire Compartment - 2-SG-1N

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Water-Based Suppression

SubSection: 3.9.2 - Water Flow Alarm

Compliance Basis:

The water-spray system for this area is provided with water flow alarm device on its deluge valve that sends its alarm signal to the local and main control room alarm panels.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-E-10L, Rev. 21, "Window Arrangement - Annunciator A10"
- 10080-RM-0433-001A, Rev. 22, "Valve Oper. No. Diagram - Fire Prot Wtr Distribution Network"
- 10080-TLD-033C-022-01, Rev. 3, "TLD FP AFP 2FWE*P23B"
- 10080-TLD-033C-069-01, Rev. 2, "TLD FP AFW 2FWE*P23B"
- 10080-TLD-033C-070-01, Rev. 2, "TLD FP AFW 2FWE*P23B"
- 2DBD-33B, Rev. 10, "Fire Protection System"
- 2OST-33.13I, Rev. 11, "Water Suppression System Heat Detector Test"
- 2OST-33.3A, Rev. 5, "FP System Supv Circuit Test"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- 10080-RB-0091C, Rev. 17, "Drawing"
- 10080-RM-0433-001B, Rev. 8, "Valve Oper. No. Diagram - Fire Protection Wtr - Misc Bldgs"
- 10080-TLD-033C-022-02, Rev. 3, "TLD FP AFW 2FWE*P23B"
- 10080-TLD-033C-069-02, Rev. 2, "TLD FP AFW 2FWE*P23B"
- 10080-TLD-033C-070-02, Rev. 2, "TLD-FP AFW 2FWE*P23B"
- 2OM-33.1.E, Rev. 10, "Specific Instrument and Control"
- 2OST-33.3, Rev. 15, "Fire Protection System Drain Test"
- 87-05-05, "BV2 SSER "
- E-11KY, Rev. 5, "Elementary Diagram - Miscellaneeous Circuits"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet

Fire Protection Features

Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-SG-1N

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Water-Based Suppression

SubSection: 3.9.3 - Suppression system annunciation

Compliance Basis:

Alarms associated with the deluge valve for this area annunciate in the control room.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-E-10L, Rev. 21, "Window Arrangement - Annunciator A10"
- 10080-RM-0433-001A, Rev. 22, "Valve Oper. No. Diagram - Fire Prot Wtr Distribution Network"
- 10080-TLD-033C-022-01, Rev. 3, "TLD FP AFP 2FWE*P23B"
- 10080-TLD-033C-069-01, Rev. 2, "TLD FP AFW 2FWE*P23B"
- 10080-TLD-033C-070-01, Rev. 2, "TLD FP AFW 2FWE*P23B"
- 2DBD-33B, Rev. 10, "Fire Protection System"
- 2OST-33.1, Rev. 21, "Fire Protection System Monthly Inspection"
- 2OST-33.3, Rev. 15, "Fire Protection System Drain Test"
- 87-05-05, "BV2 SSER "
- E-11KY, Rev. 5, "Elementary Diagram - Miscellaneeous Circuits"
- 10080-RB-0091C, Rev. 17, "Drawing"
- 10080-RM-0433-001B, Rev. 8, "Valve Oper. No. Diagram - Fire Protection Wtr - Misc Bldgs"
- 10080-TLD-033C-022-02, Rev. 3, "TLD FP AFW 2FWE*P23B"
- 10080-TLD-033C-069-02, Rev. 2, "TLD FP AFW 2FWE*P23B"
- 10080-TLD-033C-070-02, Rev. 2, "TLD-FP AFW 2FWE*P23B"
- 2OM-33.1.E, Rev. 10, "Specific Instrument and Control"
- 2OST-33.13I, Rev. 11, "Water Suppression System Heat Detector Test"
- 2OST-33.3A, Rev. 5, "FP System Supv Circuit Test"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-SG-1N

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Water-Based Suppression

SubSection: 3.9.5 - OS&Y gate valve

Compliance Basis:

An OS&Y gate valve provides shutoff for the water spray system for this compartment.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-E-10L, Rev. 21, "Window Arrangement - Annunciator A10"
- 10080-RM-0433-001A, Rev. 22, "Valve Oper. No. Diagram - Fire Prot Wtr Distribution Network"
- 10080-TLD-033C-022-01, Rev. 3, "TLD FP AFP 2FWE*P23B"
- 10080-TLD-033C-069-01, Rev. 2, "TLD FP AFW 2FWE*P23B"
- 10080-TLD-033C-070-01, Rev. 2, "TLD FP AFW 2FWE*P23B"
- 2DBD-33B, Rev. 10, "Fire Protection System"
- 2OST-33.1, Rev. 21, "Fire Protection System Monthly Inspection"
- 2OST-33.3A, Rev. 5, "FP System Supv Circuit Test"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- 10080-RB-0091C, Rev. 17, "Drawing"
- 10080-RM-0433-001B, Rev. 8, "Valve Oper. No. Diagram - Fire Protection Wtr - Misc Bldgs"
- 10080-TLD-033C-022-02, Rev. 3, "TLD FP AFW 2FWE*P23B"
- 10080-TLD-033C-069-02, Rev. 2, "TLD FP AFW 2FWE*P23B"
- 10080-TLD-033C-070-02, Rev. 2, "TLD-FP AFW 2FWE*P23B"
- 2OM-33.1.E, Rev. 10, "Specific Instrument and Control"
- 2OST-33.13I, Rev. 11, "Water Suppression System Heat Detector Test"
- 87-05-05, "BV2 SSER "
- E-11KY, Rev. 5, "Elementary Diagram - Miscellaneeous Circuits"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements — **Beaver Valley Unit 2**

Fire Compartment - 2-SG-1N

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Water-Based Suppression

SubSection: 3.9.6 - Valve Performance

Compliance Basis:

The fire protection control valves provided for the two water spray systems in this compartment are supervised by electrical position monitoring switches.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-E-10L, Rev. 21, "Window Arrangement - Annunciator A10"
- 10080-RM-0433-001A, Rev. 22, "Valve Oper. No. Diagram - Fire Prot Wtr Distribution Network"
- *10080-TLD-033C-022-01*, Rev. 3, "TLD FP AFP 2FWE*P23B"
- 10080-TLD-033C-069-01, Rev. 2, "TLD FP AFW 2FWE*P23B"
- 10080-TLD-033C-070-01, Rev. 2, "TLD FP AFW 2FWE*P23B"
- 2DBD-33B, Rev. 10, "Fire Protection System"
- 2OST-33.1, Rev. 21, "Fire Protection System Monthly Inspection"
- 2OST-33.3A, Rev. 5, "FP System Supv Circuit Test"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- 10080-RB-0091C, Rev. 17, "Drawing"
- 10080-RM-0433-001B, Rev. 8, "Valve Oper. No. Diagram - Fire Protection Wtr - Misc Bldgs"
- *10080-TLD-033C-022-02*, Rev. 3, "TLD FP AFW 2FWE*P23B"
- 10080-TLD-033C-069-02, Rev. 2, "TLD FP AFW 2FWE*P23B"
- 10080-TLD-033C-070-02, Rev. 2, "TLD-FP AFW 2FWE*P23B"
- 2OM-33.1.E, Rev. 10, "Specific Instrument and Control"
- 2OST-33.13I, Rev. 11, "Water Suppression System Heat Detector Test"
- 87-05-05, "BV2 SSER "
- E-11KY, Rev. 5, "Elementary Diagram - Miscellaneeous Circuits"

Open Items and VFDRs

-None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-SG-1N

Compliance Statement: Complies
Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.2 - Fire barriers

Compliance Basis:

Complies

The barriers separating 2-SG-1N from adjacent fire compartments are 3-hour fire rated except as discussed in the following.

The barriers are inspected periodically per procedures.

Complies with Use of EEEE

North Safeguards area (2-SG-1N) and the South Safeguards (2-SG-1S) are separated by a 3-hour fire rated barrier above elevation 718'-6". The barrier from elevation 690'-11" up to elevation 697'-6" is considered one common area due to the personnel manway opening in the common wall separating 2-SG-1N and 2-SG-1S. Evaluation DMC-0112 Addendum 2 determined the adequacy of the fire area boundary separating 2-SG-1N and 2-SG-1S with respect to the personnel manway opening on elevation 690'-11", the configurations of the penetrations, and hatches in the pump cubicles are adequate for the hazard.

Evaluation TER-012608 provides unique identifiers to seismic shake space seals that require inspection, and provides a basis for excluding, where applicable, those shake space seal locations from having a fire rated seal. The review focuses on the evaluation performed to exclude certain shake space seals from having a fire rated seal.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

10080-DMC-0112
10080-DMC-0112 Rev.0 A2
TER-012608 R0

References

- 10080-RM-0301A, Rev. 6, "Hazard Boundaries"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- FPSSR, Add. 37, "BVPS-2 Fire Protection Safe Shutdown Report"

Open Items and VFDRs

-None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-SG-1N

Compliance Statement: Complies by Previous Approval

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.3 - Fire barrier penetrations

Compliance Basis:

Fire Dampers:

All dampers have a 1 ½ hour fire rating and are installed in pairs. The SSERs concluded the dampers in series are an acceptable deviation.

Fire Doors:
All doors are 3 hr fire rated per drawings. Doors are inspected by procedure. The SSERs concluded security modifications to fire doors are an acceptable deviation.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

- None

References

- 1/2PMP-33FP-FIRE DOORS-1M, Rev. 9, "Periodic Inspection of Fire Doors"
- 10080-RA-0006B, Rev. 21, "Door Schedule & Details"
- 10080-RB-0014A, Rev. 15, "Vent Arrangement Primary Plant"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"
- 1/2PMP-75VS-VNT-4M, Rev. 13, "Ventilation System Fire Damper Maintenance and Trip Check"
- 10080-RA-0010K, Rev. 6, "Safe Guards Bldg & Gaseous Waste Stor. Vault Stairs & Dets"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements — **Beaver Valley Unit 2**

Fire Compartment - 2-SG-1N

Compliance Statement: Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.4 - Through Penetration Fire Stops

Compliance Basis:

Complies with use of Evaluation

Per GL 86-10, evaluations have been completed and documented to justify penetration seals installed to untested seal designs. The seal design is based on typical tested and approved fire seals. BV2 contains penetrations between fire areas where it is often impossible to achieve an exact duplication of the specific test configuration of penetration seal designs for fire protection requirements.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

10080-DMC-0054 Rev.2 A4

References

- 1/2-PIP-M16, Rev. 9, "Penetration Seals"
- 2601.337-844-083, Rev. B, "Internal Conduit Fire Seals EC-1 thru 6"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- 10080-DMC-0054, Rev. 2, "Untested Seal Design"
- 2BVS-0844, Rev. 0, "Index Only Fire Stops and Seals"
- B-240, Rev. 0, "Fire Seal Eval Untested Design"

Open Items and VFDRs

-None

Fire Compartment - 2-SG-1S

Compliance Statement: Complies
Complies with Clarification

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Detection

SubSection: 3.8.2 - Detection

Compliance Basis:

This discussion will focus on the critical attributes of the early warning detection system with reference to NFPA-72E, 1978 edition, and NFPA 72D, 1975 edition.

Items 1 through 10 comply with the exception of item 3.

1. Detectors are located on ceiling.

2. There are no significant platforms in the area.

4. Detectors are tested on an annual basis by procedure.

5. There is one duct mounted detector DI549 for the leak collection filters per NFPA 90A.

6. There are no detectors used for releasing fire doors.

7. Zone 27 and 29 ionization detectors detect smoke and send a signal to data gathering panel 2DGP-4 for annunciation in the main control room thru CPU-DELTA-1000. Detectors are tested annually by procedure. The test verifies a control room alarm is received for each smoke detector; the supervised circuits generate an alarm while in the trouble condition, audible alarms actuate and detectors are operable thru the use of a test gas and trouble alarm upon fault in the detector circuit.

8. Circuits required for fire detection alarm are electrically supervised with trouble alarms back to main control room. Circuit supervision is verified operable by removing a detector from the circuit or lifting leads. Fire and trouble signals are routed through DGP-4 before terminating in the Control Room.

9. Confirmed that all control panels are provided with primary and secondary power sources. The power supplies for the main fire detection and alarm panel in the control room are described in the NFPA 805 Chapter 3 record 3.8.1.

10. Procedures lists the minimum operable detectors for SG-1S. Zone 27 requires four out of 8 and zone 29 requires three out of 5 detectors to be operable. The procedure also requires a compensatory measure when two adjacent detectors are inoperable. For less than the required detectors operable the compensatory measure is to establish an hourly fire watch within one hour and restore to operable status within 14 days.

Complies with Clarification

3. The recirculation spray pump cubicle and hydrogen recombiner cubicle on elevation 737' 6" do not contain or present a fire hazard. For this reason fire detection was not provided in this portion of 2-SG-1S. The PRA for this Fire Compartment also used the partial area coverage as installed. The FRE concluded that partial detection in this area along with the DFM and PRA that the current fire detection system coverage is acceptable

Licensing Actions

- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)

Supporting EEEEs

TER-012608 R0

References

- 1/2-ADM-1900, Rev. 28, "Fire Protection Program"
- 10080-RC-0032B, Rev. 7, "Safeguards Area Roof"
- 10080-TLD-033D-027-01, Rev. 4, "FD Zone 27 SG Bldg SD"
- 10080-TLD-033D-029-01, Rev. 4, "FD Z one 29 SG Bldg SD"
- 2OST-33.16E, Rev. 0, "EARLY WARNING SMOKE DET. INSTR. TEST SERVICE BLDG AND SAFEGUARDS"
- B-221, Rev. 0, "Evaluation of Detector Locations for Early Warning FD System"
- 10080-RC-0032A, Rev. 11, "Structural Steel Safeguards"
- 10080-RS-0832A, Rev. 1, "Structural Steel Safeguards"
- 10080-TLD-033D-027-02, Rev. 4, "FD Zone 27 SG Bldg SD"
- 10080-TLD-033D-029-02, Rev. 4, "FD Zone 29 SG Bldg SD"
- 87-05-05, "BV2 SSER "

Open Items and VFDRs

-None

Fire Compartment - 2-SG-1S

Compliance Statement: Complies
Complies by Previous Approval
Will Comply with the Use of Commitment

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Water-Based Suppression

SubSection: 3.9.1 - NFPA Standards

Compliance Basis:

Complies

2. The water spray density for this system (0.25 gpm/ft2) meets the minimal acceptable criteria for this hazard per the design standard.

3. Piping and fittings are designed for a working pressure of 175 psig cold water working pressure.

4. Piping and fittings are galvanized or otherwise protected from corrosion.

6. A mainline pipe strainer is installed on the water-based suppression line for this location.

7. Nozzles visually verified during walkdown to be standard ½ inch orifice deluge nozzles.

8. Low fire severity of the area does not present a significant direct flame exposure to the gasketed fittings. Furthermore, once the system actuates, waterflow in pipes provides cooling to the gasketed fittings preventing burn, while active water-suppression of the hazard takes place.

10. Automatic detection equipment is electrically supervised to result in positive notification of an abnormal condition of any devices or equipment upon which the system actuation is dependent.

12. The compensatory measures established in procedure ½-ADM-1900 are appropriate for the level of importance of the system for this area.

Complies with use of Commitment

1. Review/confirm hydraulic calculations including discharge of all systems designed to operate simultaneously and with required fire hose streams.
   - Hydraulic calculations for this system require additional verification. See Attachment S for details.

5. Review/confirm spray nozzles are of approved makes and types (para. 2041).
   - Additional documentation is needed to confirm the make and type of nozzles. See Attachment S for details.

9. The heat detection system is designed to cause actuation of the control valve within 30 seconds under the expected fire condition.
   - The procedures will be updated to include heat detection activation time in accordance with NFPA 15. See Attachment S for details.

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Complies by Previous Approval
11. The primary power supply for the DC panels comes from the normal offsite power supply with the secondary supply being a non-safety diesel generator. The power supply arrangement was reviewed and found acceptable by the NRC in SER dated 10-1985.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 1/2-PIP-M14, Rev. 10, "Pipe Classes For Use On BV-1 And BV-2"
- 10080-TLD-033C-020-01, Rev. 4, "TLD AFW PP P22 DV"
- 10080-TLD-033C-067-01, Rev. 2, "TLD AFW PP P23A"
- 2BVS-0914, Rev. 4, "Specification for Interior Fire Protection System"
- 2BVS-173, Rev. 0, "SPRINKLER AND WATER SPRAY FIRE PROTECTION SYSTEMS"
- 2DBD-33B, Rev. 10, "Fire Protection System"
- 2OST-33.13I, Rev. 11, "Water Suppression System Heat Detector Test"
- 2OST-33.3A, Rev. 5, "FP System Supv Circuit Test"
- NUREG 1057 10/85, "NRC SER - NUREG 1057 dated October 1985"

Open Items and VFDRs

Item Number	BV2-1314	**Item Title:** BV2 Procedure Update 2OST-33.13I
Item Number	BV2-1369	**Item Title:** BV2 Hydraulic Calculations

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-SG-1S

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Water-Based Suppression

SubSection: 3.9.2 - Water Flow Alarm

Compliance Basis:

The water-spray system for this area is provided with water flow alarm device on its deluge valve that sends its alarm signal to the local and main control room alarm panels.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-E-10L, Rev. 21, "Window Arrangement - Annunciator A10"
- 10080-RM-0433-001A, Rev. 22, "Valve Oper. No. Diagram - Fire Prot Wtr Distribution Network"
- 10080-RM-0433-001B, Rev. 8, "Valve Oper. No. Diagram - Fire Protection Wtr - Misc Bldgs"
- 10080-TLD-033C-020-01, Rev. 4, "TLD AFW PP P22 DV"
- 10080-TLD-033C-020-02, Rev. 4, "TLD AFW PP P22 DV"
- 10080-TLD-033C-021-01, Rev. 3, "TLD AFW PP P23A DV"
- 10080-TLD-033C-065-01, Rev. 2, "TLD AFW PP P22 DV"
- 10080-TLD-033C-065-02, Rev. 2, "TLD AFW PP P22 DV"
- 10080-TLD-033C-066-01, Rev. 3, "TLD AFW PP P22 FD"
- 10080-TLD-033C-066-02, Rev. 3, "TLD AFW PP P22"
- 10080-TLD-033C-067-01, Rev. 2, "TLD AFW PP P23A"
- 10080-TLD-033C-067-02, Rev. 2, "TLD AFW PP P23A"
- 10080-TLD-033C-068-01, Rev. 2, "TLD AFW PP P23A"
- 10080-TLD-033C-068-02, Rev. 2, "TLD AFW PP P23A"
- 2DBD-33B, Rev. 10, "Fire Protection System"
- 2OM-33.1.E, Rev. 10, "Specific Instrument and Control"
- 2OST-33.1, Rev. 21, "Fire Protection System Monthly Inspection"
- 2OST-33.13I, Rev. 11, "Water Suppression System Heat Detector Test"
- 2OST-33.3A, Rev. 5, "FP System Supv Circuit Test"
- 87-05-05, "BV2 SSER "
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- E-11KW, Rev. 5, "Elementary Diagram - Miscellaneous Circuits"
- E-11KX, Rev. 5, "Elementary Diagram - Miscellaneous Circuits"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-SG-1S

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Water-Based Suppression

SubSection: 3.9.3 - Suppression system annunciation

Compliance Basis:

Alarms associated with the deluge valve for this area annunciate in the control room.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-E-10L, Rev. 21, "Window Arrangement - Annunciator A10"
- 10080-RM-0433-001A, Rev. 22, "Valve Oper. No. Diagram - Fire Prot Wtr Distribution Network"
- 10080-RM-0433-001B, Rev. 8, "Valve Oper. No. Diagram - Fire Protection Wtr - Misc Bldgs"
- 10080-TLD-033C-020-01, Rev. 4, "TLD AFW PP P22 DV"
- 10080-TLD-033C-020-02, Rev. 4, "TLD AFW PP P22 DV"
- 10080-TLD-033C-021-01, Rev. 3, "TLD AFW PP P23A DV"
- 10080-TLD-033C-065-01, Rev. 2, "TLD AFW PP P22 DV"
- 10080-TLD-033C-065-02, Rev. 2, "TLD AFW PP P22 DV"
- 10080-TLD-033C-066-01, Rev. 3, "TLD AFW PP P22 FD"
- 10080-TLD-033C-066-02, Rev. 3, "TLD AFW PP P22"
- 10080-TLD-033C-067-01, Rev. 2, "TLD AFW PP P23A"
- 10080-TLD-033C-067-02, Rev. 2, "TLD AFW PP P23A"
- 10080-TLD-033C-068-01, Rev. 2, "TLD AFW PP P23A"
- 10080-TLD-033C-068-02, Rev. 2, "TLD AFW PP P23A"
- 2DBD-33B, Rev. 10, "Fire Protection System"
- 2OM-33.1.E, Rev. 10, "Specific Instrument and Control"
- 2OST-33.1, Rev. 21, "Fire Protection System Monthly Inspection"
- 2OST-33.13I, Rev. 11, "Water Suppression System Heat Detector Test"
- 2OST-33.3A, Rev. 5, "FP System Supv Circuit Test"
- 87-05-05, "BV2 SSER "
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- E-11KW, Rev. 5, "Elementary Diagram - Miscellaneous Circuits"
- E-11KX, Rev. 5, "Elementary Diagram - Miscellaneous Circuits"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements — **Beaver Valley Unit 2**

Fire Compartment - 2-SG-1S

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Water-Based Suppression

SubSection: 3.9.5 - OS&Y gate valve

Compliance Basis:

An OS&Y gate valve provides shutoff for the water spray system for this compartment.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-RM-0433-001A, Rev. 22, "Valve Oper. No. Diagram - Fire Prot Wtr Distribution Network"
- 2OST-33.13I, Rev. 11, "Water Suppression System Heat Detector Test"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements — **Beaver Valley Unit 2**

Fire Compartment - 2-SG-1S

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Water-Based Suppression

SubSection: *3.9.6 - Valve Performance*

Compliance Basis:

The fire protection control valves provided for the two water spray systems in this fire compartment are supervised by electrical position monitoring switches.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-E-10L, Rev. 21, "Window Arrangement - Annunciator A10"
- 10080-RM-0433-001A, Rev. 22, "Valve Oper. No. Diagram - Fire Prot Wtr Distribution Network"
- 10080-RM-0433-001B, Rev. 8, "Valve Oper. No. Diagram - Fire Protection Wtr - Misc Bldgs"
- 10080-TLD-033C-020-01, Rev. 4, "TLD AFW PP P22 DV"
- 10080-TLD-033C-020-02, Rev. 4, "TLD AFW PP P22 DV"
- 10080-TLD-033C-021-01, Rev. 3, "TLD AFW PP P23A DV"
- 10080-TLD-033C-065-01, Rev. 2, "TLD AFW PP P22 DV"
- 10080-TLD-033C-065-02, Rev. 2, "TLD AFW PP P22 DV"
- 10080-TLD-033C-066-01, Rev. 3, "TLD AFW PP P22 FD"
- 10080-TLD-033C-066-02, Rev. 3, "TLD AFW PP P22"
- 10080-TLD-033C-067-01, Rev. 2, "TLD AFW PP P23A"
- 10080-TLD-033C-067-02, Rev. 2, "TLD AFW PP P23A"
- 10080-TLD-033C-068-01, Rev. 2, "TLD AFW PP P23A"
- 10080-TLD-033C-068-02, Rev. 2, "TLD AFW PP P23A"
- 2DBD-33B, Rev. 10, "Fire Protection System"
- 2OM-33.1.E, Rev. 10, "Specific Instrument and Control"
- 2OST-33.1, Rev. 21, "Fire Protection System Monthly Inspection"
- 2OST-33.13I, Rev. 11, "Water Suppression System Heat Detector Test"
- 2OST-33.3A, Rev. 5, "FP System Supv Circuit Test"
- 87-05-05, "BV2 SSER "
- E-11KW, Rev. 5, "Elementary Diagram - Miscellaneous Circuits"
- E-11KX, Rev. 5, "Elementary Diagram - Miscellaneous Circuits"

Open Items and VFDRs

-None

Fire Compartment - 2-SG-1S

Compliance Statement: Complies
Complies by Previous Approval
Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.2 - Fire barriers

Compliance Basis:

Complies

The barriers separating 2-SG-1S from adjacent fire compartments are 3-hour fire rated except as discussed in the following.

The barriers are inspected periodically per procedures.

Complies by Prior Approval

Ductwork is wrapped with 1 hour fire wrap. The SSER concludes the fire wrap is an acceptable deviation.

Complies with use of EEEE

TER-012608 provides unique identifiers' to seismic shake space seals that require inspection, and provides a basis for excluding, where applicable, those shake space seal locations from having a fire rated seal. This review focuses on the evaluation performed to exclude certain shake space seals from having a fire rated seal.

10080-DEC-0184 evaluated 3M Interam E-50 series blanket assemblies providing a one hour fire resistance for the ductwork and a 2 hour fire resistance for protection of the 1-1/2 hour fire dampers. The configurations were determined to be bound by fire tests to provide the stated fire resistance.

North Safeguards area (2-SG-1N) and the South Safeguards (2-SG-1S) are separated by a 3-hour fire rated barrier above elevation 718'-6". The barrier from elevation 690'-11" up to elevation 697'-6" is considered one common area due to the personnel manway opening in the common wall separating 2-SG-1N and 2-SG-1S. Evaluation DMC-0112 Addendum 2 determined the adequacy of the fire area boundary separating 2-SG-1N and 2-SG-1S with respect to the personnel manway opening on elevation 690'-11", the penetrations, and hatches in the pump cubicles are adequate for the hazard.

An engineering evaluation, FPPCE 12-100, determined that the configuration of the ductwork and fire wrap associated with 1 ½ hour fire dampers 2HVS*DMPF211 and 2HVS*DMPF212, installed in series between 2-SG-1S and 2-PT-1, is adequate for the hazard.

Licensing Actions

Supporting EEEEs

10080-DEC-0184 R1 A0

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements

Beaver Valley Unit 2

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

10080-DMC-0112

10080-DMC-0112 Rev.0 A2

FPPCE 12-100 Rev.0

TER-012608 R0

References

- 10080-RM-0301A, Rev. 6, "Hazard Boundaries"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- NUREG 1057, Supp 3 11/86, "NRC SER - NUREG 1057, Supp No. 3 dated November 1986"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"

Open Items and VFDRs

-None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements

Beaver Valley Unit 2

Fire Compartment - 2-SG-1S

Compliance Statement: Complies by Previous Approval

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.3 - Fire barrier penetrations

Compliance Basis:

Fire Dampers:

The SSERs indicated the installation of two 1 1/2 hr. fire dampers in series in lieu of one 3 hr. fire damper was used in various ducts. The SSERs concluded the dampers in series are an acceptable deviation.

Fire Doors:

All fire doors have a 3 hr fire rating and are inspected by procedure. The SSERs conclude security modifcations are acceptable deviations.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

- None

References

- 1/2-ADM-1900, Rev. 28, "Fire Protection Program"
- 1/2PMP-75VS-VNT-4M, Rev. 13, "Ventilation System Fire Damper Maintenance and Trip Check"
- 10080-RA-0010K, Rev. 6, "Safe Guards Bldg & Gaseous Waste Stor. Vault Stairs & Dets"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- NUREG 1057, Supp 3 11/86, "NRC SER - NUREG 1057, Supp No. 3 dated November 1986"
- 1/2PMP-33FP-FIRE DOORS-1M, Rev. 9, "Periodic Inspection of Fire Doors"
- 10080-RA-0006B, Rev. 21, "Door Schedule & Details"
- 10080-RB-0014A, Rev. 15, "Vent Arrangement Primary Plant"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements — **Beaver Valley Unit 2**

Fire Compartment - 2-SG-1S

Compliance Statement: Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.4 - Through Penetration Fire Stops

Compliance Basis:

Complies with use of Evaluation

Per GL 86-10, evaluations have been completed and documented to justify penetration seals installed to untested seal designs. The seal design is based on typical tested and approved fire seals. BV2 contains penetrations between fire areas where it is often impossible to achieve an exact duplication of the specific test configuration of penetration seal designs for fire protection requirements.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

10080-DMC-0054 Rev.2 A4

References

- 1/2-PIP-M16, Rev. 9, "Penetration Seals"
- 2601.337-844-083, Rev. B, "Internal Conduit Fire Seals EC-1 thru 6"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- 10080-DMC-0054, Rev. 2, "Untested Seal Design"
- 2BVS-0844, Rev. 0, "Index Only Fire Stops and Seals"
- B-240, Rev. 0, "Fire Seal Eval Untested Design"

Open Items and VFDRs

-None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-TB-1

Compliance Statement: Complies
Complies with Clarification
Will Comply with the Use of Commitment

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Water-Based Suppression

SubSection: 3.9.1 - NFPA Standards

Compliance Basis:

The turbine building mezzanine (under the operating deck) and basement (under the mezzanine floor) areas are protected by a partial area automatic, supervised wet pipe sprinkler system. The turbine oil reservoir is protected by a deluge water spray system.

Complies:

The functionality of both of the sprinkler systems is met by the following:

1. It is confirmed that the flow and density with hose streams volume meets the NFPA 13 code requirement.

2. Fire department connections are not required because reverse flow through the hydrant system can be used to back charge the suppression system.

3. The installation specification is compliant with NFPA 13.

4. The inspectors test connection has been confirmed.

5. Indicating type control valves are provided for the systems and are discussed in 1-TB-1 record 3.9.5.

6. Hangers/supports are shown on the sprinkler drawings.

7. The sprinkler heads temperature rating complies with the standard.

8. The sprinkler system protecting the mezzanine does not have any obstructions within the 18" minimum clearance.

9. The sprinkler system protecting the basement has baffles installed where required.

10. The sprinkler systems are provided with water flow alarm devices that alarm locally and send signals to the main control room annunciator panel. Discussed in 1-TB-1 record 3.9.2.

11. The alarms for the sprinkler systems annunciate to fire alarm panel located in the Control Room and on the annunciator windows in the Control Room. Discussed in 1-TB-1 record 3.9.3.

12. The sprinklers are installed an acceptable distance from the ceiling.

14. The sprinkler system protecting the mezzanine has its sprinkler deflectors positioned correctly.

15. There were no visible return bends.

16. Because this is not a pre-action system, review/confirmation of the supervisory air for the piping and the supervisory alarm to the main control room is N/A.

17. It was confirmed that the control panel is provided with primary and secondary power. This is discussed in the Chapter 3 record 3.8.1.

18. The compensatory measure shown in 1/2-ADM-1900 is appropriate for the level of importance for this system.

The functionality of the turbine oil reservoir deluge spray system is met by the following:

1. It is confirmed that the flow and density of the system meet the NFPA 15 code requirement.

2. The water spray density is in accordance with NFPA 15 Chapter 4.

3. Piping and fittings are designed for 175 psig cold water working pressure.

4. The piping and fittings are painted to prevent corrosion.

5. The make and type of spray nozzles are approved.

6. A main pipeline strainer exists.

7. Individual nozzle strainers are not needed because nozzle passageways are larger than 1/8".

8. Rubber gasketed fittings are acceptable as installed.

10. It was confirmed the automatic detection equipment is electrically supervised.

11. It was confirmed that the control panel is provided with primary and secondary power. This is discussed in the Chapter 3 record 3.8.1.

12. The compensatory measure shown in 1/2-ADM-1900 for system impairment is appropriate for the level of importance for this system.

Will Comply with use of Commitment:

Sprinkler systems:

9. The sprinkler system protecting the mezzanine has one sprinkler that did not have a baffle. This sprinkler head will have a baffle (shield) reinstalled similar to the existing adjacent sprinkler heads.

Complies with Clarification:

8. The sprinkler system protecting the basement has three distinct locations where there are obstructions. The sprinklers were evaluated in a performance based analysis and were concluded to be acceptable.

13. There are several locations where spacing was challenged on both wet pipe sprinkler systems. The sprinklers were evaluated in a performance based analysis and were concluded to be acceptable.

14. The sprinkler system protecting the basement has minor beam obstructions under the 740'-0" elevation grating. The sprinklers were evaluated in a performance based analysis and were concluded to be acceptable.

Deluge water spray system:

9. The procedures for testing the turbine oil reservoir deluge water spray system will be revised to verify that actuation of the control valve occurs within 20 seconds of heat detector alarming.

Licensing Actions

- None

Supporting EEEEs

TER-010555 R0
TER-012608 R0

References

- 1/2-ADM-1900, Rev. 28, "Fire Protection Program"
- 10080-RB-0091A, Rev. 28, "Flow Diagram Fire Protection"
- 10080-RM-0433-001A, Rev. 22, "Valve Oper. No. Diagram - Fire Prot Wtr Distribution Network"
- 10080-RM-0433-1E, Rev. 7, "Drawing"
- 10080-TLD-033C-006-01, Rev. 5, "FPW TURB LUBE OIL RES"
- 10080-TLD-033C-015-01, Rev. 3, "FPW TB BELOW MEZZ"
- 2DBD-33B, Rev. 10, "Fire Protection System"
- 2OST-33.10A, Rev. 14, "MISC DELUGE VALVE TEST"
- 10080-B-438, Add. 1, "Turbine Building Under Operating Floor Sptinkler System, Conformance with NFPA-850"
- 10080-RE-0018FG, Rev. 8, "Wiring Dia Fire Prot Turb Lube Oil Res 2FPW-PNLHYDR-2"
- 10080-RM-0433-001B, Rev. 8, "Valve Oper. No. Diagram - Fire Protection Wtr - Misc Bldgs"
- 10080-RM-433-1F, Rev. 10, "Valve Oper No Diagram FP Water"
- 10080-TLD-033C-009-01, Rev. 3, "FPW TURB BELOW FLOOR"
- 2701.620-000-106, Rev. A, "Performance Based Evaluation of the Unit 2 Turbine Building Sprinkler Systems Credited by the Detailed Fire Model"
- 2OST-33.1, Rev. 21, "Fire Protection System Valve Inspection Test"
- 2OST-33.3, Rev. 15, "Fire Protection System Drain Test"

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements

Beaver Valley Unit 2

References

- 2OST-33.3A, Rev. 5, "FP System Supv Circuit Test"
- 8700-DMC-3079, Rev. 1, "Fire Pump Minimum Operating Curve"
- 87-05-05, "BV2 SSER "
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"

Open Items and VFDRs

Item Number	BV2-1314	**Item Title:** BV2 Procedure Update 2OST-33.13I
Item Number	BV2-1572	**Item Title:** Unit 2 Turbine Building Wet-Pipe Sprinkler Head Shield Reinstallation Modification

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-TB-1

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Water-Based Suppression

SubSection: 3.9.2 - Water Flow Alarm

Compliance Basis:

The turbine building is provided with a partial area automatic wet pipe sprinkler system protecting the mezzanine and basement of the turbine building. The turbine oil reservoir is provided with a deluge water spray system. Each system is provided with a water flow alarm.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-RM-0433-001A, Rev. 22, "Valve Oper. No. Diagram - Fire Prot Wtr Distribution Network"
- 10080-RM-0433-1E, Rev. 7, "Drawing"
- 2OM-33.1.E, Rev. 10, "Specific Instrument and Control"
- 2OST-33.3, Rev. 15, "Fire Protection System Drain Test"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements

Beaver Valley Unit 2

Fire Compartment - 2-TB-1

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Water-Based Suppression

SubSection: 3.9.3 - Suppression system annunciation

Compliance Basis:

The turbine building is provided with a partial area automatic wet pipe sprinkler system protecting the mezzanine and basement of the turbine building. The turbine oil reservoir is provided with a deluge water spray system. The alarms associated with these systems annunciate in the control room.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-RM-0433-001A, Rev. 22, "Valve Oper. No. Diagram - Fire Prot Wtr Distribution Network"
- 2OM-33.1.E, Rev. 10, "Specific Instrument and Control"
- 10080-RM-0433-1E, Rev. 7, "Drawing"
- 2OST-33.3, Rev. 15, "Fire Protection System Drain Test"

Open Items and VFDRs

-None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-TB-1

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Water-Based Suppression

SubSection: 3.9.5 - OS&Y gate valve

Compliance Basis:

The turbine building is provided with a partial area automatic wet pipe sprinkler system protecting the mezzanine and basement of the turbine building. The turbine oil reservoir is provided with a deluge water spray system. The supply piping to each system is provided with an OS&Y isolation valve. These valves are periodically inspected per procedures.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-RM-0433-001A, Rev. 22, "Valve Oper. No. Diagram - Fire Prot Wtr Distribution Network"
- 2OST-33.3, Rev. 15, "Fire Protection System Drain Test"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements

Beaver Valley Unit 2

Fire Compartment - 2-TB-1

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Water-Based Suppression

SubSection: 3.9.6 - Valve Performance

Compliance Basis:

The turbine building is provided with a partial area automatic wet pipe sprinkler system protecting the mezzanine and basement of the turbine building. The turbine oil reservoir is provided with a deluge water spray system. The controlling gate valve on the supply to each system meets the supervision requirements of NFPA 805 section 3.5.14.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-RM-0433-001A, Rev. 22, "Valve Oper. No. Diagram - Fire Prot Wtr Distribution Network"
- 2OM-33.1.E, Rev. 10, "Specific Instrument and Control"

Open Items and VFDRs

-None

Fire Compartment - 2-TB-1

Compliance Statement: Complies
Complies with Clarification
Complies with use of EEEE
Will Comply with the Use of Commitment

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.2 - Fire barriers

Compliance Basis:

Complies

Fire compartments 2-TB-1 has 3 hour rated fire barriers with adjacent compartments except as noted below.

The floor of 2-TB-2 separating 2-TB-1 and 2-TB-2 has exposed steel that is not fireproofed. The risk associated with these two compartments has been analyzed in the Fire PRA Task 5.11c Multi Compartment Analysis.

Complies with Clarification

Part of the fire barrier separation between compartments 2-TB-1, 2-TR-1, 2-TR-2, & 2-TR-3 uses a performance-based approach in accordance with NFPA 805 section 3.11.1. Adequacy of the separation between these compartments is documented in the Generic Fire Risk Evaluation which includes the associated compartments and in the multi-compartment analysis report.

Complies with use of EEEE

Evaluation TER-012608 concludes there is no impact to fire safe shutdown or alternate shutdown capability due to the increase in combustible loading from the combustible shake space filler material. Overall barrier integrity is not compromised by not providing and/or maintaining fire rated seals in certain seismic shake spaces located within BV2 fire compartments.

Complies with Commitment

The additional 2-TB-1 compartment perimeter fire barriers that are included in the PRA will be included in the revised inspection procedure per BV2-1576.

Licensing Actions

- None

Supporting EEEEs

TER-012608 R0

References

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

References

- 1/2-ADM-2094, Rev. 3, "FIRE PROTECTION SURVEILLANCE TESTS"
- 10080-RM-0301D, Rev. 15, "Hazard Boundaries El 760 7"
- 2701.620-000-022, Rev. C, "NFPA 805 Fire PRA Task 5.11c Multi Compartment Fire Analysis"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- 10080-RM-0301C, Rev. 15, "Hazard Boundaries EL 752 - 6"
- 10080-RM-0301E, Rev. 12, "Hazard Boundaries El. 774 - 7"
- 2701.620-000-083, Rev. A, "Fire Risk Evaluation for Generic Fire Compartments"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"

Open Items and VFDRs

Item Number BV2-1576 **Item Title:** Addition of Barriers to Surveillance Procedures

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-TB-1

Compliance Statement: Complies
Complies with Clarification
Will Comply with the Use of Commitment

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.3 - Fire barrier penetrations

Compliance Basis:

Complies

Most of the 2-TB-1 fire compartment doors are rated for 3 hours. The doors separating the 2-TB-2 fire compartment are rated for 1 1/2 hours. All doors are inspected periodically by procedure.

Complies with Clarification

The fire barrier separation between compartments 2-TB-1 & 2-TB-2 uses a performance-based approach in accordance with NFPA 805 section 3.11.1. Adequacy of the separation between these compartments is documented in the Generic Fire Risk Evaluation which includes the associated compartments and in the multi-compartment analysis report.

The Multi Compartment Fire Analysis for 2-TB-1 assumes an opening at the top to represent the roof exhaust fans. Also, an engineering evaluation FPPCE-13-073 includes the roof ventilation dampers to protect the structural integrity of the turbine building during a catastrophic turbine generator oil fire event.

Complies with Commitment

The additional 2-TB-1 compartment perimeter fire barriers that are included in the PRA will be included in the revised inspection procedure per BV2-1576.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 1/2PMP-33FP-FIRE DOORS-1M, Rev. 9, "Periodic Inspection of Fire Doors"
- 10080-B-085, Rev. 14, "Fire Hazard Analysis"
- 10080-RA-0006A, Sht. 1, Rev. 30, "Door Schedule"
- 10080-RB-0024A, Rev. 8, "Ventilation Arrangement Turbine Building"
- 1/2PMP-75VS-VNT-4M, Rev. 13, "Ventilation System Fire Damper Maintenance and Trip Check"
- 10080-RA-0001A, Rev. 8, "Roof Plan Turbine Building"
- 10080-RA-0009D, Rev. 9, "Miscellaneous Details"
- 10080-RB-0024B, Rev. 2, "Ventilation Arrangement turbine building"

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

References

- 2701.620-000-022, Rev. C, "NFPA 805 Fire PRA Task 5.11c Multi Compartment Fire Analysis"
- 2701.620-000-106, Rev. A, "Performance Based Evaluation of the Unit 2 Turbine Building Sprinkler Systems Credited by the Detailed Fire Model"
- 2OST-33.5, Rev. 18, "Fire Protection System Inspection Test"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"
- 2701.620-000-083, Rev. A, "Fire Risk Evaluation for Generic Fire Compartments"
- 2BVS-0155, Rev. 2, "Power Roof Ventilators"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"

Open Items and VFDRs

Item Number BV2-1576 **Item Title:** Addition of Barriers to Surveillance Procedures

VFDR Number BV2-1319 2-TB-2 Door & Damper Ratings

Fire barriers are not rated for a portion of this fire compartment. Performance-based methods allowed in NFPA 805 have been used to analze the existing barriers to ensure the adequacy for hazards in the area. This may challenge the Nuclear Safety Performance Criteria (NSPC) for Vital Auxiliaries. This is a separation issue.

Component ID:
NA

Disposition

Performance-based analysis has concluded the non-rated portion of the fire barriers is adequate to withstand the fire effects of the potential hazard. No further action required.

Implementation Documents

ARS-BV2-13-185 r0 Separation Between :

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements

Beaver Valley Unit 2

Fire Compartment - 2-TB-1

Compliance Statement: Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.4 - Through Penetration Fire Stops

Compliance Basis:

Complies with use of EEEE

The penetration seal designs are based on typical tested and approved fire seals. BV2 contains some penetrations between fire areas where it is often impossible to achieve an exact duplication of the specific test configuration of penetration seal designs for fire protection requirements. GL 86-10, evaluations have been completed and documented to justify penetration seals installed to untested seal designs.

Evaluation TER-010555 determines the adequacy of sealing two 5 inch conduits at each end where they terminate in the pull and terminal boxes. The configuration of the conduits is such that they are continuous through the barrier with their ends terminating inside a terminal box and a pull box.

Licensing Actions

- None

Supporting EEEEs

10080-DMC-0054 Rev.2 A4
TER-010555 R0

References

- 1/2-PIP-M16, Rev. 9, "Penetration Seals"
- 2601.337-844-083, Rev. B, "Internal Conduit Fire Seals EC-1 thru 6"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- 10080-DMC-0054, Rev. 2, "Untested Seal Design"
- 2BVS-0844, Rev. 0, "Index Only Fire Stops and Seals"
- B-240, Rev. 0, "Fire Seal Eval Untested Design"

Open Items and VFDRs

Item Number BV2-1576 **Item Title:** Addition of Barriers to Surveillance Procedures

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements — **Beaver Valley Unit 2**

Fire Compartment - 2-TB-2

Compliance Statement: Complies
Complies with Clarification

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.2 - Fire barriers

Compliance Basis:

Complies

The boundaries associated with 2-TB-2 are 2 hr. fire rated.

Complies with Clarification

The floor of 2-TB-2 separating 2-TB-1 and 2 has exposed steel that is not fireproofed. The non fire-rated separation (floor and ventilation chase walls) between compartments 2-TB-1 & 2-TB-2 uses a performance-based approach in accordance with NFPA 805 section 3.11.1. Adequacy of the separation between these compartments is documented in the Generic Fire Risk Evaluation which includes the associated compartments and in the multi-compartment analysis report.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-RA-0009D, Rev. 9, "Miscellaneous Details"
- 2701.620-000-022, Rev. C, "NFPA 805 Fire PRA Task 5.11c Multi Compartment Fire Analysis"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"
- 10080-RM-0301C, Rev. 15, "Hazard Boundaries EL 752 - 6"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"

Open Items and VFDRs

Item Number BV2-1232 **Item Title:** FPSSR & UFSAR Discrepancies

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements

Beaver Valley Unit 2

Fire Compartment - 2-TB-2

Compliance Statement: Complies with Clarification

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.3 - Fire barrier penetrations

Compliance Basis:

Part of the fire barrier separation between compartments 2-TB-1 & 2-TB-2 uses a performance-based approach in accordance with NFPA 805 section 3.11.1. Adequacy of the separation between these compartments is documented in the Generic Fire Risk Evaluation which includes the associated compartments and in the multi-compartment analysis report. The fire loading for both compartments is less than 1.5 hours.

Neither the FPSSR or the UFSAR indicate there are any deviations associated with fire compartment 2-TB-2 doors or dampers. The documents take credit for the building construction providing fire barriers in excess of the required 2-hour separation ratings determined by the fire loadings.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 1/2PMP-33FP-FIRE DOORS-1M, Rev. 9, "Periodic Inspection of Fire Doors"
- 10080-RA-0006A, Sht. 1, Rev. 30, "Door Schedule"
- 10080-RB-0024A, Rev. 8, "Ventilation Arrangement Turbine Building"
- 2701.620-000-022, Rev. C, "NFPA 805 Fire PRA Task 5.11c Multi Compartment Fire Analysis"
- 87-05-05, "BV2 SSER "
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"
- 1/2PMP-75VS-VNT-4M, Rev. 13, "Ventilation System Fire Damper Maintenance and Trip Check"
- 10080-RA-0009D, Rev. 9, "Miscellaneous Details"
- 10080-RB-0024B, Rev. 2, "Ventilation Arrangement turbine building"
- 2701.620-000-083, Rev. A, "Fire Risk Evaluation for Generic Fire Compartments"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"

Open Items and VFDRs

VFDR Number BV2-1319 2-TB-2 Door & Damper Ratings

Fire barriers are not rated for a portion of this fire compartment. Performance-based methods allowed in NFPA 805 have been used to analze the existing barriers to ensure the adequacy for hazards in the area. This may challenge the Nuclear Safety Performance Criteria (NSPC) for Vital Auxiliaries. This is a separation issue.

Component ID:
NA

Disposition
Performance-based analysis has concluded the non-rated portion of the fire barriers is adequate to withstand the fire effects of the potential hazard. No further action required.

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-TB-2

Compliance Statement: Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.4 - Through Penetration Fire Stops

Compliance Basis:

Complies with use of EEEE

The penetration seal designs are based on typical tested and approved fire seals. BV2 contains some penetrations between fire areas where it is often impossible to achieve an exact duplication of the specific test configuration of penetration seal designs for fire protection requirements. GL 86-10, evaluations have been completed and documented to justify penetration seals installed to untested seal designs.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 1/2-PIP-M16, Rev. 9, "Penetration Seals"
- 2601.337-844-083, Rev. B, "Internal Conduit Fire Seals EC-1 thru 6"
- 87-05-05, "BV2 SSER "
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- 10080-DMC-0054, Rev. 2, "Untested Seal Design"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- B-240, Rev. 0, "Fire Seal Eval Untested Design"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet

Fire Protection Features

Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-TR-1

Compliance Statement: Complies by Previous Approval
Complies with Clarification

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.2 - Fire barriers

Compliance Basis:

Complies by Previous Approval

Fire barriers for 2-TR-1 consist of 12 inches reinforced concrete. This depth of concrete is in excess of that required for a three hour fire rated barrier.

Complies by Clarification

Part of the fire barrier separation between compartments 2-TR-1 & 2-TB-1 *uses a performance-based approach in accordance with* NFPA 805 *section* 3.11.1. Adequacy of the separation between these compartments is documented in the Generic Fire Risk Evaluation which includes the associated compartments (VTI# 2701.620-000-083) and in the multi-compartment analysis report (VTI #2701.620-000-022).

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-DEC-3560, Rev. 0, Add. 0, "Fire PRA Task 1 - Plant Boundary Definition and Partitioning"
- 10080-RE-0030A, Rev. 6, "Arrangement Main & Unit Sta Svce TRANS"
- 2701.620-000-083, Rev. A, "Fire Risk Evaluation for Generic Fire Compartments"
- 10080-RC-0021B, Rev. 0, "Transformer & Bus Duct supports"
- 2701.620-000-022, Rev. C, "NFPA 805 Fire PRA Task 5.11c Multi Compartment Fire Analysis"
- 85/10, "BV 2 UFSAR SER"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements — **Beaver Valley Unit 2**

Fire Compartment - 2-TR-1

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.3 - Fire barrier penetrations

Compliance Basis:

This area complies with NFPA 805 requirements because there are no doors, dampers or other mechanical fire rated assemblies in the fire barrier.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-DEC-3560, Rev. 0, Add. 0, "Fire PRA Task 1 - Plant Boundary Definition and Partitioning"
- 10080-RE-0030A, Rev. 6, "Arrangement Main & Unit Sta Svce TRANS"
- FPSSR, Add. 31, "BV2 Fire Protection Safe Shutdown Report"
- 10080-RC-0021B, Rev. 0, "Transformer & Bus Duct supports"
- 85/10, "BV 2 UFSAR SER"
- UFSAR, Rev. 17, "BV2 UFSAR"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-TR-1

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.4 - Through Penetration Fire Stops

Compliance Basis:

Fire barriers that are part of another fire compartment and provide separation from the transformers are addressed as part of that fire compartments discussion.
There are no penetrations in the fire barriers separating the transformers.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 85/10, "BV 2 UFSAR SER"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"

Open Items and VFDRs

-None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-TR-2

Compliance Statement: Complies by Previous Approval
Complies with Clarification

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.2 - Fire barriers

Compliance Basis:

Complies by Previous Approval

Transformers are separated by minimum three hour rated fire barriers. NRC has granted a deviation from Section C.5.a (14) of BTP CMEB 9.5-1 since the transformer is not located more than 50 feet from the Turbine Building.

Complies with Clarification

Part of the fire barrier separation between compartments 2-TR-2 & 2-TB-1 uses a performance-based approach in accordance with NFPA 805 section 3.11.1. Adequacy of the separation between these compartments is documented in the Generic Fire Risk Evaluation which includes the associated compartments (VTI# 2701.620-000-083) and in the multi-compartment analysis report (VTI #2701.620-000-022).

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-DEC-3560, Rev. 0, Add. 0, "Fire PRA Task 1 - Plant Boundary Definition and Partitioning"
- 10080-RE-0030A, Rev. 6, "Arrangement Main & Unit Sta Svce TRANS"
- 2701.620-000-083, Rev. A, "Fire Risk Evaluation for Generic Fire Compartments"
- 10080-RC-0021B, Rev. 0, "Transformer & Bus Duct supports"
- 2701.620-000-022, Rev. C, "NFPA 805 Fire PRA Task 5.11c Multi Compartment Fire Analysis"
- 85/10, "BV 2 UFSAR SER"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet

Fire Protection Features

Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-TR-2

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.3 - Fire barrier penetrations

Compliance Basis:

This area complies with NFPA 805 requirements because there are no doors, dampers or other mechanical fire rated assemblies in the fire barrier.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-DEC-3560, Rev. 0, Add. 0, "Fire PRA Task 1 - Plant Boundary Definition and Partitioning"
- 10080-RE-0030A, Rev. 6, "Arrangement Main & Unit Sta Svce TRANS"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- 10080-RC-0021B, Rev. 0, "Transformer & Bus Duct supports"
- 85/10, "BV 2 UFSAR SER"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements — **Beaver Valley Unit 2**

Fire Compartment - 2-TR-2

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.4 - Through Penetration Fire Stops

Compliance Basis:

Fire barriers that are part of another fire compartment and provide separation from the transformers are addressed as part of that fire compartments discussion.
There are no penetrations in the fire barriers separating the transformers.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-DEC-3560, Rev. 0, Add. 0, "Fire PRA Task 1 - Plant Boundary Definition and Partitioning"
- 10080-RE-0030A, Rev. 6, "Arrangement Main & Unit Sta Svce TRANS"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"
- 10080-RC-0021B, Rev. 0, "Transformer & Bus Duct supports"
- 85/10, "BV 2 UFSAR SER"

Open Items and VFDRs

-None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements

Beaver Valley Unit 2

Fire Compartment - 2-TR-3

Compliance Statement: Complies by Previous Approval
Complies with Clarification

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.2 - Fire barriers

Compliance Basis:

Complies by Previous Approval

Transformers are separated by minimum three hour rated fire barriers.

NRC has granted a deviation from Section C.5.a (14) of BTP CMEB 9.5-1 since the transformer is not located more than 50 feet from the Turbine Building.

Complies with Clarification

Part of the fire barrier separation between compartments 2-TR-3 & 2-TB-1 uses a performance-based approach in accordance with NFPA 805 section 3.11.1. Adequacy of the separation between these compartments is documented in the Generic Fire Risk Evaluation which includes the associated compartments (VTI# 2701.620-000-083) and in the multi-compartment analysis report (VTI #2701.620-000-022).

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-DEC-3560, Rev. 0, Add. 0, "Fire PRA Task 1 - Plant Boundary Definition and Partitioning"
- 10080-RE-0030A, Rev. 6, "Arrangement Main & Unit Sta Svce TRANS"
- 2701.620-000-083, Rev. A, "Fire Risk Evaluation for Generic Fire Compartments"
- 10080-RC-0021B, Rev. 0, "Transformer & Bus Duct supports"
- 2701.620-000-022, Rev. C, "NFPA 805 Fire PRA Task 5.11c Multi Compartment Fire Analysis"
- 85/10, "BV 2 UFSAR SER"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-TR-3

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.3 - Fire barrier penetrations

Compliance Basis:

This area complies with NFPA 805 requirements because there are no doors, dampers or other mechanical fire rated assemblies in the fire barrier.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-DEC-3560, Rev. 0, Add. 0, "Fire PRA Task 1 - Plant Boundary Definition and Partitioning"
- 10080-RE-0030A, Rev. 6, "Arrangement Main & Unit Sta Svce TRANS"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"
- 10080-RC-0021B, Rev. 0, "Transformer & Bus Duct supports"
- 85/10, "BV 2 UFSAR SER"

Open Items and VFDRs

-None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements

Beaver Valley Unit 2

Fire Compartment - 2-TR-3

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.4 - Through Penetration Fire Stops

Compliance Basis:

Complies with NFPA 805 requirements.

Fire barriers that are part of another fire compartment and provide separation from the transformers are addressed as part of that fire compartments discussion. There are no penetrations in the fire barriers separating the transformers.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-DEC-3560, Rev. 0, Add. 0, "Fire PRA Task 1 - Plant Boundary Definition and Partitioning"
- 10080-RE-0030A, Rev. 6, "Arrangement Main & Unit Sta Svce TRANS"
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- 10080-RC-0021B, Rev. 0, "Transformer & Bus Duct supports"
- 85/10, "BV 2 UFSAR SER"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements — **Beaver Valley Unit 2**

Fire Compartment - 2-VP-1

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.2 - Fire barriers

Compliance Basis:

This compartment is a valve pit isolated on all sides by a minimum thickness of 12 inches of concrete. The barriers provide a 3 hour fire rated barrier. This area complies with NFPA 805 requirements.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-DEC-3560, Rev. 1, "Fire PRA Task 1 - Plant Boundary Definition and Partitioning"
- 10080-RC-0045E, Rev. 8, "Plans Sections & Details Lower Pump Cubicles R.C."
- FPSSR, Add. 37, "BVPS-2 Fire Protection Safe Shutdown Report"
- 10080-RC-0045D, Rev. 8, "Pipe Tranch - Sh. 4"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"

Open Items and VFDRs

-None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements

Beaver Valley Unit 2

Fire Compartment - 2-VP-1

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.3 - Fire barrier penetrations

Compliance Basis:

Fire Doors:

The only perimeter door to 2-VP-1 is an unrated external door that is considered acceptable due to the negligible fire loading.

Fire Dampers:

This fire compartment does not contain ventilation.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-DEC-3560, Rev. 1, "Fire PRA Task 1 - Plant Boundary Definition and Partitioning"
- 10080-RC-0045E, Rev. 8, "Plans Sections & Details Lower Pump Cubicles R.C."
- 10080-RC-0045D, Rev. 8, "Pipe Tranch - Sh. 4"

Open Items and VFDRs

-None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements

Beaver Valley Unit 2

Fire Compartment - 2-VP-1

Compliance Statement: Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.4 - Through Penetration Fire Stops

Compliance Basis:

Complies with use of EEEE

The penetration seal designs are based on typical tested and approved fire seals. BV2 contains some penetrations between fire areas where it is often impossible to achieve an exact duplication of the specific test configuration of penetration seal designs for fire protection requirements. GL 86-10, evaluations have been completed and documented to justify penetration seals installed to untested seal designs.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 1/2-PIP-M16, Rev. 9, "Penetration Seals"
- 10080-RE-0037R, Rev. 8, "CONCEALED CONDUITS AND SLEEVES VALVE PIT"
- 10080-RP-0068A, Rev. 14, "SLEEVE SCHEDULE"
- 2601.337-844-083, Rev. B, "Internal Conduit Fire Seals EC-1 thru 6"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- 10080-DMC-0054, Rev. 2, "Untested Seal Design"
- 10080-RE-0053H, Rev. 11, "CONDUIT PLAN VALVE PIT"
- 10080-RP-0068B, Rev. 12, "SLEEVE LOCATION"
- 2BVS-0844, Rev. 0, "Index Only Fire Stops and Seals"
- B-240, Rev. 0, "Fire Seal Eval Untested Design"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-VP-2

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.2 - Fire barriers

Compliance Basis:

This compartment is a valve pit isolated on all sides by a minimum thickness of 12 inches of concrete. The barriers provide a 3 hour fire rated barrier. This area complies with NFPA 805 requirements.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-DEC-3560, Rev. 1, "Fire PRA Task 1 - Plant Boundary Definition and Partitioning"
- 10080-RC-0045E, Rev. 8, "Plans Sections & Details Lower Pump Cubicles R.C."
- FPSSR, Add. 37, "BVPS-2 Fire Protection Safe Shutdown Report"
- 10080-RC-0045D, Rev. 8, "Pipe Tranch - Sh. 4"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"

Open Items and VFDRs

-None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-VP-2

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.3 - Fire barrier penetrations

Compliance Basis:

Fire Doors:

The only perimeter door to 2-VP-2 is an unrated external door that is considered acceptable due to the negligible fire loading.

Fire Dampers:

This fire compartment does not contain ventilation.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 10080-DEC-3560, Rev. 1, "Fire PRA Task 1 - Plant Boundary Definition and Partitioning"
- 10080-RC-0045E, Rev. 8, "Plans Sections & Details Lower Pump Cubicles R.C."
- 10080-RC-0045D, Rev. 8, "Pipe Tranch - Sh. 4"

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements — **Beaver Valley Unit 2**

Fire Compartment - 2-VP-2

Compliance Statement: Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.4 - Through Penetration Fire Stops

Compliance Basis:

Complies with use of EEEE

The penetration seal designs are based on typical tested and approved fire seals. BV2 contains some penetrations between fire areas where it is often impossible to achieve an exact duplication of the specific test configuration of penetration seal designs for fire protection requirements. GL 86-10, evaluations have been completed and documented to justify penetration seals installed to untested seal designs.

Licensing Actions

- None

Supporting EEEEs

- None

References

- 1/2-PIP-M16, Rev. 9, "Penetration Seals"
- 10080-DMC-0054, Rev. 2, "Untested Seal Design"
- 10080-RE-0037R, Rev. 8, "CONCEALED CONDUITS AND SLEEVES VALVE PIT"
- 10080-RE-0053H, Rev. 11, "CONDUIT PLAN VALVE PIT"
- 10080-RP-0068A, Rev. 14, "SLEEVE SCHEDULE"
- 10080-RP-0068B, Rev. 12, "SLEEVE LOCATION"
- 2601.337-844-083, Rev. B, "Internal Conduit Fire Seals EC-1 thru 6"
- 2BVS-0844, Rev. 0, "Index Only Fire Stops and Seals"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- B-240, Rev. 0, "Fire Seal Eval Untested Design"

Open Items and VFDRs

-None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Fire Compartment - 2-WH-1

Compliance Statement: Complies

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.2 - Fire barriers

Compliance Basis:

Fire barriers in this area are rated for 3 hours or 1-1/2 hours dependent on the location. The barriers in this area comply with applicable requirements.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)

Supporting EEEEs

- None

References

- 1/2-PIP-M16, Rev. 9, "Penetration Seals"
- 10080-DMC-0054, Rev. 2, "Untested Seal Design"
- 10080-RA-0006A, Sht. 1, Rev. 30, "Door Schedule"
- 10080-RA-0006D, Rev. 16, "door schedule"
- 10080-RA-0010H, Rev. 5, "stair detail cnd polish bldg"
- 10080-RA-0012A, Rev. 6, "PLANS PRI CHEM LAB CND POLISH BLDG"
- 10080-RA-0060B, Rev. 4, "Personnel Access Bridge Sections & Details"
- 10080-RB-0067A, Rev. 11, "VENT WSTE HAND BLDG"
- 10080-RB-0067B, Rev. 6, "VENT COND POLISH BLDG"
- 10080-RB-0067C, Rev. 7, "vent arrang cond polish bldg"
- 10080-RB-0067D, Rev. 9, "VENT COND POLISH "
- 10080-RB-0067E, Rev. 7, "VENT HP"
- 10080-RB-0067F, Rev. 4, "VENT HP"
- 10080-RC-0054C, Rev. 5, "Plan 735'-6" Cond Polish. Bldg"
- 10080-RC-0054G, Rev. 4, "Plan 774'-6" Cond Polish. Bldg"
- 10080-RE-0037Y, Rev. 16, "Conduit Sleeve Waste Handling"
- 10080-RE-0049U, Rev. 6, "CONDUIT PLN HP FACILITY"
- 10080-RM-0301B, Rev. 15, "Hazard Boundaries El 735 - 6"
- 10080-RM-0301C, Rev. 15, "Hazard Boundaries EL 752 - 6"
- 10080-RM-0301D, Rev. 15, "Hazard Boundaries El 760 7"
- 10080-RM-0301E, Rev. 12, "Hazard Boundaries El. 774 - 7"
- 10080-RP-0117M, Rev. 7, "Sleeve Loc Waste Handling"
- 2601.337-844-083, Rev. B, "Internal Conduit Fire Seals EC-1 thru 6"
- 2BVS-0844, Rev. 0, "Index Only Fire Stops and Seals"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- 87-05-05, "BV2 SSER "
- B-240, Rev. 0, "Fire Seal Eval Untested Design"
- FPSSR, Add. 36, "BVPS-2 Fire Protection Safe Shutdown Report"

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

Open Items and VFDRs

-None

Fire Compartment - 2-WH-1

Compliance Statement: Complies
Complies by Previous Approval
Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.3 - Fire barrier penetrations

Compliance Basis:

Complies

There are several fire doors in this area and they are either 3 hour or 1-1/2 hour fire rated dependent on the fire rating of the barrier.

Complies by Previous Approval

Some fire doors were modified and received prior approval as documented in NRC SER Supplement 5 dated May 1987.

The area includes two 1-1/2 hour fire rated dampers in series instead of a three hour fire rated damper. Additionally, dampers are located outside of the barrier and the ductwork portion from the barrier to the dampers is protected with a 1-hour fire rated material. This has received prior NRC approval as documented in NRC SER Supplement 5 dated May 1987.

Complies with use of EEEE

FPPCE 13-030 concludes the horizontal sliding door overlap is acceptable.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)

Supporting EEEEs

FPPCE 13-030 Rev.0

References

- 1/2-ADM-1900, Rev. 28, "Fire Protection Program"
- 1/2PMP-75VS-VNT-4M, Rev. 13, "Ventilation System Fire Damper Maintenance and Trip Check"
- 10080-RA-0006A, Sht. 1, Rev. 30, "Door Schedule"
- 1/2PMP-33FP-FIRE DOORS-1M, Rev. 9, "Periodic Inspection of Fire Doors"
- 10080-DEC-3560, Rev. 1, "Fire PRA Task 1 - Plant Boundary Definition and Partitioning"
- 10080-RA-0006D, Rev. 16, "door schedule"

References

- 10080-RA-0010H, Rev. 5, "stair detail cnd polish bldg"
- 10080-RA-0060B, Rev. 4, "Personnel Access Bridge Sections & Details"
- 10080-RB-0067E, Rev. 7, "VENT HP"
- 10080-RB-67G, Rev. 7, "Ventilation (Damper Sch)"
- 10080-RM-0301C, Rev. 15, "Hazard Boundaries EL 752 - 6"
- 10080-RM-0301E, Rev. 12, "Hazard Boundaries El. 774 - 7"
- 2OST-33.5, Rev. 18, "Fire Protection System Inspection Test"
- FPSSR, Add. 37, "BVPS-2 Fire Protection Safe Shutdown Report"
- 10080-RA-0036A, Sht. 1, Rev. 16, "Plans Auxiliary Building"
- 10080-RB-0067A, Rev. 11, "VENT WSTE HAND BLDG"
- 10080-RB-0067F, Rev. 4, "VENT HP"
- 10080-RM-0301B, Rev. 15, "Hazard Boundaries El 735 - 6"
- 10080-RM-0301D, Rev. 15, "Hazard Boundaries El 760 7"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- 87-05-05, "BV2 SSER "

Open Items and VFDRs

-None

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

Fire Compartment - 2-WH-1

Compliance Statement: Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.4 - Through Penetration Fire Stops

Compliance Basis:

Complies with use of EEEE

The penetration seal designs are based on typical tested and approved fire seals. BV2 contains some penetrations between fire areas where it is often impossible to achieve an exact duplication of the specific test configuration of penetration seal designs for fire protection requirements. GL 86-10, evaluations have been completed and documented to justify penetration seals installed to untested seal designs.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 05 Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork One-Hour Fire Wrap - BTP C.5.a(4)

Supporting EEEEs

10080-DMC-0054 Rev.2 A4

8700-DMC-2840 Rev. 0 Eval #4

References

- 1/2-PIP-M16, Rev. 9, "Penetration Seals"
- 1/2pmp-33FP-FIRE DOORS-1M, Rev. 4, "Periodic Inspection of Fire doors"
- 10080-RA-0006A, Sht. 1, Rev. 30, "Door Schedule"
- 10080-RA-0010H, Rev. 5, "stair detail cnd polish bldg"
- 10080-RA-0060B, Rev. 4, "Personnel Access Bridge Sections & Details"
- 10080-RB-0067B, Rev. 6, "VENT COND POLISH BLDG"
- 10080-RB-0067D, Rev. 9, "VENT COND POLISH "
- 10080-RB-0067F, Rev. 4, "VENT HP"
- 10080-RC-0054G, Rev. 4, "Plan 774'-6" Cond Polish. Bldg"
- 10080-RE-0049U, Rev. 6, "CONDUIT PLN HP FACILITY"
- 10080-RM-0301C, Rev. 15, "Hazard Boundaries EL 752 - 6"
- 10080-RM-0301E, Rev. 12, "Hazard Boundaries El. 774 - 7"
- 1/2PMP-75VS-VNT-4M, Rev. 13, "Ventilation System Fire Damper Maintenance and Trip Check"
- 10080-DMC-0054, Rev. 2, "Untested Seal Design"
- 10080-RA-0006D, Rev. 16, "door schedule"
- 10080-RA-0012A, Rev. 6, "PLANS PRI CHEM LAB CND POLISH BLDG"
- 10080-RB-0067A, Rev. 11, "VENT WSTE HAND BLDG"
- 10080-RB-0067C, Rev. 7, "vent arrang cond polish bldg"
- 10080-RB-0067E, Rev. 7, "VENT HP"
- 10080-RC-0054C, Rev. 5, "Plan 735'-6" Cond Polish. Bldg"
- 10080-RE-0037Y, Rev. 16, "Conduit Sleeve Waste Handling"
- 10080-RM-0301B, Rev. 15, "Hazard Boundaries El 735 - 6"
- 10080-RM-0301D, Rev. 15, "Hazard Boundaries El 760 7"
- 10080-RP-0117M, Rev. 7, "Sleeve Loc Waste Handling"

References

- 1OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- 2BVS-0844, Rev. 0, "Index Only Fire Stops and Seals"
- 87-05-05, "BV2 SSER "
- 2601.337-844-083, Rev. B, "Internal Conduit Fire Seals EC-1 thru 6"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- B-240, Rev. 0, "Fire Seal Eval Untested Design"

Open Items and VFDRs

-None

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements

Beaver Valley Unit 2

Fire Compartment - 3-CR-1

Compliance Statement: Complies
Complies with Clarification

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.2 - Fire barriers

Compliance Basis:

Complies

Fire barriers surrounding this compartment are of reinforced concrete, a minimum of 8" thick, providing in excess of 3 hour fire resistance rating. The fire barriers for this area are periodically inspected by procedure.

Complies with Clarification

Fire compartment 3-CR-1 is common to both units. Therefore the compliance summary is similar to Unit 1 compartment 3-CR-1, subsection 3.11.2.

The PRA models both control rooms in a single fire compartment.

Part of the fire barrier separation within compartment 3-CR-1 between Unit 1 and Unit 2 sections uses a performance-based approach in accordance with NFPA 805 section 3.11.1. Adequacy of the separation between these compartments is documented in the Fire Risk Evaluation of the associated compartments and in the MCA (multi-compartment analysis) report.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

- None

References

- 10080-B-085, Rev. 14, "Fire Hazard Analysis"
- 2701.620-000-020, Rev. A, "Detailed Fire Modeling Report - 2-CR-1"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- 86-12-04, "BVPS-1 - Transmittal of Fire Protection Technical Exemption (TAC 56566)"
- 8700-01.062-0034, Rev. A, "Detailed Fire Modeling Report - Fire Compartment 3-CR-1"
- 1OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- 2701.620-000-053, Rev. A, "Fire Risk Evaluation of Control Room (3-CR-1)"
- 85-01-14, "Appendix R - Additional Exemption Requests"
- 8700-01.062-0013, Rev. B, "NFPA 805 Fire PRA Task 5.11C Multi Compartment Fire Analysis"
- 8700-01.062-0059, Rev. A, "Fire Risk Evaluation of Comtrol Room (3-CR-1)"

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements **Beaver Valley Unit 2**

References

- 8700-B-084, Rev. 12, "Fire Hazards Analysis"
- 8700-RA-0006B, Sht. 2, Rev. 21, "Door Schedule"
- 8700-RB-0002M, Rev. 13, "Fire Protection Arrangement"
- 8700-RC-0008C, Rev. 13, "Slab Plan at el. 735-6 Outline Service Bldg."
- 8700-RC-0008R, Rev. 9, "Plan-EL. 735'-6" & Roof EL. 751'-8" Control Room Extension"
- FPSSR, Add. 37, "BVPS-2 Fire Protection Safe Shutdown Report"
- 8700-RA-0006A, Sht. 1, Rev. 28, "Door Schedule - Sheet 1"
- 8700-RA-0020A, Rev. 10, "Floor Plans Main Entrance & Control Rm"
- 8700-RC-0008A, Rev. 18, "Slab Plan at el. 713-6 Service Bldg."
- 8700-RC-0008H, Rev. 11, "Sections, Service Building"
- 8700-RC-0008T, Rev. 10, "Control room Ext"
- UFPARR, Rev. 30, "Updated Fire Protection Appendix R Review"

Open Items and VFDRs

VFDR Number BV2-0255 Fire Modeling to Support lack of Wall between BV1 & BV2 Control Rooms

Fire barriers are not rated for a portion of this fire compartment. Performance-based methods allowed in NFPA 805 have been used to analyze the existing barriers to ensure the adequacy for hazards in the area. This may challenge the Nuclear Safety Performance Criteria (NSPC) for Vital Auxiliaries. This is a separation issue.

Component ID:
NA

Disposition

Performance-based analysis has concluded the non-rated portion of the fire barriers is adequate to withstand the fire effects of the potential hazard. No further action required.

Fire Compartment - 3-CR-1

Compliance Statement: Complies
Complies by Previous Approval
Complies with Clarification

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.3 - Fire barrier penetrations

Compliance Basis:

Fire compartment 3-CR-1 is common to both units. Therefore the compliance summary is similar to Unit 1 compartment 3-CR-1, subsection 3.11.3. The PRA models both unit control rooms in a single fire compartment and addresses the main control room as part of the multi-compartment analysis.

Complies

The fire rated doors are periodically inspected by procedure.

Door O35-2 between 3-CR-1 and the vestibule of the turbine building is a 3 hour fire rated door. Door S35-5 between 3-CR-1 and the control room south stairwell is a 1.5 hour rated fire door. Door S35-71 between the Unit 2 section of the Control Room and the outside is not a fire rated door. All other doors internal to the Unit 1 section of 3-CR-1 are non-rated.

Unit 2 section fire doors S35-68 and S35-70 located within 3-CR-1 (to the north stairwell and the Computer Room, respectively) are 3 hour fire rated.

The fire rated dampers are periodically inspected by procedure.

Complies by Previous Approval

Door O35-2 was identified as having a security modification as well as an unlabeled pressed metal frome. NRC letter dated Dec. 4, 1986 granted exemptions based on the fire severity calculated for the area.

In the Unit 2 portion of the control room, ventilation ductwork penetrations between 2-CB-5 and 3-CR-1 are provided with two 1-1/2 hr dampers in series. One deviation for 3-CR-1 was granted for having two 1½ hour rated fire dampers in lieu of one 3 hour rated damper.

Complies with Clarification

Drawings identify that the ventilation ductwork for the Unit 1 portion of the control room, routed through a ventilation shaft between 1-CR-2 and 3-CR-1, does not have a fire damper in it. The absence of a fire damper to separate 3-CR-1 from 1-CR-2 and the combination of the Unit 1 and Unit 2 control rooms in the same fire compartment with no separating barrier was evaluated using NFPA 805 Section 4.2.4 risk informed methods and determined to be acceptable.

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet

Fire Protection Features

Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements

Beaver Valley Unit 2

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

- None

References

- 1/2-ADM-1900, Rev. 28, "Fire Protection Program"
- 1/2PMP-75VS-VNT-4M, Rev. 13, "Ventilation System Fire Damper Maintenance and Trip Check"
- 10080-RB-0038A, Rev. 11, "Ac and Vent arrang Control Bldg"
- 1OST-33.5, Rev. 19, "Fire Protection System Inspection Test"
- 85-01-14, "Appendix R - Additional Exemption Requests"
- 8700-RA-0001D, Sht. 1, Rev. 17, "Floor Plan Service Building"
- 8700-RA-0006B, Sht. 2, Rev. 21, "Door Schedule"
- 8700-RB-0002M, Rev. 13, "Fire Protection Arrangement"
- 8700-RB-0017K, Sht. 10, Rev. 15, "Air Conditioning- Sections- Control Room- Service BLDG."
- FPSSR, Add. 37, "BVPS-2 Fire Protection Safe Shutdown Report"
- UFPARR, Rev. 30, "Updated Fire Protection Appendix R Review"
- 1/2PMP-33FP-FIRE DOORS-1M, Rev. 9, "Periodic Inspection of Fire Doors"
- 10080-RA-0006B, Rev. 21, "Door Schedule & Details"
- 10080-RB-0038B, Rev. 4, "AC and Vent Arrang - Contrl bldg"
- 2OST-33.5, Rev. 18, "Fire Protection System Inspection Test"
- 86-12-04, "BVPS-1 - Transmittal of Fire Protection Technical Exemption (TAC 56566)"
- 8700-RA-0006A, Sht. 1, Rev. 28, "Door Schedule - Sheet 1"
- 8700-RA-0020A, Rev. 10, "Floor Plans Main Entrance & Control Rm"
- 8700-RB-0017J, Sht. 9, Rev. 16, "Air Conditioning- Plan- Control Room-Service Bldg."
- BVPS-2 UFSAR, Rev. 19, "BVPS-2 Updated Final Safety Analysis Report"
- NUREG 1057, Supp 3 11/86, "NRC SER - NUREG 1057, Supp No. 3 dated November 1986"

Open Items and VFDRs

VFDR Number BV2-0255 Fire Modeling to Support lack of Wall between BV1 & BV2 Control Rooms

Fire barriers are not rated for a portion of this fire compartment. Performance-based methods allowed in NFPA 805 have been used to analyze the existing barriers to ensure the adequacy for hazards in the area. This may challenge the Nuclear Safety Performance Criteria (NSPC) for Vital Auxiliaries. This is a separation issue.

Component ID:
NA

Disposition
Performance-based analysis has concluded the non-rated portion of the fire barriers is adequate to withstand the fire effects of the potential hazard. No further action required.

Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet
Fire Protection Features
Transition Report

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements — **Beaver Valley Unit 2**

Fire Compartment - 3-CR-1

Compliance Statement: Complies with use of EEEE

Post-Transition Methods:

NFPA 805 Section 4.2.4.2 Performance-Based Approach - Fire Risk Evaluation with simplifying deterministic assumptions

Fire Protection Features Form: Passive Protection

SubSection: 3.11.4 - Through Penetration Fire Stops

Compliance Basis:

Complies with use of EEEE

The penetration seal designs are based on typical tested and approved fire seals. BV2 contains some penetrations between fire areas where it is often impossible to achieve an exact duplication of the specific test configuration of penetration seal designs for fire protection requirements. GL 86-10, evaluations have been completed and documented to justify penetration seals installed to untested seal designs.

Licensing Actions

- 04 Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)
- 06 Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Supporting EEEEs

10080-DMC-0054 Rev.2 A4

8700-DMC-2840 Rev. 0 Eval #4

References

- 1/2-PIP-M16, Rev. 9, "Penetration Seals"
- 2601.337-844-083, Rev. B, "Internal Conduit Fire Seals EC-1 thru 6"
- 2OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- 1OST-33.35, Rev. 2, "Fire Rated Assemblies Visual Inspection"
- 2BVS-0844, Rev. 0, "Index Only Fire Stops and Seals"

Open Items and VFDRs

-None

B. NEI 04-02 Table B-2 – Nuclear Safety Capability Assessment - Methodology Review

127 Pages Attached

Transition Report Attachment

Transition Report Section: **- Attachments**

Transition Report Subsection: **B - NEI 04-02 Table B-2 - Nuclear Safety Capability Assessment - Methodology Review**

NFPA 805 Section: 2.4.2.1 - Nuclear Safety Capability System and Equipment Selection

A comprehensive list of systems and equipment and their interrelationships to be analyzed for a fire event shall be developed. The equipment list shall contain an inventory of those critical components required to achieve the nuclear safety performance criteria of Section 1.5. Components required to achieve and maintain the nuclear safety functions and components whose fire-induced failure could prevent the operation or result in the maloperation of those components needed to meet the nuclear safety criteria shall be included. Availability and reliability of equipment selected shall be evaluated.

NEI 00-01 Section:

3.0 - Deterministic Methodology

Alignment Statement: Aligns

This section discusses a generic deterministic methodology and criteria that licensees can use to perform a post-fire safe shutdown analysis to address regulatory requirements. The plant-specific analysis approved by NRC is reflected in the plant's licensing basis. The methodology described in this section is also an acceptable method of performing a post-fire safe shutdown analysis. This methodology is indicated in Figure 3-1. Other methods acceptable to NRC may also be used. Regardless of the method selected by an individual licensee, the criteria and assumptions provided in this guidance document may apply. The methodology described in Section 3 is based on a computer database oriented approach, which is utilized by several licensees to model Appendix R data relationships. This guidance document, however, does not require the use of a computer database oriented approach.

The requirements of Appendix R Sections III.G.1, III.G.2 and III.G.3 apply to equipment and cables required for achieving and maintaining safe shutdown in any fire area. Although equipment and cables for fire detection and suppression systems, communications systems and 8-hour emergency lighting systems are important features, this guidance document does not address them.

Alignment Basis:

This is an introductory paragraph and does not contain any specific guidance. The specific guidance, and references to the applicable BVPS documents, is provided in the subsequent sections. Except as specifically noted below, the BVPS methodology aligns with that provided in NEI 00-01.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- None

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1 - Safe Shutdown Systems and Path Development

Alignment Statement: Aligns

This section discusses the identification of systems available and necessary to perform the required safe shutdown functions. It also provides information on the process for combining these systems into safe shutdown paths. Appendix R Section III.G.1.a requires that the capability to achieve and maintain hot shutdown be free of fire damage. It is expected that the term "free of fire damage" will be further clarified in a forthcoming Regulatory Issue Summary. Appendix R Section III.G.1.b requires that repairs to systems and equipment necessary to achieve and maintain cold shutdown be completed within 72 hours. It is the intent of the NRC that requirements related to the use of manual operator actions will be addressed in a forthcoming rulemaking.

The goal of post-fire safe shutdown is to assure that a one train of shutdown systems, structures, and components remains free of fire damage for a single fire in any single plant fire area. This goal is accomplished by determining those functions important to achieve and maintain hot shutdown. Safe shutdown systems are selected so that the capability to perform these required functions is a part of each safe shutdown path. The functions important to post-fire safe shutdown generally include, but are not limited to the following:

- Reactivity Control
- Pressure Control Systems
- Inventory Control Systems
- Decay Heat Removal Systems
- Process Monitoring
- Support Systems
  * Electrical systems
  * Cooling systems

These functions are of importance because they have a direct bearing on the safe shutdown goal of being able to achieve and maintain hot shutdown which ensures the integrity of the fuel, the reactor pressure vessel, and the primary containment. If these functions are preserved, then the plant will be safe because the fuel, the reactor and the primary containment will not be damaged. By assuring that this equipment is not damaged and remains functional, the protection of the health and safety of the public is assured.

In addition to the above listed functions, Generic Letter 81-12 specifies consideration of associated circuits with the potential for spurious equipment operation and/or loss of power source, and the common enclosure failures. Spurious operations/actuations can affect the accomplishment of the post-fire safe shutdown functions listed above. Typical examples of the effects of the spurious operations of concern are the following:

- A loss of reactor pressure vessel/reactor coolant inventory in excess of the safe shutdown makeup capability
- A flow loss or blockage in the inventory makeup or decay heat removal systems being used for the required safe shutdown path.

Spurious operations are of concern because they have the potential to directly affect the ability to achieve and maintain hot shutdown, which could affect the fuel and cause damage to the reactor pressure vessel or the primary containment. Common power source and common enclosure concerns could also affect these and must be addressed.

Table B-2 Nuclear Safety Capability Assessment
Methodology Review
Transition Report

Beaver Valley Power Station

Alignment Basis:

This is an introductory paragraph and does not contain any specific guidance. The specific guidance, and references to the applicable BVPS documents, is provided in the subsequent sections. Except as specifically noted below, the BVPS methodology aligns with that provided in NEI 00-01.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- None

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.1 - Criteria/Assumptions

Alignment Statement: Aligns

The following criteria and assumptions may be considered when identifying systems available and necessary to perform the required safe shutdown functions and combining these systems into safe shutdown paths.

Alignment Basis:

This is an introductory paragraph and does not contain any specific guidance. The specific guidance, and references to the applicable BVPS documents, is provided in the subsequent sections. Except as specifically noted below, the BVPS methodology aligns with that provided in NEI 00-01.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- None

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.1.1 - Safe Shutdown Paths for BWRs

Alignment Statement: Not Applicable

[BWR] GE Report GE-NE-T43-00002-00-01-R01 entitled "Original Safe Shutdown Paths For The BWR" addresses the systems and equipment originally designed into the GE boiling water reactors (BWRs) in the 1960s and 1970s, that can be used to achieve and maintain safe shutdown per Section III.G.1 of 10CFR 50, Appendix R. Any of the shutdown paths (methods) described in this report are considered to be acceptable methods for achieving redundant safe shutdown.

Alignment Basis:

Beaver Valley units are pressurized water reactors (PWR).

Licensing Actions

- None

Supporting Documents

- No Documents
- *No Evaluations*

References

- None

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.1.2 - SRVs and LPCI/CS for BWRs

Alignment Statement: Not Applicable

[BWR] GE Report GE-NE-T43-00002-00-03-R01 provides a discussion on the BWR Owners'' Group (BWROG) position regarding the use of Safety Relief Valves (SRVs) and low pressure systems (LPCI/CS) for safe shutdown. The BWROG position is that the use of SRVs and low pressure systems is an acceptable methodology for achieving redundant safe shutdown in accordance with the requirements of 10CFR50 Appendix R Sections III.G.1 and III.G.2. The NRC has accepted the BWROG position and issued an SER dated Dec. 12, 2000.

Alignment Basis:

Beaver Valley units are pressurized water reactors (PWR).

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- None

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.1.3 - Pressurizer Heaters

Alignment Statement: Aligns with Intent

[PWR] Generic Letter 86-10, Enclosure 2, Section 5.3.5 specifies that hot shutdown can be maintained without the use of pressurizer heaters (i.e., pressure control is provided by controlling the makeup/charging pumps). Hot shutdown conditions can be maintained via natural circulation of the RCS through the steam generators. The cooldown rate must be controlled to prevent the formation of a bubble in the reactor head. Therefore, feedwater (either auxiliary or emergency) flow rates as well as steam release must be controlled.

Alignment Basis:

Generic Letter 86-10, Enclosure 2, Section 5.3.5 documents that pressurizer heaters may not be required for RCS pressure control, and that RCS pressure control may be maintained by other means such as establishing a controlled plant cooldown. As part of the examination of nuclear safety performance criteria of Section 1.5 of NFPA 805, the ability to provide RCS pressure control has been reviewed and documented for each safe shutdown fire compartment in transition report Attachment C. Where subcooling is not demonstrated in accordance with the performance criteria of Section 1.5.1(b), VFDRs has been documented and associated to the applicable fire compartment record.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-010, Rev. C, "ARS-PI-0003, Task 2.3, Nuclear Safety Performance Criteria (Fire Area) Reviews"
- 8700-01.062-0008, Rev. A, "P1866-003-001, Post-fire Safe Shutdown and PRA Sys. and Component Selection"
- 8700-01.062-0009, Rev. A, "P1866-004-001, Post-fire Safe Shutdown Cable Identification"
- 8700-01.062-0010, Rev. A, "P1866-008-001, Post-fire Safe Shutdown Component Location"
- 8700-01.062-0011, Rev. A, "P1866-009-001, Post-Fire Safe Shutdown Analysis"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.1.4 - Alternative Shutdown Classification

Alignment Statement: Aligns

The classification of shutdown capability as alternative shutdown is made independent of the selection of systems used for shutdown. Alternative shutdown capability is determined based on an inability to assure the availability of a redundant safe shutdown path. Compliance to the separation requirements of Sections III.G.1 and III.G.2 may be supplemented by the use of manual actions to the extent allowed by the regulations and the licensing basis of the plant, repairs (cold shutdown only), exemptions, deviations, GL 86-10 fire hazards analyses or fire protection design change evaluations, as appropriate. These may also be used in conjunction with alternative shutdown capability.

Alignment Basis:

Areas where a potential loss of safe shutdown capability could occur were provided with alternate equipment or an alternative means of operation to comply with the intent of Appendix R, or exemptions / deviations were requested from the guidance. RG 1.205, Revision 1, Regulatory Position 2.4 documents that "primary control station" actions (actions taken in the main control room or at the primary control station) which meet the criteria of Regulatory Position 2.4 are not considered "recovery actions."

Transition Report Attachment C documents a review of the nuclear safety performance criteria against the criteria of NFPA 805 Section 1.5.1. Where recovery actions are required because of a lack of separation in accordance with NFPA 805 Section 4.2.3, issues are identified as potential variances from the deterministic requirements and evaluated via the fire risk evaluation process.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-096, Rev. B, "Fire Area Transition Review"
- NFPA 805, Rev. 2001, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants"
- RG 1.205, Rev. 1, "Risk-Informed, Performance-Based Fire Prot. for Existing Light Water NPPs"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.1.5 - Operable and Available

Alignment Statement: Aligns

At the onset of the postulated fire, all safe shutdown systems (including applicable redundant trains) are assumed operable and available for post-fire safe shutdown. Systems are assumed to be operational with no repairs, maintenance, testing, Limiting Conditions for Operation, etc. in progress. The units are assumed to be operating at full power under normal conditions and normal lineups.

Alignment Basis:

For both units, this assumption is consistent with the Beaver Valley safe shutdown analyses. Procedure 2601.620-000-010, "Task 2.3, Nuclear Safety Performance Criteria (Fire Area) Reviews" Purpose states:
"The NSPC Review scope assumes a bounding start condition for the design basis fire of 100% reactor power, and evaluates achieving a safe and stable condition after the fire. This initial condition is considered bounding for fires that occur in Modes 1 or 2."

Procedures 8700.01.062-0008 and 2601.620-000-021, "Post-Fire Safe Shutdown PRA Systems and Components," each credit the assumptions of NEI 00-01 Section 3.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-010, Rev. C, "ARS-PI-0003, Task 2.3, Nuclear Safety Performance Criteria (Fire Area) Reviews"
- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 8700-01.062-0008, Rev. A, "P1866-003-001, Post-fire Safe Shutdown and PRA Sys. and Component Selection"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.1.6 - No concurrent DBAs

Alignment Statement: Aligns

No Final Safety Analysis Report accidents or other design basis events (e.g. loss of coolant accident, earthquake), single failures or nonfire induced transients need be considered in conjunction with the fire.

Alignment Basis:

This assumption is consistent with the BVPS-1 and BVPS-2 procedures titled "Post-Fire Safe Shutdown Analysis (8700-01.062-0011 and 2601.620-000-021). No single or concurrent failures other than those directly attributable to the postulated fire were considered, with the exception of loss of offsite power.

The procedures state in Section 8.0:

"When performing a computer-assisted analysis, the software presumes that all of the SSD equipment and cable located in an analysis area (e.g., fire scenario, zone, and/or area) are involved in the fire, and have failed."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 8700-01.062-0011, Rev. A, "P1866-009-001, Post-Fire Safe Shutdown Analysis"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.1.7 - Offsite Power Availability

Alignment Statement: Aligns

For the case of redundant shutdown, offsite power may be credited if demonstrated to be free of fire damage. Offsite power should be assumed to remain available for those cases where its availability may adversely impact safety (i.e., reliance cannot be placed on fire causing a loss of offsite power if the consequences of offsite power availability are more severe than its presumed loss). No credit should be taken for a fire causing a loss of offsite power. For areas where train separation cannot be achieved and alternative shutdown capability is necessary, shutdown must be demonstrated both where offsite power is available and where offsite power is not available for 72 hours.

Alignment Basis:

For both units as part of NFPA 805 transition, evaluations of offsite power availability were performed. These evaluations have been incorporated into SAFE and have been used to determine whether deterministic separation in accordance with NFPA 805 Section 4.2.3 is met.

Procedures 8700-01.062-0011 and 2601.620-000-021, "Post-Fire Safe Shutdown Analysis," state in Section 4.0, Overview:
"The SAFE Logics Model has been modified to include off-site power, over-current trip concerns, Multiple Spurious Operation concerns and other agreed upgrades based on current regulatory guidance."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 8700-01.062-0011, Rev. A, "P1866-009-001, Post-Fire Safe Shutdown Analysis"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.1.8 - Safety-related Classification

Alignment Statement: Aligns

Post-fire safe shutdown systems and components are not required to be safety-related.

Alignment Basis:

The existing safe shutdown analyses were loaded into NFPA 805 safe shutdown analysis software. This assumption is consistent with the safe shutdown analyses which credit use of non-safety related components for alternate shutdown (e.g., dedicated AFW pump, and station service air that "is required to position several flow control, hand control, and air-operated valves for plant shutdown.") A detailed write-up of each NSPC was developed based upon Beaver Valley system line-ups. Safe shutdown components were identified whether it was safety-related. [Beaver Valley Units 1 & 2 NFPA Safe Shutdown Analysis Interim Transition Report, "Transition Methodology"]

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.1.9 - 72-hour Coping Period

Alignment Statement: Not in Alignment, but No Adverse Consequences

The post-fire safe shutdown analysis assumes a 72-hour coping period starting with a reactor scram/trip. Fire-induced impacts that provide no adverse consequences to hot shutdown within this 72-hour period need not be included in the post-fire safe shutdown analysis. At least one train can be repaired or made operable within 72 hours using onsite capability to achieve cold shutdown.

Alignment Basis:

As stated in FAQ 07-0039, "Although NFPA 805 does not require cooldown to cold shutdown, the assessment of accomplishment of performance goals should document the equipment required to achieve a safe and stable plant condition in accordance with NFPA 805 Section 1.3."

The 72 hour requirement from NEI 00-01 is only applicable to the 10 CFR 50, Appendix R licensing basis. Safe and stable is the basis for the NFPA 805 post-fire evaluation, and is discussed in Transition Report Section 4.2.1.2.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- FAQ 07-0039, "ML091320068 B-2 Table Closure Memo"
- FAQ 07-0039, Rev. 2, "ML091420138 Lessons Learned – NEI 04-02 B-2 Table"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.1.10 - Manual Initiation of Systems

Alignment Statement: Aligns with Intent

Manual initiation from the main control room or emergency control stations of systems required to achieve and maintain safe shutdown is acceptable where permitted by current regulations or approved by NRC; automatic initiation of systems selected for safe shutdown is not required but may be included as an option.

Alignment Basis:

RG 1.205, Revision 1, Regulatory Position 2.4 documents that "primary control station actions" (actions taken in the main control room or at the primary control station) which meet the criteria of Regulatory Position 2.4 are not considered "recovery actions."

VFDRs have been documented in Transition Report Attachment C and include recovery actions which are required because of a lack of separation in accordance with NFPA 805 Section 4.2.3.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-010, Rev. C, "ARS-PI-0003, Task 2.3, Nuclear Safety Performance Criteria (Fire Area) Reviews"
- RG 1.205, Rev. 1, "Risk-Informed, Performance-Based Fire Prot. for Existing Light Water NPPs"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.1.11 - Multi-unit Plant

Alignment Statement: Aligns

Where a single fire can impact more than one unit of a multi-unit plant, the ability to achieve and maintain safe shutdown for each affected unit must be demonstrated.

Alignment Basis:

The BVPS-1 and BVPS-2 NFPA 805 Safe Shutdown Analysis Interim Transition Reports document that each unit can achieve and maintain safe shutdown for each fire compartment in accordance with the applicable regulatory requirements.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.2 - Shutdown Functions

Alignment Statement: Aligns

The following discussion on each of these shutdown functions provides guidance for selecting the systems and equipment required for safe shutdown. For additional information on BWR system selection, refer to GE Report GENE-T43-00002-00-01-R01 entitled "Original Safe Shutdown Paths for the BWR."

Alignment Basis:

This is an introductory paragraph and does not contain any specific guidance. The specific guidance, and references to the applicable BVPS documents, is provided in the subsequent sections. Except as specifically noted below, the BVPS methodology aligns with that provided in NEI 00-01.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- None

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.2.1 - Reactivity Control

Alignment Statement: Aligns

[BWR] Control Rod Drive System
The safe shutdown performance and design requirements for the reactivity control function can be met without automatic scram/trip capability. Manual scram/reactor trip is credited. The post-fire safe shutdown analysis must only provide the capability to manually scram/trip the reactor.

[PWR] Makeup/Charging
There must be a method for ensuring that adequate shutdown margin is maintained by ensuring borated water is utilized for RCS makeup/charging.

Alignment Basis:

The Nuclear Safety Performance Criteria (NSPC) is described in Section 1.5.1 of the BVPS-1 and BVPS-2 NFPA 805 Safe shutdown analysis interim transition reports (8700-01.062-0048 and 2701.620-000-105). The Safe Shutdown Model addresses reactivity controlling both negative and positive reactivity. Negative reactivity control includes control rod insertion into the reactor core and addition of borated water to the reactor coolant system. Positive reactivity is controlled by isolating boron dilution sources and preventing an uncontrolled RCS temperature decrease. Additional shutdown margin (negative reactivity) for cooldown is assured by the use of borated water for makeup.

BVPS-1 Analysis 8700-DMC-3669 demonstrates that the plant can achieve and maintain 1% shutdown margin without RCS letdown, by making up for RCS volume shrink due to cooldown with 2400 ppm borated water from the RWST.

Transition Report Attachment C documents potential variances from the deterministic requirements due to a lack of separation in accordance with NFPA 805 Section 4.2.3, which are evaluated via the fire risk evaluation process.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-096, Rev. B, "Fire Area Transition Review"
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-DMC-3669, Rev. 0, "BVPS-1 Cycle 22 Simulate-3 Appendix R Shutdown Margin Verification"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.2.2 - Pressure Control Systems

Alignment Statement: Aligns

[BWR] Safety Relief Valves (SRVs)
The systems discussed in this section are examples of systems that can be used for pressure control. This does not restrict the use of other systems for this purpose. The SRVs are opened to maintain hot shutdown conditions or to depressurize the vessel to allow injection using low pressure systems. These are operated manually. Automatic initiation of the Automatic Depressurization System is not a required function.

[PWR] Makeup/Charging
The systems discussed in this section are examples of systems that can be used for pressure control. This does not restrict the use of other systems for this purpose. RCS pressure is controlled by controlling the rate of charging/makeup to the RCS. Although utilization of the pressurizer heaters and/or auxiliary spray reduces operator burden, neither component is required to provide adequate pressure control. Pressure reductions are made by allowing the RCS to cool/shrink, thus reducing pressurizer level/pressure. Pressure increases are made by initiating charging/makeup to maintain pressurizer level/pressure. Manual control of the related pumps is acceptable.

Alignment Basis:

The Nuclear Safety Performance Criteria (NSPC) is described in Section 1.5.1 of the BVPS-1 and BVPS-2 NFPA 805 Safe shutdown analysis interim transition reports (8700-01.062-0048 and 2701.620-000-105). The Safe Shutdown Model addresses primary pressure and coolant levels by limiting reactor coolant loss and by charging makeup water. Reactor sub-cooling is maintained by controlled cooldown using natural circulation and dumping steam from one or more steam generators.

Pressure control is accomplished primarily by controlling makeup and cooldown rates. PORVs are modeled as a means of manual overpressure control. Spurious operation of equipment that would interfere with pressure control (spray valves, pressurizer heaters and RCP breakers) are modeled.

Transition Report Attachment C documents potential variances from the deterministic requirements due to a lack of separation in accordance with NFPA 805 Section 4.2.3, which are evaluated via the fire risk evaluation process.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-010, Rev. C, "ARS-PI-0003, Task 2.3, Nuclear Safety Performance Criteria (Fire Area) Reviews"
- 2701.620-000-096, Rev. B, "Fire Area Transition Review"
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.2.3 - Inventory Control

Alignment Statement: Aligns

[BWR] Systems selected for the inventory control function should be capable of supplying sufficient reactor coolant to achieve and maintain hot shutdown. Manual initiation of these systems is acceptable. Automatic initiation functions are not required.

[PWR] Systems selected for the inventory control function should be capable of maintaining level to achieve and maintain hot shutdown. Typically, the same components providing inventory control are capable of providing pressure control. Manual initiation of these systems is acceptable. Automatic initiation functions are not required.

Alignment Basis:

The Nuclear Safety Performance Criteria (NSPC) is described in Section 1.5.1 of the BVPS-1 and BVPS-2 NFPA 805 Safe shutdown analysis interim transition reports (8700-01.062-0048 and 2701.620-000-105). The Safe Shutdown Model addresses inventory control by limiting reactor coolant loss and by charging makeup water. Reactor sub-cooling is maintained by controlled cooldown using natural circulation and dumping steam from one or more steam generators. Coolant loss is controlled by modeling the isolation of primary pressure boundaries: PORVs, RHR isolation valves, vent valves, letdown path and excess letdown path.

Makeup water is modeled by charging water from the RWST through the reactor coolant pump seals (preferred path). Cooling of the RCP seals helps control leakage from the reactor coolant system. This has the added benefits of charging borated water from the RWST. Cavitation of the charging pumps is prevented by ensuring gas does not enter the suction path and by ensuring that seal water return is either cooled before returning to the pump suction or is diverted to the pressurizer relief tank. Note that isolation of the seal injection flow path has been modeled as an Optional system to ensure the integrity of the RCP seals on loss of seal injection.

Transition Report Attachment C documents potential variances from the deterministic requirements due to a lack of separation in accordance with NFPA 805 Section 4.2.3, which are evaluated via the fire risk evaluation process.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-010, Rev. C, "ARS-PI-0003, Task 2.3, Nuclear Safety Performance Criteria (Fire Area) Reviews"
- 2701.620-000-096, Rev. B, "Fire Area Transition Review"
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.080-0048, Rev. C, "Conduit Plan Auxiliary Bldg. El. 722'6"-Charging Pump Pits 1A, 1B & 1C"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.2.4 - Decay Heat Removal

Alignment Statement: Not in Alignment, but No Adverse Consequences

[BWR] Systems selected for the decay heat removal function(s) should be capable of:
- Removing sufficient decay heat from primary containment, to prevent containment over-pressurization and failure.
- Satisfying the net positive suction head requirements of any safe shutdown systems taking suction from the containment (suppression pool).
- Removing sufficient decay heat from the reactor to achieve cold shutdown.

[PWR] Systems selected for the decay heat removal function(s) should be capable of:
- Removing sufficient decay heat from the reactor to reach hot shutdown conditions. Typically, this entails utilizing natural circulation in lieu of forced circulation via the reactor coolant pumps and controlling steam release via the Atmospheric Dump valves.
- Removing sufficient decay heat from the reactor to reach cold shutdown conditions.

This does not restrict the use of other systems.

Alignment Basis:

Per calculation 10080-DMC-0890, decay heat is removed by use of a natural circulation cooldown and steam release via the main steam safety valves and manual operation of atmospheric dump valves or residual heat removal. AFW is credited to supply cooling water to the steam generators.

As stated in FAQ 07-0039, "Although NFPA 805 does not require cooldown to cold shutdown, the assessment of accomplishment of performance goals should document the equipment required to achieve 'a safe and stable' plant condition in accordance with NFPA 805 Section 1.3. In the event that a safe and stable plant condition cannot be achieved without cooldown to cold shutdown, the assessment should document the method of accomplishment of cold shutdown including required recovery actions (formerly operator actions or repairs)." Safe and stable conditions are discussed in Transition Report Section 4.2.1.2.

Transition Report Attachment C documents potential variances from the deterministic requirements due to a lack of separation in accordance with NFPA 805 Section 4.2.3, which are evaluated via the fire risk evaluation process.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 10080-DMC-0890, Rev. 0, Add. 1, "MAAP-DBA Calculations for the Beaver Valley Power Station Units 1 and 2 PRA EPU Model"
- 2601.620-000-010, Rev. C, "ARS-PI-0003, Task 2.3, Nuclear Safety Performance Criteria (Fire Area) Reviews"
- 2701.620-000-096, Rev. B, "Fire Area Transition Review"
- FAQ 07-0039, "ML091320068 B-2 Table Closure Memo"
- FAQ 07-0039, Rev. 2, "ML091420138 Lessons Learned – NEI 04-02 B-2 Table"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.2.5 - Process Monitoring

Alignment Statement: Not in Alignment, but Prior NRC Approval

The process monitoring function is provided for all safe shutdown paths. IN 84-09, Attachment 1, Section IX "Lessons Learned from NRC Inspections of Fire Protection Safe Shutdown Systems (10CFR50 Appendix R)" provides guidance on the instrumentation acceptable to and preferred by the NRC for meeting the process monitoring function. This instrumentation is that which monitors the process variables necessary to perform and control the functions specified in Appendix R Section III.L.1. Such instrumentation must be demonstrated to remain unaffected by the fire. The IN 84-09 list of process monitoring is applied to alternative shutdown (III.G.3). IN 84-09 did not identify specific instruments for process monitoring to be applied to redundant shutdown (III.G.1 and III.G.2). In general, process monitoring instruments similar to those listed below are needed to successfully use existing operating procedures (including Abnormal Operating Procedures).

BWR

- Reactor coolant level and pressure
- Suppression pool level and temperature
- Emergency or isolation condenser level
- Diagnostic instrumentation for safe shutdown systems
- Level indication for tanks needed for safe shutdown

PWR

- Reactor coolant temperature (hot leg / cold leg)
- Pressurizer pressure and level
- Neutron flux monitoring (source range)
- Level indication for tanks needed for safe shutdown
- Steam generator level and pressure
- Diagnostic instrumentation for safe shutdown systems

The specific instruments required may be based on operator preference, safe shutdown procedural guidance strategy (symptomatic vs. prescriptive), and systems and paths selected for safe shutdown.

Alignment Basis:

Process monitoring instrumentation required to achieve and maintain a "safe and stable" plant condition post-fire is identified in Transition Report Attachment C. The safe shutdown evaluations require the following instrumentation to be utilized for process monitoring. This instrumentation is consistent with minimum process monitoring instrumentation expectations identified in USNRC Information Notice (IN) 84-09, and as previously approved by the NRC in the licensing bases for Beaver Valley.

• Pressurizer pressure and level: In support of the inventory and pressure control NSPC, both units evaluate pressurizer level. BVPS-1 has exemption 11.24 to permit evaluation of RCS pressure as an acceptable substitute for pressurizer pressure. BVPS-2 evaluates the availability of pressurizer pressure.
• Reactor coolant temperature (T-hot / T-cold): In support of the decay heat removal NSPC, T-hot is evaluated by the availability of either hot leg temperature indicators or incore thermocouples. T-cold is evaluated by the availability of T-cold temperature element and the T-cold temperature recorder.
• Steam Generator (SG) level and pressure: In support of the decay heat removal NSPC, BVPS-1 has exemption 11.24 to permit evaluation of narrow range steam generator level. Steam generator wide range pressure instruments are evaluated for availability after a fire. BVPS-2 evaluates availability of wide range steam generator pressure, and wide range steam generator level, as well as narrow range steam generator level.
• Neutron flux monitoring (source range): In support of the reactivity control NPSC, BVPS-1 has exemption 11.24 to have a source range monitor operational within 80 minutes of the event. BVPS-2 evaluates the availability of the source range detectors after a fire.
• Diagnostic instrumentation for safe shutdown systems: Where beneficial to reduce operator burden, instruments that read out in the control room have been included in the model and logically associated with the component being monitored. In addition, instruments which provide permissive or controlling signals to safe shutdown components are modeled in direct support of the associated safe shutdown component. Reference the safe shutdown analysis report for each unit.
• Level indication for various tanks: These instruments are included in the model system logics for which the tank is required. Reference the safe shutdown analysis report for each unit.

Level indication for the RWST and the primary plant demineralized water tank are not provided at the backup indicating panel for BVPS-1 or at the alternate shutdown panel for BVPS-2. This does not align with Section 3.1.2.5 of NEI 00-01. Each tank is of sufficient capacity that level monitoring is not critical to safe shutdown functions. This configuration was previously approved by the NRC in the licensing bases for Beaver Valley.

Transition Report Attachment C documents potential variances from the deterministic requirements due to a lack of separation in accordance with NFPA 805 Section 4.2.3 which were evaluated via the fire risk evaluation process.

Licensing Actions

- 11.24 Process Instrumentation - Alternative Shutdown Capability (III.G.3 criteria and III.L criteria)

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-010, Rev. C, "ARS-PI-0003, Task 2.3, Nuclear Safety Performance Criteria (Fire Area) Reviews"
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.2.6.1 - Support Systems Electrical Distribution

Alignment Statement: Aligns

AC Distribution System
Power for the Appendix R safe shutdown equipment is typically provided by a medium voltage system such as 4.16 KV Class 1E busses either directly from the busses or through step down transformers/load centers/distribution panels for 600, 480 or 120 VAC loads. For redundant safe shutdown performed in accordance with the requirements of Appendix R Section III.G.1 and 2, power may be supplied from either offsite power sources or the emergency diesel generator depending on which has been demonstrated to be free of fire damage. No credit should be taken for a fire causing a loss of offsite power. Refer to Section 3.1.1.7.

DC Distribution System
Typically, the 125VDC distribution system supplies DC control power to various 125VDC control panels including switchgear breaker controls. The 125VDC distribution panels may also supply power to the 120VAC distribution panels via static inverters. These distribution panels typically supply power for instrumentation necessary to complete the process monitoring functions.
For fire events that result in an interruption of power to the AC electrical bus, the station batteries are necessary to supply any required control power during the interim time period required for the diesel generators to become operational. Once the diesels are operational, the 125 VDC distribution system can be powered from the diesels through the battery chargers.

[BWR] Certain plants are also designed with a 250VDC Distribution System that supplies power to Reactor Core Isolation Cooling and/or High Pressure Coolant Injection equipment.
The DC control centers may also supply power to various small horsepower Appendix R safe shutdown system valves and pumps. If the DC system is relied upon to support safe shutdown without battery chargers being available, it must be verified that sufficient battery capacity exists to support the necessary loads for sufficient time (either until power is restored, or the loads are no longer required to operate).

Alignment Basis:

For both units, in the NFPA 805 Safe Shutdown Analysis Interim Transition Report, Attachment 1 is the Safe Shutdown Model, and it indicates this under Vital Auxiliaries:
"Electrical Supply.
"Each bus, breaker, MCC, panel, etc., is modeled in direct support of the specific safe shutdown load(s). Determination of the power supplies for each required component (including other electrical supply components) is considered part of the Cable Selection task and is not described in this Safe Shutdown Model document."

Cable selection is done in accordance with 8700.01.062-0009 and 2701.620-000-016, the procedures for "Post-Fire Safe Shutdown/Fire-PRA Cable Selection." Section 5.0 Procedure includes:
"The electrical circuits associated with safe shutdown components shall be evaluated to determine which cables are necessary to support the required safe shutdown function(s) of the component. If a fire induced fault of the cable can adversely affect the control/operation of the component, the cable shall be identified as a required safe shutdown cable. Required safe shutdown cables will generally include circuits directly involved with power, control, and / or operation of the component, interlocks and permissives, associated circuit, etc."

Transition Report Attachment C documents potential variances from the deterministic requirements due to a lack of separation in accordance with NFPA 805 Section 4.2.3 which are evaluated via the fire risk evaluation process.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 2701.620-000-016, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown and Fire PRA Cable Selection Report"
- 2701.620-000-096, Rev. B, "Fire Area Transition Review"
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0009, Rev. A, "P1866-004-001, Post-fire Safe Shutdown Cable Identification"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.2.6.2 - Support Systems Cooling Systems

Alignment Statement: Aligns

Various cooling water systems may be required to support safe shutdown system operation, based on plant-specific considerations.
Typical uses include:

- RHR/SDC/DH Heat Exchanger cooling water
- Safe shutdown pump cooling (seal coolers, oil coolers)
- Diesel generator cooling
- HVAC system cooling water.

HVAC Systems may be required to assure that safe shutdown equipment remains within its operating temperature range, as specified in manufacturer's literature or demonstrated by suitable test methods, and to assure protection for plant operations staff from the effects of fire (smoke, heat, toxic gases, and gaseous fire suppression agents). HVAC systems may be required to support safe shutdown system operation, based on plant-specific configurations. Typical uses include:

- Main control room, cable spreading room, relay room
- ECCS pump compartments
- Diesel generator rooms
- Switchgear rooms

Plant-specific evaluations are necessary to determine which HVAC systems are essential to safe shutdown equipment operation.

Alignment Basis:

BVPS-1 Transition Report Attachment C introduction indicates the following cooling and ventilation systems are evaluated for the safe shutdown analysis:

- River water,
    1. Train A: The A or C pump or the auxiliary pump via the A supply header,
    2. Train B: The B pump or the auxiliary pump via the B supply header.

- Heating, Ventilation and Cooling (HVAC),
    1. Main control room HVAC,
    2. Charging pump cubicles HVAC,
    3. Emergency switchgear and battery room HVAC,
    4. Emergency diesel room HVAC,
    5. Intake structure HVAC.

BVPS-2 Transition Report Attachment C introduction indicates the following cooling and ventilation systems are evaluated for the safe shutdown analysis:

- Service water,
  1. Train A: The A SW pump via the A SW header,
  2. Train B: The B SW pump via the B SW header.

- Heating, Cooling & Ventilation,
  1. Main control room HVAC,
  2. Charging pump cubicles HVAC,
  3. Emergency switchgear and battery room HVAC,
  4. Emergency diesel room HVAC,
  5. Intake structure HVAC.

Transition Report Attachment C documents potential variances from the deterministic requirements due to a lack of separation in accordance with NFPA 805 Section 4.2.3 which are evaluated via the fire risk evaluation process.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-096, Rev. B, "Fire Area Transition Review"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.3 - Methodology for Shutdown System Selection

Alignment Statement: Aligns

Refer to NEI-00-01 Rev 1 Figure 3-2 for a flowchart illustrating the various steps involved in selecting safe shutdown systems and developing the shutdown paths. The following methodology may be used to define the safe shutdown systems and paths for an Appendix R analysis:
[refer to hard copy of NEI 00-01 Figure 3-2]

Alignment Basis:

This is an introductory paragraph and does not contain any specific guidance. The specific guidance, and references to the applicable BVPS documents, is provided in the subsequent sections. Except as specifically noted below, the BVPS methodology aligns with that provided in NEI 00-01.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- None

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.3.1 - Identify Safe Shutdown Features

Alignment Statement: Aligns

Review available documentation to obtain an understanding of the available plant systems and the functions required to achieve and maintain safe shutdown.

Documents such as the following may be reviewed:
- Operating Procedures (Normal, Emergency, Abnormal)
- System descriptions
- Fire Hazard Analysis
- Single-line electrical diagrams
- Piping and Instrumentation Diagrams (P&IDs)
- [BWR] GE Report GE-NE-T43-00002-00-01-R02 entitled "Original Shutdown Paths for the BWR"

Alignment Basis:

This statement from NEI 00-01 is a general statement on available resources for development of the post-fire safe shutdown analysis. No specific requirements are identified or required.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- None

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.3.2 - Identify Combinations Of Systems That Satisfy Each Safe Shutdown Function

Alignment Statement: Aligns

Given the criteria/assumptions defined in Section 3.1.1, identify the available combinations of systems capable of achieving the safe shutdown functions of reactivity control, pressure control, inventory control, decay heat removal, process monitoring and support systems such as electrical and cooling systems (refer to Section 3.1.2). This selection process does not restrict the use of other systems. In addition to achieving the required safe shutdown functions, consider spurious operations and power supply issues that could impact the required safe shutdown function.

Alignment Basis:

The existing safe shutdown analyses were loaded into NFPA 805 safe shutdown analysis software. A detailed write-up of each NSPC was developed based upon Beaver Valley system line-ups. Additionally, system logics were developed to support the NSPC. Offsite power availability was incorporated into the safe shutdown analysis model. [Beaver Valley Units 1 & 2 NFPA Safe Shutdown Analysis Interim Transition Report, "Transition Methodology"]

The expert panel multiple spurious operation review results were incorporated into the cable tracing reviews, where required. [8700-01.062-0002 and 2701.620-000-005]

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-005, Rev. B, "BVPS-2 MSO Expert Panel Review Report "
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0002, Rev. B, "BVPS-1 MSO Expert Panel Review Report"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.3.3 - Define Combination of Systems for Each Safe Shutdown Path

Alignment Statement: Aligns with Intent

Select combinations of systems with the capability of performing all of the required safe shutdown functions and designate this set of systems as a safe shutdown path. In many cases, paths may be defined on a divisional basis since the availability of electrical power and other support systems must be demonstrated for each path. During the equipment selection phase, identify any additional support systems and list them for the appropriate path.

Alignment Basis:

The BVPS-1 and BVPS-2 safe shutdown analysis methodology is summarized in Section 8 of the procedures titled "Post Fire Safe Shutdown Analysis" (8700-01.062-0011 and 2601.620-000-021). The safe shutdown systems and equipment required for safe shutdown for each fire compartment are identified.

As part of NFPA 805 Transition, Beaver Valley has incorporated the post-fire safe shutdown analysis into a computerized safe shutdown analysis tool, "SAFE," which maintains success path models of performance goals (methods), systems, equipment, and cables.

The procedures state:

"8.0 METHODOLOGY

"The SAFE analysis software identifies all of the SSD equipment and cables that are located in the analysis area and fail as a direct consequence of the fire (location failures). The effect of these location failures is then propagated (by the software) through the cable logic, component logic, system logic, and finally the performance goal logic in order to evaluate the overall impact upon safe shutdown capability. This iterative process identifies the equipment, systems, and performance goals that fail as an indirect consequence of the fire. These indirect failures are identified as logic failures.

"When performing a computer-assisted analysis, the software presumes that all of the SSD equipment and cable located in an analysis area (e.g., fire scenario, zone, and/or area) are involved in the fire, and have failed. The SSD engineer who resolves the analysis output should initially presume that all of the failed components have assumed the worst-case status or position with respect to achieving safe shutdown."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0011, Rev. A, "P1866-009-001, Post-Fire Safe Shutdown Analysis"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.1.3.4 - Assign Shutdown Paths to Each Combination of Systems

Alignment Statement: Aligns with Intent

Assign a path designation to each combination of systems. The path will serve to document the combination of systems relied upon for safe shutdown in each fire area. Refer to Attachment 1 to this document for an example of a table illustrating how to document the various combinations of systems for selected shutdown paths.

Alignment Basis:

The BVPS-1 and BVPS-2 safe shutdown analysis methodology is summarized in Section 8 of the procedures titled "Post Fire Safe Shutdown Analysis" (8700-01.062-0011 and 2601.620-000-021). The safe shutdown systems and equipment required for safe shutdown for each fire compartment are identified.

As part of NFPA 805 Transition, Beaver Valley has incorporated the post-fire safe shutdown analysis into a computerized safe shutdown analysis tool, "SAFE," which maintains success path models of performance goals (methods), systems, equipment, and cables.

The procedures state:

"8.0 METHODOLOGY

"The SAFE analysis software identifies all of the SSD equipment and cables that are located in the analysis area and fail as a direct consequence of the fire (location failures). The effect of these location failures is then propagated (by the software) through the cable logic, component logic, system logic, and finally the performance goal logic in order to evaluate the overall impact upon safe shutdown capability. This iterative process identifies the equipment, systems, and performance goals that fail as an indirect consequence of the fire. These indirect failures are identified as logic failures.

"When performing a computer-assisted analysis, the software presumes that all of the SSD equipment and cable located in an analysis area (e.g., fire scenario, zone, and/or area) are involved in the fire, and have failed. The SSD engineer who resolves the analysis output should initially presume that all of the failed components have assumed the worst-case status or position with respect to achieving safe shutdown."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0011, Rev. A, "P1866-009-001, Post-Fire Safe Shutdown Analysis"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.2 - Safe Shutdown Equipment Selection

Alignment Statement: Aligns

The previous section described the methodology for selecting the systems and paths necessary to achieve and maintain safe shutdown for an exposure fire event (see Section 5.0 DEFINITIONS for "Exposure Fire"). This section describes the criteria/assumptions and selection methodology for identifying the specific safe shutdown equipment necessary for the systems to perform their Appendix R function. The selected equipment should be related back to the safe shutdown systems that they support and be assigned to the same safe shutdown path as that system. The list of safe shutdown equipment will then form the basis for identifying the cables necessary for the operation or that can cause the maloperation of the safe shutdown systems.

Alignment Basis:

This is an introductory paragraph and does not contain any specific guidance. The specific guidance, and references to the applicable BVPS documents, is provided in the subsequent sections. Except as specifically noted below, the BVPS methodology aligns with that provided in NEI 00-01.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- None

Open Items and VFDRs

-None

NEI 00-01 Section:

3.2.1 - Criteria/Assumptions

Alignment Statement: Aligns

Consider the following criteria and assumptions when identifying equipment necessary to perform the required safe shutdown functions:

Alignment Basis:

This is an introductory paragraph and does not contain any specific guidance. The specific guidance, and references to the applicable BVPS documents, is provided in the subsequent sections. Except as specifically noted below, the BVPS methodology aligns with that provided in NEI 00-01.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- None

Open Items and VFDRs

-None

NEI 00-01 Section:

3.2.1.1 - Safe Shutdown Equipment Categories

Alignment Statement: Aligns

Safe shutdown equipment can be divided into two categories. Equipment may be categorized as (1) primary components or (2) secondary components. Typically, the following types of equipment are considered to be primary components:

- Pumps, motor operated valves, solenoid valves, fans, gas bottles, dampers, unit coolers, etc.

- *All necessary process indicators and recorders (i.e., flow indicator, temperature indicator, turbine speed indicator, pressure indicator, level recorder)*

- Power supplies or other electrical components that support operation of primary components (i.e., diesel generators, switchgear, motor control centers, load centers, power supplies, distribution panels, etc.).

Secondary components are typically items found within the circuitry for a primary component. These provide a supporting role to the overall circuit function. Some secondary components may provide an isolation function or a signal to a primary component via either an interlock or input signal processor. Examples of secondary components include flow switches, pressure switches, temperature switches, level switches, temperature elements, speed elements, transmitters, converters, controllers, transducers, signal conditioners, hand switches, relays, fuses and various instrumentation devices.

Determine which equipment should be included on the Safe Shutdown Equipment List (SSEL). As an option, include secondary components with a primary component(s) that would be affected by fire damage to the secondary component. By doing this, the SSEL can be kept to a manageable size and the equipment included on the SSEL can be readily related to required post-fire safe shutdown systems and functions.

Alignment Basis:

The BVPS-1 and BVPS-2 NFPA 805 Safe shutdown analysis interim transition reports, Attachment 1 (8700-01.062-0048 and 2701.620-000-105) describe the systems that are required for post fire safe shutdown. The analysis does not classify the components as primary and secondary. The safe shutdown equipment list (SSEL) required for safe shutdown for each fire compartment are identified in Attachment 2. This list identifies the components that are required to achieve safe shutdown. The types of equipment located on the SSEL include pumps, MOVs, manual valves, and indicators.

The electrical equipment is analyzed in the BVPS-1 "Post Fire Safe Shutdown Cable Identification" procedure (8700-01.062-0009) and the "BVPS-2 NFPA 805 Safe Shutdown and Fire PRA Cable Selection Report" (2701.620-000-016).

Section 5.0 of 8700-01.062-0009 and Attachment 3 of 2701.620-000-016 states:

"The electrical circuits associated with safe shutdown components shall be evaluated to determine which cables are necessary to support the required safe shutdown function(s) of the component. If a fire induced fault of the cable can adversely affect the control/operation of the component, the cable shall be identified as a required safe shutdown cable. Required safe shutdown cables will generally include circuits directly involved with power, control, and/or operation of the component, interlocks and permissives, associated circuit, etc."

The BVPS-1 and BVPS-2 safe shutdown analysis methodology is summarized in Section 8 of the procedures titled "Post Fire Safe Shutdown Analysis" (8700-01.062-0011 and 2601.620-000-021). The safe shutdown systems and equipment required for safe shutdown for each fire compartment are identified. As part of NFPA 805 Transition, Beaver Valley has incorporated the post-fire safe shutdown analysis into a computerized safe shutdown analysis tool, "SAFE," which maintains success path models of performance goals (methods), systems, equipment, and cables. There is a SAFE shutdown analysis report for each unit (8700-01.062-0048 and 2701.620-000-105).

The procedures (8700-01.062-0011 and 2601.620-000-021) state:

"8.0 METHODOLOGY

"The SAFE analysis software identifies all of the SSD equipment and cables that are located in the analysis area and fail as a direct consequence of the fire (location failures). The effect of these location failures is then propagated (by the software) through the cable logic, component logic, system logic, and finally the performance goal logic in order to evaluate the overall impact upon safe shutdown capability. This iterative process identifies the equipment, systems, and performance goals that fail as an indirect consequence of the fire. These indirect failures are identified as logic failures.

"When performing a computer-assisted analysis, the software presumes that all of the SSD equipment and cable located in an analysis area (e.g., fire scenario, zone, and/or area) are involved in the fire, and have failed. The SSD engineer who resolves the analysis output should initially presume that all of the failed components have assumed the worst-case status or position with respect to achieving safe shutdown."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 2701.620-000-016, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown and Fire PRA Cable Selection Report"
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0009, Rev. A, "P1866-004-001, Post-fire Safe Shutdown Cable Identification"
- 8700-01.062-0011, Rev. A, "P1866-009-001, Post-Fire Safe Shutdown Analysis"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.2.1.2 - Manual Valves and Piping

Alignment Statement: Aligns

Assume that exposure fire damage to manual valves and piping does not adversely impact their ability to perform their pressure boundary or safe shutdown function (heat sensitive piping materials, including tubing with brazed or soldered joints, are not included in this assumption). Fire damage should be evaluated with respect to the ability to manually open or close the valve should this be necessary as a part of the post-fire safe shutdown scenario.

Alignment Basis:

Piping, heat exchangers, and tanks that are exposed to a fire are assumed to be unaffected in their ability to function as pressure boundaries or as safe shutdown components. Brazed and soldered lines are assumed to be damaged in the event of a fire. Availability of Instrument Air (IA) is not assured.

Fire damage was evaluated with respect to the ability to manually open or close the valves as necessary as a part of the post-fire safe shutdown scenario. The issue was to analyze the potential for fire damage to credited manual valves.

As part of the NFPA 805 transition project, a review and evaluation of recovery actions was performed. The process followed the guidance provided in NEI-04-02, and the FAQ 07-0030 and included the determination of feasibility/reliability of the operator manual actions. Where feasibility reviews called into question use of manual valves in the fire compartment after the fire was extinguished, the recovery strategy was modified to ensure recovery actions could be successfully and reliability credited.

The methodology for evaluation of recovery actions is documented in Transition Report Attachment G "Recovery Actions Transition".

VFDRs have been documented in Transition Report Attachment C and include recovery actions which are required because of a lack of separation in accordance with NFPA 805 Section 4.2.3.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-096, Rev. B, "Fire Area Transition Review"
- 2701.620-000-103, Rev. B, "Review Recover Actions for LAR Attachment G"
- FAQ 07-0030, Rev. 5, "ML110070485 Establishing Recovery Actions"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.2.1.3 - Valves in Normal Position

Alignment Statement: Aligns

Assume that manual valves are in their normal position as shown on P&IDs or in the plant operating procedures.

Alignment Basis:

The BVPS-1 and BVPS-2 NFPA 805 Safe Shutdown Analysis Interim Transition Reports (8700-01.062-0048 and 2701.620-000-105), Attachment 1 describes the Safe Shutdown Performance Goal and System Logic Model Description. The Notes section states:

"All manual valves are assumed to be in the normal, at-power position, as shown on the respective Valve Operation/Numbering Diagram (VOND). Manual valves are assumed to survive the fire. They are considered available, even inside the Fire Area, as long as they are not required to be operated for Hot Shutdown."

Therefore, manual valves are assumed to be in their normal position.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.2.1.4 - Check Valves

Alignment Statement: Aligns

Assume that a check valve closes in the direction of potential flow diversion and seats properly with sufficient leak tightness to prevent flow diversion. Therefore, check valves do not adversely affect the flow rate capability of the safe shutdown systems being used for inventory control, decay heat removal, equipment cooling or other related safe shutdown functions.

Alignment Basis:

Safe Shutdown analysis assumptions for BVPS-1 and BVPS-2 post-fire integrity of check valves are functionally identical to the NEI guidance.

BVPS-1 procedure "Post Fire Safe Shutdown and PRA Systems and Component Selection" states:

"7.4 Piping, check valves, strainers, tanks, manual valves, heat exchangers, safety relief valves, and pressure vessels are assumed to remain functional during and after a fire."

"8.2.3 Normally closed manual valves and properly oriented check valves credited as system boundaries are not required to be listed in the SSEL."

BVPS-2 procedure "Post-Fire Safe Shutdown Analysis" states:
"7.0 Criteria, Assumptions and Bases
"Assumptions applicable to this activity can be found in NFPA 805, Appendix B and NEI 00-01, Section 3.0."

Confirmation of the check valve assumptions can be found in Attachment 1, Safe Shutdown Model, to the "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report."
For example, Note 1 under 2-RCS-ISOL indicates:
"All interconnected systems that would inject water to the RCS (CVCS, several SI connections) are protected by double check valve arrangements and need not be considered as loss of inventory paths."
Note 4 under 2-CVCS-SUPP indicates in part:
"To prevent loss of RWST water, spurious closure of the Quench Spray Pump breakers is modeled. ... Drain-down to the sump or Boric Acid Tanks is prevented by check valves in the lines."

Therefore check valves do not adversely affect the flow rate capability of the safe shutdown systems.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0008, Rev. A, "P1866-003-001, Post-fire Safe Shutdown and PRA Sys. and Component Selection"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.2.1.5 - Instrument Failure

Alignment Statement: Aligns

Instruments (e.g., resistance temperature detectors, thermocouples, pressure transmitters, and flow transmitters) are assumed to fail upscale, midscale, or downscale as a result of fire damage, whichever is worse. An instrument performing a control function is assumed to provide an undesired signal to the control circuit.

Alignment Basis:

The BVPS-1 procedure "Post Fire Safe Shutdown Cable Identification" (8700-01.062-0009) and Attachment 3 of the BVPS-2 report "Beaver Valley Unit 2 NFPA 805 Safe Shutdown and Fire PRA Cable Selection Report" (2701.620-000-016) state:

"3.5.4 For instrument loops, the instrument circuits (cables that transmit signals from the transmitter to the indicator or recorder) should be listed against the indicator or recorder. In addition, the support components should also be listed for the indicator or recorder (i.e., square-root converters, isolation devices, loop power supplies, etc.). These support instruments are not required to appear on the Safe Shutdown Equipment List (SSEL)."

Section 5.0 further states:

"The electrical circuits associated with safe shutdown components shall be evaluated to determine which cables are necessary to support the required safe shutdown function(s) of the component. If a fire induced fault of the cable can adversely affect the control/operation of the component, the cable shall be identified as a required safe shutdown cable. Required safe shutdown cables will generally include circuits directly involved with power, control, and/or operation of the component, interlocks and permissives, associated circuit, etc."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-016, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown and Fire PRA Cable Selection Report"
- 8700-01.062-0009, Rev. A, "P1866-004-001, Post-fire Safe Shutdown Cable Identification"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.2.1.6 - Spurious Operation

Alignment Statement: Aligns

Identify equipment that could spuriously operate or mal-operate and impact the performance of equipment on a required safe shutdown path during the equipment selection phase. Consider Bin 1 of RIS 2004-03 during the equipment identification process.

Alignment Basis:

As part of the NFPA 805 transition project, a BVPS-1 and BVPS-2 review and evaluation of susceptibility to fire-induced MSOs was performed. The methodology for evaluation of MSOs are documented in LAR Attachment F. Where multiple spurious operations result in potential loss of the credited safe shutdown flowpath, VFDRs are documented in the applicable Transition Report Attachment C record.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-010, Rev. C, "ARS-PI-0003, Task 2.3, Nuclear Safety Performance Criteria (Fire Area) Reviews"
- 2701.620-000-005, Rev. B, "BVPS-2 MSO Expert Panel Review Report "
- 2701.620-000-094, Rev. A, "BV Transition Report Att. F, Fire-Induced Multiple Spurious Operations Resolution"
- 2701.620-000-096, Rev. B, "Fire Area Transition Review"
- 8700-01.062-0002, Rev. B, "BVPS-1 MSO Expert Panel Review Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.2.1.7 - Instrument Tubing

Alignment Statement: Aligns

Identify instrument tubing that may cause subsequent effects on instrument readings or signals as a result of fire. Determine and consider the fire area location of the instrument tubing when evaluating the effects of fire damage to circuits and equipment in the fire area.

Alignment Basis:

BVPS-1 and BVPS-2 review of fire effects on instrument sensing lines were performed. Each unit's transmitters were reviewed and found acceptable or were satisfactorily dispositioned. The results of those analyses are found in 8700-01.062-0039, "BVPS-1 Instrument Tubing Locations for NFPA-805 Transition" and 2701.620-000-011, "BVPS-2 Instrument Tubing Locations for NFPA-805 Transition."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-011, Rev. A, "BVPS-2 Instrument Tubing Locations for NFPA-805 Transition"
- 8700-01.062-0039, Rev. B, "BVPS-1 Instrument Tubing Locations for NFPA-805"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.2.2 - Methodology for Equipment Selection

Alignment Statement: Aligns

Refer to NEI-00-01 Rev 1 Figure 3-3 for a flowchart illustrating the various steps involved in selecting safe shutdown equipment.

Use the following methodology to select the safe shutdown equipment for a post-fire safe shutdown analysis:

Alignment Basis:

This is an introductory paragraph and does not contain any specific guidance. The specific guidance, and references to the applicable BVPS-1 and BVPS-2 documents, are provided in the subsequent sections. Except as specifically noted below, the BVPS-1 and BVPS-2 methodology align with that provided in NEI 00-01.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- None

Open Items and VFDRs

-None

NEI 00-01 Section:

3.2.2.1 - Identify the System Flow Path for Each Shutdown Path

Alignment Statement: Not in Alignment, but No Adverse Consequences

Mark up and annotate a P&ID to highlight the specific flow paths for each system in support of each shutdown path. Refer to NEI 00-01, Attachment 2 for an example of an annotated P&ID illustrating this concept.

Alignment Basis:

The BVPS-1 and BVPS-2 NFPA 805 Safe shutdown analysis interim transition reports (8700-01.062-0048 and 2701.620-000-105), Attachment 1 describe the systems that are required for post fire safe shutdown. The BVPS-1 procedure "Post-Fire SSD and PRA and Component Selection" (8700-01.062-0008) describe the methodology and documentation requirements associated with selection of post-fire safe shutdown systems and components.

Section 8.1 of the procedures indicates that P&IDs are reviewed:

"8.1.1 The systems engineer will review the following documentation as applicable to perform this validation:
- Operating Procedures
- Piping and Instrumentation Diagrams (P&IDs)
- Single-line Diagrams
- System Design Basis Documents
- Licensing Documents
- Calculations

"8.1.2 The specific safe shutdown function(s) provided by each system shall be identified (i.e., for CVCS, provides makeup to RCS to account for normal leakage and shrinkage due to cooldown, provides RCP seal injection flow to maintain the integrity of the RCP seals, etc.)."

Section 8.2 of the procedure states:

"The P&IDs will be reviewed to verify the components on the SSEL for the subject system(s) are necessary to support the nuclear safety objectives. The validation activity for SSEL components will be performed through a review of flowpaths for systems and system boundaries. Components in the flow paths that require operation/repositioning to allow the system to function, and components that could spuriously operate and impair safe shutdown shall be verified/identified and included in the SSEL. Support system (e.g., electrical power and control, instrumentation, instrument air, cooling and ventilation, smoke evacuation, etc.) components shall also bc included in the SSEL. The safe shutdown and spurious components shall be designated as such."

As part of NFPA 805 Transition, Beaver Valley has incorporated the post-fire safe shutdown analysis into a computerized safe shutdown analysis tool, "SAFE," which *maintains success path models of performance goals (methods), systems, equipment, and cables.*

The procedures (8700-01.062-0011 and 2601.620-000-021) state:

"8.0 METHODOLOGY

"The SAFE analysis software identifies all of the SSD equipment and cables that are located in the analysis area and fail as a direct consequence of the fire (location failures). The effect of these location failures is then propagated (by the software) through the cable logic, component logic, system logic, and finally the performance goal logic in order to evaluate the overall impact upon safe shutdown capability. This iterative process identifies the equipment, systems, and performance goals that fail as an indirect consequence of the fire. These indirect failures are identified as logic failures.

"When performing a computer-assisted analysis, the software presumes that all of the SSD equipment and cable located in an analysis area (e.g., fire scenario, zone, and/or area) are involved in the fire, and have failed. The SSD engineer who resolves the analysis output should initially presume that all of the failed components have assumed the worst-case status or position with respect to achieving safe shutdown."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0008, Rev. A, "P1866-003-001, Post-fire Safe Shutdown and PRA Sys. and Component Selection"
- 8700-01.062-0011, Rev. A, "P1866-009-001, Post-Fire Safe Shutdown Analysis"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.2.2.2 - Identify the Equipment in Each Safe Shutdown System Flow Path Including Equipment That May Spuriously Operate and Affect System Operation

Alignment Statement: Aligns

Review the applicable documentation (e.g. P&IDs, electrical drawings, instrument loop diagrams) to assure that all equipment in each system's flow path has been identified. Assure that any equipment that could spuriously operate and adversely affect the desired system function(s) is also identified. If additional systems are *identified which are necessary for the operation of the safe shutdown system under review, include these as systems required for safe shutdown. Designate these* new systems with the same safe shutdown path as the primary safe shutdown system under review (Refer to Figure 3-1).

Alignment Basis:

The BVPS-1 and BVPS-2 NFPA 805 Safe shutdown analysis interim transition reports (8700-01.062-0048 and 2701.620-000-105), Attachment 1 describe the systems that are required for post fire safe shutdown. The BVPS-1 procedure "Post-Fire SSD and PRA and Component Selection" (8700-01.062-0008) describe the methodology and documentation requirements associated with selection of post-fire safe shutdown systems and components.

Section 8.2 of the procedure states:

"The P&IDs will be reviewed to verify the components on the SSEL for the subject system(s) are necessary to support the nuclear safety objectives. The validation activity for SSEL components will be performed through a review of flowpaths for systems and system boundaries. Components in the flow paths that require operation/repositioning to allow the system to function, and components that could spuriously operate and impair safe shutdown shall be verified/identified and included in the SSEL. Support system (e.g., electrical power and control, instrumentation, instrument air, cooling and ventilation, smoke evacuation, etc.) components shall also bc included in the SSEL. The safe shutdown and spurious components shall be designated as such."

As part of NFPA 805 Transition, Beaver Valley has incorporated the post-fire safe shutdown analysis into a computerized safe shutdown analysis tool, "SAFE," which maintains success path models of performance goals (methods), systems, equipment, and cables.

The procedures (8700-01.062-0011 and 2601.620-000-021) state:

"8.0 METHODOLOGY

"The SAFE analysis software identifies all of the SSD equipment and cables that are located in the analysis area and fail as a direct consequence of the fire (location failures). The effect of these location failures is then propagated (by the software) through the cable logic, component logic, system logic, and finally the performance goal logic in order to evaluate the overall impact upon safe shutdown capability. This iterative process identifies the equipment, systems, and performance goals that fail as an indirect consequence of the fire. These indirect failures are identified as logic failures.

"When performing a computer-assisted analysis, the software presumes that all of the SSD equipment and cable located in an analysis area (e.g., fire scenario, zone, and/or area) are involved in the fire, and have failed. The SSD engineer who resolves the analysis output should initially presume that all of the failed components have assumed the worst-case status or position with respect to achieving safe shutdown."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0008, Rev. A, "P1866-003-001, Post-fire Safe Shutdown and PRA Sys. and Component Selection"
- 8700-01.062-0011, Rev. A, "P1866-009-001, Post-Fire Safe Shutdown Analysis"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.2.2.3 - Develop a List of Safe Shutdown Equipment and Assign the Corresponding System and Safe Shutdown Path(s) Designation to Each

Alignment Statement: Aligns with Intent

Prepare a table listing the equipment identified for each system and the shutdown path that it supports. Identify any valves or other equipment that could spuriously operate and impact the operation of that safe shutdown system.

Assign the safe shutdown path for the affected system to this equipment. During the cable selection phase, identify additional equipment required to support the safe shutdown function of the path (e.g., electrical distribution system equipment). Include this additional equipment in the safe shutdown equipment list. Attachment 3 to this document provides an example of a (SSEL). The SSEL identifies the list of equipment within the plant considered for safe shutdown and it documents various equipment related attributes used in the analysis.

Alignment Basis:

The NEI 00-01 Attachment 3 SSEL table provides a template and a description of the type of information for listing safe shutdown systems and components.

The safe shutdown equipment list (SSEL) required for safe shutdown for each fire compartment are identified in Attachment 2 of the BVPS-1 and BVPS-2 NFPA 805 Safe shutdown analysis interim transition reports (8700-01.062-0048 and 2701.620-000-105). This list identifies the components that are required to achieve safe shutdown. The types of equipment located on the SSEL include pumps, MOVs, manual valves, and indicators.

The electrical equipment is analyzed in the BVPS-1 "Post Fire Safe Shutdown Cable Identification" procedure (8700-01.062-0009) and the "BVPS-2 NFPA 805 Safe Shutdown and Fire PRA Cable Selection Report" (2701.620-000-016).

Section 5.0 of 8700-01.062-0009 and Attachment 3 of 2701.620-000-016 states:

"The electrical circuits associated with safe shutdown components shall be evaluated to determine which cables are necessary to support the required safe shutdown function(s) of the component. If a fire induced fault of the cable can adversely affect the control/operation of the component, the cable shall be identified as a required safe shutdown cable. Required safe shutdown cables will generally include circuits directly involved with power, control, and/or operation of the component, interlocks and permissives, associated circuit, etc."

In addition, for both units as part of NFPA 805 transition, BVPS has incorporated the post-fire safe shutdown analyses into a computerized safe shutdown analysis tool "SAFE" which maintains success path models of performance goals (methods), systems, equipment, and cables, sorted by fire compartment and by equipment identification.

The "Post Fire Safe Shutdown Analysis" procedures (8700-01.062-0011 and 2601.620-000-021) state:

"8.0 METHODOLOGY

"The SAFE analysis software identifies all of the SSD equipment and cables that are located in the analysis area and fail as a direct consequence of the fire (location

failures). The effect of these location failures is then propagated (by the software) through the cable logic, component logic, system logic, and finally the performance goal logic in order to evaluate the overall impact upon safe shutdown capability. This iterative process identifies the equipment, systems, and performance goals that fail as an indirect consequence of the fire. These indirect failures are identified as logic failures.

"When performing a computer-assisted analysis, the software presumes that all of the SSD equipment and cable located in an analysis area (e.g., fire scenario, zone, and/or area) are involved in the fire, and have failed. The SSD engineer who resolves the analysis output should initially presume that all of the failed components have assumed the worst-case status or position with respect to achieving safe shutdown."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 2701.620-000-016, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown and Fire PRA Cable Selection Report"
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0009, Rev. A, "P1866-004-001, Post-fire Safe Shutdown Cable Identification"
- 8700-01.062-0011, Rev. A, "P1866-009-001, Post-Fire Safe Shutdown Analysis"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.2.2.4 - Identify Equipment Information Required for the Safe Shutdown Analysis

Alignment Statement: Aligns with Intent

Collect additional equipment-related information necessary for performing the post-fire safe shutdown analysis for the equipment. In order to facilitate the analysis, tabulate this data for each piece of equipment on the SSEL. Refer to Attachment 3 to this document for an example of a SSEL. Examples of related equipment data should include the equipment type, equipment description, safe shutdown system, safe shutdown path, drawing reference, fire area, fire zone, and room location of equipment. Other information such as the following may be useful in performing the safe shutdown analysis: normal position, hot shutdown position, cold shutdown position, failed air position, failed electrical position, high/low pressure interface concern, and spurious operation concern.

Alignment Basis:

The NEI 00-01 Attachment 3 SSEL table provides a template and a description of the type of information for listing safe shutdown systems and components.

The safe shutdown equipment list (SSEL) required for safe shutdown for each fire compartment are identified in Attachment 2 of the BVPS-1 and BVPS-2 NFPA 805 Safe shutdown analysis interim transition reports (8700-01.062-0048 and 2701.620-000-105). This list identifies the components that are required to achieve safe shutdown. The types of equipment located on the SSEL include pumps, MOVs, manual valves, and indicators.

The electrical equipment is analyzed in the BVPS-1 "Post Fire Safe Shutdown Cable Identification" procedure (8700-01.062-0009) and the "BVPS-2 NFPA 805 Safe Shutdown and Fire PRA Cable Selection Report" (2701.620-000-016).

Section 5.0 of 8700-01.062-0009 and Attachment 3 of 2701.620-000-016 states:

"The electrical circuits associated with safe shutdown components shall be evaluated to determine which cables are necessary to support the required safe shutdown function(s) of the component. If a fire induced fault of the cable can adversely affect the control/operation of the component, the cable shall be identified as a required safe shutdown cable. Required safe shutdown cables will generally include circuits directly involved with power, control, and/or operation of the component, interlocks and permissives, associated circuit, etc."

In addition, for both units as part of NFPA 805 transition, BVPS has incorporated the post-fire safe shutdown analyses into a computerized safe shutdown analysis tool "SAFE" which maintains success path models of performance goals (methods), systems, equipment, and cables, sorted by fire compartment and by equipment identification.

The "Post Fire Safe Shutdown Analysis" procedures (8700-01.062-0011 and 2601.620-000-021) state:

"8.0 METHODOLOGY

"The SAFE analysis software identifies all of the SSD equipment and cables that are located in the analysis area and fail as a direct consequence of the fire (location failures). The effect of these location failures is then propagated (by the software) through the cable logic, component logic, system logic, and finally the performance goal logic in order to evaluate the overall impact upon safe shutdown capability. This iterative process identifies the equipment, systems, and

performance goals that fail as an indirect consequence of the fire. These indirect failures are identified as logic failures.

"When performing a computer-assisted analysis, the software presumes that all of the SSD equipment and cable located in an analysis area (e.g., fire scenario, zone, and/or area) are involved in the fire, and have failed. The SSD engineer who resolves the analysis output should initially presume that all of the failed components have assumed the worst-case status or position with respect to achieving safe shutdown."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 2701.620-000-016, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown and Fire PRA Cable Selection Report"
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0009, Rev. A, "P1866-004-001, Post-fire Safe Shutdown Cable Identification"
- 8700-01.062-0011, Rev. A, "P1866-009-001, Post-Fire Safe Shutdown Analysis"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.2.2.5 - Identify Dependencies Between Equipment, Supporting Equipment, Safe Shutdown Systems and Safe Shutdown Paths

Alignment Statement: Aligns

In the process of defining equipment and cables for safe shutdown, identify additional supporting equipment such as electrical power and interlocked equipment. As an aid in assessing identified impacts to safe shutdown, consider modeling the dependency between equipment within each safe shutdown path either in a relational database or in the form of a Safe Shutdown Logic Diagram (SSLD). Attachment 4 provides an example of a SSLD that may be developed to document these relationships.

Alignment Basis:

For both units as part of NFPA 805 transition, BVPS has incorporated the post-fire safe shutdown analyses into a computerized safe shutdown analysis tool "SAFE" which maintains success path models of performance goals (methods), systems, equipment, and cables, sorted by fire compartment and by equipment identification. The SAFE analysis software identifies the SSD equipment and cables that are located in the analysis area and fail as a direct consequence of the fire. The effect of these location failures is then propagated (by the software) through the cable logic, component logic, system logic, and finally the performance goal logic in order to evaluate the overall impact upon safe shutdown capability. This iterative process identifies the equipment, systems, and performance goals that fail as an indirect consequence of the fire. Attachment 2 of the SAFE shutdown analyses reports contains the safe shutdown equipment list and failure modes analyzed.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NFPA 805 Section: 2.4.2.2 - Nuclear Safety Capability Circuit Analysis

2.4.2.2.1 Circuits Required in Nuclear Safety Functions. Circuits required for the nuclear safety functions shall be identified. This includes circuits that are required for operation, that could prevent the operation, or that result in the maloperation of the equipment identified in 2.4.2.1. This evaluation shall consider fire-induced failure modes such as hot shorts (external and internal), open circuits, and shorts to ground, to identify circuits that are required to support the proper operation of components required to achieve the nuclear safety performance criteria, including spurious operation and signals. This will ensure that a comprehensive population of circuitry is evaluated. 2.4.2.2.2 Other Required Circuits. Other circuits that share common power supply and/or common enclosure with circuits required to achieve nuclear safety performance criteria shall be evaluated for their impact on the ability to achieve nuclear safety performance criteria. (a) Common Power Supply Circuits. Those circuits whose fire-induced failure could cause the loss of a power supply required to achieve the nuclear safety performance criteria shall be identified. This situation could occur if the upstream protection device (i.e., breaker or fuse) is not properly coordinated with the downstream protection device. (b) Common Enclosure Circuits. Those circuits that share enclosures with circuits required to achieve the nuclear safety performance criteria and whose fire-induced failure could cause the loss of the required components shall be identified. The concern is that the effects of a fire can extend outside of the immediate fire area due to fire-induced electrical faults on inadequately protected cables or via inadequately sealed fire area boundaries.

NEI 00-01 Section:

3.3 - Safe Shutdown Cable Selection And Location

Alignment Statement: Aligns

This section provides industry guidance on the recommended methodology and criteria for selecting safe shutdown cables and determining their potential impact on equipment required for achieving and maintaining safe shutdown of an operating nuclear power plant for the condition of an exposure fire. The Appendix R safe shutdown cable selection criteria are developed to ensure that all cables that could affect the proper operation or that could cause the maloperation of safe shutdown equipment are identified and that these cables are properly related to the safe shutdown equipment whose functionality they could affect. Through this cable-to-equipment relationship, cables become part of the safe shutdown path assigned to the equipment affected by the cable.

Alignment Basis:

This is an introductory paragraph and does not contain any specific guidance. The specific guidance, and references to the applicable BVPS-1 and BVPS-2 documents, are provided in the subsequent sections. Except as specifically noted below, the BVPS-1 and BVPS-2 methodology align with that provided in NEI 00-01.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- None

Open Items and VFDRs

-None

NEI 00-01 Section:

3.3.1 - Criteria/Assumptions

Alignment Statement: Aligns

To identify an impact to safe shutdown equipment based on cable routing, the equipment must have cables that affect it identified. Carefully consider how cables are related to safe shutdown equipment so that impacts from these cables can be properly assessed in terms of their ultimate impact on safe shutdown system equipment.

Consider the following criteria when selecting cables that impact safe shutdown equipment:

Alignment Basis:

This is an introductory paragraph and does not contain any specific guidance. The specific guidance, and references to the applicable BVPS-1 and BVPS-2 documents, are provided in the subsequent sections. Except as specifically noted below, the BVPS-1 and BVPS-2 methodology align with that provided in NEI 00-01.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- None

Open Items and VFDRs

-None

NEI 00-01 Section:

3.3.1.1 - Cable Failures

Alignment Statement: Aligns

The list of cables whose failure could impact the operation of a piece of safe shutdown equipment includes more than those cables connected to the equipment. The relationship between cable and affected equipment is based on a review of the electrical or elementary wiring diagrams. To assure that all cables that could affect the operation of the safe shutdown equipment are identified, investigate the power, control, instrumentation, interlock, and equipment status indication cables related to the equipment. Consider reviewing additional schematic diagrams to identify additional cables for interlocked circuits that also need to be considered for their impact on the ability of the equipment to operate as required in support of postfire safe shutdown. As an option, consider applying the screening criteria from Section 3.5 as a part of this section. For an example of this see Section 3.3.1.4.

Alignment Basis:

The BVPS-1 and BVPS-2 NFPA 805 Safe shutdown analysis interim transition reports, Attachment 1 (8700-01.062-0048 and 2701.620-000-105) describe the systems that are required for post fire safe shutdown. The BVPS-1 procedure "Post Fire Safe Shutdown Cable Identification" (8700-01.062-0009) and BVPS-2 report "Beaver Valley Unit 2 NFPA 805 Safe Shutdown and Fire PRA Cable Selection Report" (2701.620-000-016) describe the methodology and documentation requirements associated with selection of post-fire safe shutdown cables.

As part of NFPA 805 Transition, Beaver Valley has incorporated the post-fire safe shutdown analysis (8700-01.062-0011 and 2601.620-000-021) into a computerized safe shutdown analysis tool, "SAFE," which maintains success path models of performance goals (methods), systems, equipment, and cables.

The procedures state:

"8.0 METHODOLOGY

"The SAFE analysis software identifies all of the SSD equipment and cables that are located in the analysis area and fail as a direct consequence of the fire (location failures). The effect of these location failures is then propagated (by the software) through the cable logic, component logic, system logic, and finally the performance goal logic in order to evaluate the overall impact upon safe shutdown capability. This iterative process identifies the equipment, systems, and performance goals that fail as an indirect consequence of the fire. These indirect failures are identified as logic failures.

"When performing a computer-assisted analysis, the software presumes that all of the SSD equipment and cable located in an analysis area (e.g., fire scenario, zone, and/or area) are involved in the fire, and have failed. The SSD engineer who resolves the analysis output should initially presume that all of the failed components have assumed the worst-case status or position with respect to achieving safe shutdown."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 2701.620-000-016, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown and Fire PRA Cable Selection Report"
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0009, Rev. A, "P1866-004-001, Post-fire Safe Shutdown Cable Identification"
- 8700-01.062-0011, Rev. A, "P1866-009-001, Post-Fire Safe Shutdown Analysis" .
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.3.1.2 - Cable Failures Affecting Multiple Safe Shutdown Equipment

Alignment Statement: Aligns

In cases where the failure (including spurious actuations) of a single cable could impact more than one piece of safe shutdown equipment, include the cable with each piece of safe shutdown equipment.

Alignment Basis:

The BVPS-1 and BVPS-2 NFPA 805 Safe shutdown analysis interim transition reports (8700-01.062-0048 and 2701.620-000-105), Attachment 1 describe the systems that are required for post fire safe shutdown. The safe shutdown equipment list (SSEL) required for safe shutdown for each fire compartment are identified in Attachment 2. This list identifies the components that are required to achieve safe shutdown. The types of equipment located on the SSEL include pumps, MOVs, manual valves, and indicators.

The BVPS-1 procedure "Post Fire Safe Shutdown Cable Identification" (8700-01.062-0009) and BVPS-2 report "Beaver Valley Unit 2 NFPA 805 Safe Shutdown and *Fire PRA Cable Selection Report" (2701.620-000-016) describe the methodology and documentation requirements associated with selection of post-fire safe* shutdown cables.

Section 5.0 of 8700-01.062-0009 and Attachment 3 of 2701.620-000-016 states:

"The electrical circuits associated with safe shutdown components shall be evaluated to determine which cables are necessary to support the required safe shutdown function(s) of the component. If a fire induced fault of the cable can adversely affect the control/operation of the component, the cable shall be identified as a required safe shutdown cable. Required safe shutdown cables will generally include circuits directly involved with power, control, and/or operation of the component, interlocks and permissives, associated circuit, etc."

The procedures also state:

"A hot short between an energized conductor and a de-energized conductor within the same cable may cause a spurious actuation of equipment. The spuriously actuated device (e.g., relay) may be interlocked with another circuit that causes the spurious actuation of other equipment. This type of hot short is called a conductor-to-conductor hot short or an internal hot short."

For both units as part of the NFPA 805 transition project, a review and evaluation of susceptibility to fire-induced MSOs was performed. The methodology for evaluation of MSOs is documented in Transition Report Attachment F. Where multiple spurious operations result in potential loss of the credited safe shutdown flowpath, VFDRs are documented in the applicable Transition Report Attachment C record.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-016, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown and Fire PRA Cable Selection Report"
- 2701.620-000-094, Rev. A, "BV Transition Report Att. F, Fire-Induced Multiple Spurious Operations Resolution"
- 2701.620-000-096, Rev. B, "Fire Area Transition Review"
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0009, Rev. A, "P1866-004-001, Post-fire Safe Shutdown Cable Identification"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.3.1.3 - Electrical Isolation Devices

Alignment Statement: Aligns

Electrical devices such as relays, switches and signal resistor units are considered to be acceptable isolation devices. In the case of instrument loops, review the isolation capabilities of the devices in the loop to determine that an acceptable isolation device has been installed at each point where the loop must be isolated so that a fault would not impact the performance of the safe shutdown instrument function.

Alignment Basis:

The BVPS-1 procedure "Post Fire Safe Shutdown Cable Identification" (8700-01.062-0009) and Attachment 3 of the BVPS-2 report "Beaver Valley Unit 2 NFPA 805 Safe Shutdown and Fire PRA Cable Selection Report" (2701.620-000-016) state:

"3.5.4 For instrument loops, the instrument circuits (cables that transmit signals from the transmitter to the indicator or recorder) should be listed against the indicator or recorder. In addition, the support components should also be listed for the indicator or recorder (i.e., square-root converters, isolation devices, loop power supplies, etc.). These support instruments are not required to appear on the Safe Shutdown Equipment List (SSEL)."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-016, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown and Fire PRA Cable Selection Report"
- 8700-01.062-0009, Rev. A, "P1866-004-001, Post-fire Safe Shutdown Cable Identification"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.3.1.4 - Screening

Alignment Statement: Aligns

Screen out cables for circuits that do not impact the safe shutdown function of a component (i.e., annunciator circuits, space heater circuits and computer input circuits) unless some reliance on these circuits is necessary. However, they must be isolated from the component's control scheme in such a way that a cable fault would not impact the performance of the circuit.

Alignment Basis:

The BVPS-1 and BVPS-2 safe shutdown analysis methodology is summarized in Section 8 of the procedures titled "Post Fire Safe Shutdown Analysis" (8700-01.062-0011 and 2601.620-000-021). The safe shutdown systems and equipment required for safe shutdown for each fire compartment are identified. Therefore cables for circuits that do not impact the safe shutdown function of a component are screened out.

Section 5.0 of BVPS-1 and BVPS-2 "Post-Fire Safe Shutdown Cable Identification" (8700-01.062-0009 and Attachment 3 of 2701.620-000-016) states:

"The electrical circuits associated with safe shutdown components shall be evaluated to determine which cables are necessary to support the required safe shutdown function(s) of the component. If a fire induced fault of the cable can adversely affect the control/operation of the component, the cable shall be identified as a required safe shutdown cable. Required safe shutdown cables will generally include circuits directly involved with power, control, and/or operation of the component, interlocks and permissives, associated circuit, etc."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 2701.620-000-016, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown and Fire PRA Cable Selection Report"
- 8700-01.062-0009, Rev. A, "P1866-004-001, Post-fire Safe Shutdown Cable Identification"
- 8700-01.062-0011, Rev. A, "P1866-009-001, Post-Fire Safe Shutdown Analysis"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.3.1.5 - Power Supply to Safe Shutdown Equipment

Alignment Statement: Aligns

For each circuit requiring power to perform its safe shutdown function, identify the cable supplying power to each safe shutdown and/or required interlock component. Initially, identify only the power cables from the immediate upstream power source for these interlocked circuits and components (i.e., the closest power supply, load center or motor control center). Review further the electrical distribution system to capture the remaining equipment from the electrical power distribution system necessary to support delivery of power from either the offsite power source or the emergency diesel generators (i.e., onsite power source) to the safe shutdown equipment. Add this equipment to the safe shutdown equipment list. Evaluate the power cables for this additional equipment for associated circuits concerns.

Alignment Basis:

For both units as part of NFPA 805 transition, Beaver Valley has incorporated the post-fire safe shutdown analyses for both units into a computerized safe shutdown analysis tool "SAFE" which maintains success path models of performance goals (methods), systems, equipment, and cables. The software model incorporates the analyses done for the pre-transition licensing bases as well as an analysis of offsite power availability. The SAFE analysis software identifies all of the SSD equipment and cables that are located in the analysis fire compartment and fail as a direct consequence of the fire. The effect of these location failures is then propagated (by the software) through the cable logic, component logic, system logic, and finally the performance goal logic in order to evaluate the overall impact upon safe shutdown capability. This iterative process identifies the equipment, systems, and performance goals that fail as an indirect consequence of the fire. There is a SAFE shutdown analysis report (ITR-P1866-001 and ITR-P1953-001) for each unit.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.3.1.6 - Automatic Initiation Logics

Alignment Statement: Aligns

The automatic initiation logics for the credited post-fire safe shutdown systems are not required to support safe shutdown. Each system can be controlled manually by operator actuation in the main control room or emergency control station. If operator actions outside the MCR are necessary, those actions must conform to the regulatory requirements on manual actions. However, if not protected from the effects of fire, the fire-induced failure of automatic initiation logic circuits must not adversely affect any post-fire safe shutdown system function.

Alignment Basis:

The BVPS-1 and BVPS-2 Transition Report Attachment C documents the methodology required to achieve the nuclear safety performance requirements of NFPA 805 Section 1.5.1. A listing of required recovery actions (as defined in RG 1.205, Revision 1) and a summary of the approach for addressing the transition of recovery actions using guidance from FAQ 07-0030 is provided in Transition Report Attachment G.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-096, Rev. B, "Fire Area Transition Review"
- 2701.620-000-103, Rev. B, "Review Recover Actions for LAR Attachment G"
- FAQ 07-0030, Rev. 5, "ML110070485 Establishing Recovery Actions"
- RG 1.205, Rev. 1, "Risk-Informed, Performance-Based Fire Prot. for Existing Light Water NPPs"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.3.1.7 - Associated Circuits

Alignment Statement: Aligns

Cabling for the electrical distribution system is a concern for those breakers that feed associated circuits and are not fully coordinated with upstream breakers. With respect to electrical distribution cabling, two types of cable associations exist. For safe shutdown considerations, the direct power feed to a primary safe shutdown component is associated with the primary component. For example, the power feed to a pump is necessary to support the pump. Similarly, the power feed from the load center to an MCC supports the MCC. However, for cases where sufficient branch-circuit coordination is not provided, the same cables discussed above would also support the power supply. For example, the power feed to the pump discussed above would support the bus from which it is fed because, for the case of a common power source analysis, the concern is the loss of the upstream power source and not the connected load. Similarly, the cable feeding the MCC from the load center would also be necessary to support the load center.

Alignment Basis:

BVPS-1 procedure titled "Post Fire Safe Shutdown and PRA Systems and Component Selection" (8700-01.062-0008), Section 8.3 states:

"Electrical Properties: The normal power supply/source (and alternate power supply if one exists) associated with the safe shutdown component (including control power and indication only power, if applicable) shall be identified from existing design documents. Such documents may be the SSA, EWDs, single-lines, loop drawings, breaker list, and/or AC/DC load lists.

"The normal Motive Power source and the normal Control Power source shall be listed in the appropriate fields. The power supply shall be listed even if power is not required for the component to perform its safe shutdown function. Typically, the breaker supplying the power shall be listed as the normal power source.

"For those components with multiple sources of power, this information shall be entered in the "Additional Power Sources" field. This field may also be used to document the bus providing power, alternative power sources, indication power sources, or interlock power supplies. This text field shall include as much information as necessary to document the power sources for the component. A separate power supply to a dedicated interlocking device, which is not separately included in the SSEL, shall be entered against the primary component and the interlocking device's association with this primary component identified in the Additional Power Sources field. Manual and pneumatic components or direct reading indicators that do not have a power supply shall have "Manual", "Pneumatic", or "Direct Reading" or other means of approved terms identified under this attribute.

"For each power supply to a component, include the power source description. (Note that SAFE automatically prints the description for components entered into the Motive Power source and Control Power source fields)."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 8700-01.062-0008, Rev. A, "P1866-003-001, Post-fire Safe Shutdown and PRA Sys. and Component Selection"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.3.2 - Associated Circuit Cables

Alignment Statement: Aligns

Appendix R, Section III.G.2, requires that separation features be provided for equipment and cables, including associated nonsafety circuits that could prevent operation or cause maloperation due to hot shorts, open circuits, or shorts to ground, of redundant trains of systems necessary to achieve hot shutdown. The three types of associated circuits were identified in Reference 6.1.5 and further clarified in a NRC memorandum dated March 22, 1982 from R. Mattson to D. Eisenhut, Reference 6.1.6.
They are as follows:
- Spurious actuations
- Common power source
- Common enclosure

Cables Whose Failure May Cause Spurious Actuations
Safe shutdown system spurious actuation concerns can result from fire damage to a cable whose failure could cause the spurious actuation/mal-operation of equipment whose operation could affect safe shutdown. These cables are identified in Section 3.3.3 together with the remaining safe shutdown cables required to support control and operation of the equipment.
Common Power Source Cables
The concern for the common power source associated circuits is the loss of a safe shutdown power source due to inadequate breaker/fuse coordination. In the case of a fire-induced cable failure on a non-safe shutdown load circuit supplied from the safe shutdown power source, a lack of coordination between the upstream supply breaker/fuse feeding the safe shutdown power source and the load breaker/fuse supplying the non-safe shutdown faulted circuit can result in loss of the safe shutdown bus. This would result in the loss of power to the safe shutdown equipment supplied from that power source preventing the safe shutdown equipment from performing its required safe shutdown function. Identify these cables together with the remaining safe shutdown cables required to support control and operation of the equipment. Refer to Section 3.5.2.4 for an acceptable methodology for analyzing the impact of these cables on post-fire safe shutdown.
Common Enclosure Cables
The concern with common enclosure associated circuits is fire damage to a cable whose failure could propagate to other safe shutdown cables in the same enclosure either because the circuit is not properly protected by an isolation device (breaker/fuse) such that a fire induced fault could result in ignition along its length, or by the fire propagating along the cable and into an adjacent fire area. This fire spread to an adjacent fire area could impact safe shutdown equipment in that fire area, thereby resulting in a condition that exceeds the criteria and assumptions of this methodology (i.e., multiple fires). Refer to Section 3.5.2.5 for an acceptable methodology for analyzing the impact of these cables on post-fire safe shutdown.

Alignment Basis:

This is an introductory paragraph and does not contain any specific guidance. The specific guidance, and references to the applicable BVPS-1 and BVPS-2 documents, are provided in the subsequent sections. Except as specifically noted below, the BVPS-1 and BVPS-2 methodology align with that provided in NEI 00-01.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- None

Open Items and VFDRs

-None

NEI 00-01 Section:

3.3.3 - Methodology for Cable Selection and Location

Alignment Statement: Aligns

Refer to NEI 00-01 Figure 3-4 for a flowchart illustrating the various steps involved in selecting the cables necessary for performing a post-fire safe shutdown analysis.

Use the following methodology to define the cables required for safe shutdown including cables that may cause associated circuits concerns for a post-fire safe shutdown analysis:

Alignment Basis:

This is an introductory paragraph and does not contain any specific guidance. The specific guidance, and references to the applicable BVPS-1 and BVPS-2 documents, are provided in the subsequent sections. Except as specifically noted below, the BVPS-1 and BVPS-2 methodology align with that provided in NEI 00-01.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- None

Open Items and VFDRs

-None

NEI 00-01 Section:

3.3.3.1 - Identify Circuits Required for the Operation of the Safe Shutdown Equipment

Alignment Statement: Aligns

For each piece of safe shutdown equipment defined in section 3.2, review the appropriate electrical diagrams including the following documentation to identify the circuits (power, control, instrumentation) required for operation or whose failure may impact the operation of each piece of equipment:
- Single-line electrical diagrams
- Elementary wiring diagrams
- Electrical connection diagrams
- Instrument loop diagrams.

For electrical power distribution equipment such as power supplies, identify any circuits whose failure may cause a coordination concern for the bus under evaluation.

If power is required for the equipment, include the closest upstream power distribution source on the safe shutdown equipment list. Through the iterative process described in Figures 3-2 and 3-3, include the additional upstream power sources up to either the offsite or the emergency power source.

Alignment Basis:

For both units as part of NFPA 805 transition, Beaver Valley has incorporated the post-fire safe shutdown analysis into a computerized safe shutdown analysis tool "SAFE" which maintains success path models of performance goals (methods), systems, equipment, and cables.

Procedure 8700.01.062-0009 [2701.620-000-016], "Post Fire Safe Shutdown [/ Fire PRA] Cable Identification," Section 5.2, states:
"Using the Component and Cable Data Sheet (Exhibit 1) or electronic equivalent, the electrical engineer will identify and review electrical drawings such as one lines, schematics, block diagrams, wiring connection diagrams, etc and the latest revision of the BVPS-1 Updated Fire Protection Appendix R Review [BVPS-2 Fire Protection Safe Shutdown Report]. The electrical engineer shall identify the cables that are associated with the component, and identify those cables that are required for safe shutdown. Required cables are those that are necessary for the proper operation of the circuit, so that it can perform its required function(s), or cables which may adversely affect the circuit and keep it from correctly performing its required function(s)."

Licensing Actions

- None

Supporting Documents

- No Documents
- *No Evaluations*

References

- 2701.620-000-016, Rev. A, "Beaver Valley Unit 2 *NFPA 805 Safe Shutdown and Fire PRA Cable Selection* Report"
- 8700-01.062-0009, Rev. A, "P1866-004-001, Post-fire Safe Shutdown Cable Identification"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.3.3.2 - Identify Interlocked Circuits and Cables Whose Spurious Operation or Mal-operation Could Affect Shutdown

Alignment Statement: Aligns

In reviewing each control circuit, investigate interlocks that may lead to additional circuit schemes, cables and equipment. Assign to the equipment any cables for interlocked circuits that can affect the equipment.

While investigating the interlocked circuits, additional equipment or power sources may be discovered. Include these interlocked equipment or power sources in the safe shutdown equipment list (refer to NEI 00-01 Rev 1 Figure 3-3) if they can impact the operation of the equipment under consideration.

Alignment Basis:

Procedures 8700.01.062-0009 and 2701.620-000-016, "Post Fire Safe Shutdown / Fire PRA Cable Identification," state, in Section 3.1, Automatic Signals:
"Automatic signals (i.e., logic interlocks) from other circuits (i.e., interposing contacts in control circuits) shall be considered in the cable selection. One of the following two options may be used:
"1. The contact(s) can be assumed to be in the worst case position(s)
"2. The circuits associated with the interlock contact(s) can be analyzed and included in the safe shutdown cable selection for the component of concern."

And further, in Section 3.2, Permissive Signals:
"Permissive interlocks from other circuits (i.e., interposing contacts in control circuits) shall be considered in the cable selection. One of the following two options may be used:
"1. The contact(s) can be assumed to be in the worst case position(s)
"2. The circuits associated with the interlock contact(s) can be analyzed and included in the safe shutdown cable selection for the component of concern."

The above analysis descriptions meet the requirements of NEI 00-01.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-016, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown and Fire PRA Cable Selection Report"
- 8700-01.062-0009, Rev. A, "P1866-004-001, Post-fire Safe Shutdown Cable Identification"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.3.3.3 - Assign Cables to the Safe Shutdown Equipment

Alignment Statement: Aligns

Given the criteria/assumptions defined in Section 3.3.1, identify the cables required to operate or that may result in maloperation of each piece of safe shutdown equipment.

Tabulate the list of cables potentially affecting each piece of equipment in a relational database including the respective drawing numbers, their revision and any interlocks that are investigated to determine their impact on the operation of the equipment. In certain cases, the same cable may support multiple pieces of equipment. Relate the cables to each piece of equipment, but not necessarily to each supporting secondary component.

If adequate coordination does not exist for a particular circuit, relate the power cable to the power source. This will ensure that the power source is identified as affected equipment in the fire areas where the cable may be damaged.

Alignment Basis:

For both units as part of NFPA 805 transition, BVPS has incorporated the post-fire safe shutdown analyses into a computerized safe shutdown analysis tool "SAFE" which maintains success path models of performance goals (methods), systems, equipment, and cables, sorted by fire compartment and by equipment identification. The SAFE analysis software identifies the SSD equipment and cables that are located in the analysis fire compartment and fail as a direct consequence of the fire. The effect of these location failures is then propagated (by the software) through the cable logic, component logic, system logic, and finally the performance goal logic in order to evaluate the overall impact upon safe shutdown capability. This iterative process identifies the equipment, systems, and performance goals that fail as an indirect consequence of the fire. In the SAFE shutdown analysis reports, Attachment 7 identifies Failed Safe Shutdown Cables for each fire compartment and the impacted component(s).

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.5 - Circuit Analysis And Evaluation

Alignment Statement: Aligns

This section on circuit analysis provides information on the potential impact of fire on circuits used to monitor, control and power safe shutdown equipment. Applying the circuit analysis criteria will lead to an understanding of how fire damage to the cables may affect the ability to achieve and maintain post-fire safe shutdown in a particular fire area. This section should be used in conjunction with Section 3.4, to evaluate the potential fire-induced impacts that require mitigation. Appendix R Section III.G.2 identifies the fire-induced circuit failure types that are to be evaluated for impact from exposure fires on safe shutdown equipment. Section III.G.2 of Appendix R requires consideration of hot shorts, shorts-to-ground and open circuits.

Alignment Basis:

This is an introductory paragraph and does not contain any specific guidance. The specific guidance, and references to the applicable BVPS-1 and BVPS-2 documents, are provided in the subsequent sections. Except as specifically noted below, the BVPS-1 and BVPS-2 methodology align with that provided in NEI 00-01.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- None

Open Items and VFDRs

-None

NEI 00-01 Section:

3.5.1 - Criteria/Assumptions

Alignment Statement: Aligns

Apply the following criteria/assumptions when performing fire-induced circuit failure evaluations.

Alignment Basis:

This is an introductory paragraph and does not contain any specific guidance. The specific guidance, and references to the applicable BVPS-1 and BVPS-2 documents, are provided in the subsequent sections. Except as specifically noted below, the BVPS-1 and BVPS-2 methodology align with that provided in NEI 00-01.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- None

Open Items and VFDRs

-None

NEI 00-01 Section:

3.5.1.1 - Circuit Failure Types

Alignment Statement: Aligns

Consider the following circuit failure types on each conductor of each unprotected safe shutdown cable to determine the potential impact of a fire on the safe shutdown equipment associated with that conductor.

- A hot short may result from a fire-induced insulation breakdown between conductors of the same cable, a different cable or from some other external source resulting in a compatible but undesired impressed voltage or signal on a specific conductor. A hot short may cause a spurious operation of safe shutdown equipment.

- An open circuit may result from a fire-induced break in a conductor resulting in the loss of circuit continuity. An open circuit may prevent the ability to control or power the affected equipment. An open circuit may also result in a change of state for normally energized equipment. (e.g. [for BWRs] loss of power to the Main Steam Isolation Valve (MSIV) solenoid valves due to an open circuit will result in the closure of the MSIVs). Note that RIS 2004-03 indicates that open circuits, as an initial mode of cable failures, are considered to be of very low likelihood. The risk-informed inspection process will focus on failures with relatively high probabilities.

- A short-to-ground may result from a fire-induced breakdown of a cable insulation system, resulting in the potential on the conductor being applied to ground potential. A short-to-ground may have all of the same effects as an open circuit and, in addition, a short-to ground may also cause an impact to the control circuit or power train of which it is a part.

Consider the three types of circuit failures identified above to occur individually on each conductor of each safe shutdown cable on the required safe shutdown path in the fire area.

Alignment Basis:

BVPS-1 and BVPS-2 procedures titled "Post Fire Safe Shutdown Cable Identification" (8700-01.062-0009 and Attachment 3 of 2701.620-000-016) states:

"3.5.2 Circuits

"Circuit analysis and cable selection for an active component should include the following functions as applicable:

- Power Circuits
- Control Power Circuits
- Control Circuits
- Indication Circuits
- Instrument Circuits
- Permissive/Interlock Circuits
- Spurious Circuits
- Not Required Cables

"3.5.3

"Once the circuit conductors required to support the desired operations have been determined, the cables that contain these circuit conductors will be identified and documented in the "Cable Data" section of the Component and Cable Data Sheet(s). The function of the identified cables and the electrical drawings used for identification will also be determined and tabulated."

The identification of these Associated Circuits of concern was performed in accordance with NRC Generic Letters 81-12, 85-10, and the Staff's Clarification to the Generic Letter.

Licensing Actions

- None

Supporting Documents

- CALC -> 8700-DMC-1352
- No Evaluations

References

- 2701.620-000-016, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown and Fire PRA Cable Selection Report"
- 8700-01.062-0009, Rev. A, "P1866-004-001, Post-fire Safe Shutdown Cable Identification"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.5.1.2 - Circuit Contact Position

Alignment Statement: Aligns with Intent

Assume that circuit contacts are positioned (i.e., open or closed) consistent with the normal mode/position of the safe shutdown equipment as shown on the schematic drawings. The analyst must consider the position of the safe shutdown equipment for each specific shutdown scenario when determining the impact that fire damage to a particular circuit may have on the operation of the safe shutdown equipment.

Alignment Basis:

The Beaver Valley circuit analysis methodology documentation does not specifically address the analysis of electrical contact position; however, Beaver Valley did analyze the loss of system integrity or equipment damage in the analysis. In order to perform this analysis, electrical contact positions would have been taken into account.

BVPS-1 "Post Fire Safe Shutdown Cable Identification" (8700-01.62-0009) and Attachment 3 of BVPS-2 "NFPA 805 Safe Shutdown and Fire PRA Cable Selection Report" (2701.062-000-016) both state:

"For the purposes of performing cable selection, safe shutdown components are assumed initially to be in their normal plant operating position. All relay, position switch, and control switch contacts in control circuits are assumed to be in the position that corresponds to the normal plant operating condition of that device unless specifically stated otherwise. Test switches in control circuits are assumed to be in their normal plant operating position."

As part of NFPA 805 Transition, Beaver Valley has incorporated the post-fire safe shutdown analysis into a computerized safe shutdown analysis tool, "SAFE," which maintains success path models of performance goals (methods), systems, equipment, and cables. The SAFE analysis software considered the position of the safe shutdown equipment for each specific shutdown scenario.

The BVPS-1 and BVPS-2 procedures "Post Fire Safe Shutdown Analysis" (8700-01.062-0011 and 2601.620-000-021) state:

"8.0 METHODOLOGY

"The SAFE analysis software identifies all of the SSD equipment and cables that are located in the analysis area and fail as a direct consequence of the fire (location failures). The effect of these location failures is then propagated (by the software) through the cable logic, component logic, system logic, and finally the performance goal logic in order to evaluate the overall impact upon safe shutdown capability. This iterative process identifies the equipment, systems, and performance goals that fail as an indirect consequence of the fire. These indirect failures are identified as logic failures.

"When performing a computer-assisted analysis, the software presumes that all of the SSD equipment and cable located in an analysis area (e.g., fire scenario, zone, and/or area) are involved in the fire, and have failed. The SSD engineer who resolves the analysis output should initially presume that all of the failed components have assumed the worst-case status or position with respect to achieving safe shutdown."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 2701.620-000-016, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown and Fire PRA Cable Selection Report"
- 8700-01.062-0009, Rev. A, "P1866-004-001, Post-fire Safe Shutdown Cable Identification"
- 8700-01.062-0011, Rev. A, "P1866-009-001, Post-Fire Safe Shutdown Analysis"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.5.1.3 - Non-self Mitigating Effects

Alignment Statement: Aligns

Assume that circuit failure types resulting in spurious operations exist until action has been taken to isolate the given circuit from the fire area, or other actions have been taken to negate the effects of circuit failure that is causing the spurious actuation. The fire is not assumed to eventually clear the circuit fault. Note that RIS 2004-03 indicates that fire-induced hot shorts typically self-mitigate after a limited period of time.

Alignment Basis:

Cable selection is done in accordance with 8700.01.062-0009 and 2701.620-000-016, the procedures for "Post-Fire Safe Shutdown/Fire-PRA Cable Selection."
Section 5.0 Procedure includes:
"The electrical circuits associated with safe shutdown components shall be evaluated to determine which cables are necessary to support the required safe shutdown function(s) of the component. If a fire induced fault of the cable can adversely affect the control/operation of the component, the cable shall be identified as a required safe shutdown cable, Required safe shutdown cables will generally include circuits directly involved with power, control, and / or operation of the component, interlocks and permissives, associated circuit, etc. If a fire induced failure of a cable cannot adversely affect the required safe shutdown function(s) of the component, then it is considered to be a non-required cable."

The faults are evaluated in the software as present or absent, and the circuits are dispositioned as required or not required, based upon the potential impact of the faults caused by the fire. The faults are not evaluated as time-dependent or self-mitigating. For both units, the Beaver Valley safe shutdown analyses are consistent with this assumption.

For both units as part of the NFPA 805 transition project, a review and evaluation of susceptibility to fire-induced MSOs was performed. In order to evaluate the susceptibility of automatic initiation logic circuits to fire induced failure, a review and evaluation of susceptibility to fire-induced MSOs was performed and documented in Transition Report Attachment F. Where multiple spurious operations result in potential loss of the credited safe shutdown flowpath, or where recovery actions are required because of a lack of separation, VFDRs are documented in the applicable Transition Report Attachment C record. MSOs were considered within the fire PRA, and the multiple spurious failure combinations scenarios that meet "probabilistic criteria" are included in the design and license basis for the NFPA 805 transition process.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-005, Rev. B, "BVPS-2 MSO Expert Panel Review Report "
- 2701.620-000-016, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown and Fire PRA Cable Selection Report"
- 2701.620-000-094, Rev. A, "BV Transition Report Att. F, Fire-Induced Multiple Spurious Operations Resolution"
- 2701.620-000-096, Rev. B, "Fire Area Transition Review"
- 8700-01.062-0002, Rev. B, "BVPS-1 MSO Expert Panel Review Report"
- 8700-01.062-0009, Rev. A, "P1866-004-001, Post-fire Safe Shutdown Cable Identification"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.5.1.4 - Worst Case Failure

Alignment Statement: Aligns

When both trains are in the same fire area outside of primary containment, all cables that do not meet the separation requirements of Section III.G.2 are assumed to fail in their worst case configuration.

Alignment Basis:

Procedures for both units 8700.01.062-0009 and 2701.620-000-016, "Post Fire Safe Shutdown / Fire PRA Cable Identification," state, in Section 3.1, Automatic Signals:
"Automatic signals (i.e., logic interlocks) from other circuits (i.e., interposing contacts in control circuits) shall be considered in the cable selection. One of the following two options may be used:
"1. The contact(s) can be assumed to be in the worst case position(s)
"2. The circuits associated with the interlock contact(s) can be analyzed and included in the safe shutdown cable selection for the component of concern."

And further, in Section 3.2, Permissive Signals:
"Permissive interlocks from other circuits (i.e., interposing contacts in control circuits) shall be considered in the cable selection. One of the following two options may be used:
"1. The contact(s) can be assumed to be in the worst case position(s)
"2. The circuits associated with the interlock contact(s) can be analyzed and included in the safe shutdown cable selection for the component of concern."

The above analysis descriptions meet the requirements of NEI 00-01.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-016, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown and Fire PRA Cable Selection Report"
- 8700-01.062-0009, Rev. A, "P1866-004-001, Post-fire Safe Shutdown Cable Identification"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.5.1.5 - RIS 2004-03

Alignment Statement: Aligns

The following guidance provides the NRC inspection focus from Bin 1 of RIS 2004-03 in order to identify any potential combinations of spurious operations with higher risk significance. Bin 1 failures should also be the focus of the analysis; however, NRC has indicated that other types of failures required by the regulations for analysis should not be disregarded even if in Bin 2 or 3. If Bin 1 changes in subsequent revisions of RIS 2004-03, the guidelines in the revised RIS should be followed.

Cable Failure Modes.
For multiconductor cables testing has demonstrated that conductor-to-conductor shorting within the same cable is the most common mode of failure. This is often referred to as "intra-cable shorting." It is reasonable to assume that given damage, more than one conductor-to-conductor short will occur in a given cable. A second primary mode of cable failure is conductor-to-conductor shorting between separate cables, commonly referred to as "inter-cable shorting." Inter-cable shorting is less likely than intra-cable shorting. Consistent with the current knowledge of fire-induced cable failures, the following configurations should be considered:

A. For any individual multiconductor cable (thermoset or thermoplastic), any and all potential spurious actuations that may result from intra-cable shorting, including any possible combination of conductors within the cable, may be postulated to occur concurrently regardless of number. However, as a practical matter, the number of combinations of potential hot shorts increases rapidly with the number of conductors within a given cable. For example, a multiconductor cable with three conductors (3C) has 3 possible combinations of two (including desired combinations), while a five conductor cable (5C) has 10 possible combinations of two (including desired combinations), and a seven conductor cable (7C) has 21 possible combinations of two (including desired combinations). To facilitate an inspection that considers most of the risk presented by postulated hot shorts within a multiconductor cable, inspectors should consider only a few (three or four) of the most critical postulated combinations.

B. For any thermoplastic cable, any and all potential spurious actuations that may result from intra-cable and inter-cable shorting with other thermoplastic cables, including any possible combination of conductors within or between the cables, may be postulated to occur concurrently regardless of number. (The consideration of thermoset cable inter-cable shorts is deferred pending additional research.)

C. For cases involving the potential damage of more than one multiconductor cable, a maximum of two cables should be assumed to be damaged concurrently. The spurious actuations should be evaluated as previously described. The consideration of more than two cables being damaged (and subsequent spurious actuations) is deferred pending additional research.

D. For cases involving direct current (DC) circuits, the potential spurious operation due to failures of the associated control cables (even if the spurious operation requires two concurrent hot shorts of the proper polarity, e.g., plus-to-plus and minus-to-minus) should be considered when the required source and target conductors are each located within the same multiconductor cable.

E. Instrumentation Circuits. Required instrumentation circuits are beyond the scope of this associated circuit approach and must meet the same requirements as required power and control circuits. There is one case where an instrument circuit could potentially be considered an associated circuit. If fire-induced damage of an instrument circuit could prevent operation (e.g., lockout permissive signal) or cause maloperation (e.g., unwanted start/stop/reposition signal) of systems necessary

to achieve and maintain hot shutdown, then the instrument circuit may be considered an associated circuit and handled accordingly.

Likelihood of Undesired Consequences

Determination of the potential consequence of the damaged associated circuits is based on the examination of specific NPP *piping and instrumentation diagrams* (P&IDs) and review of components that could prevent operation or cause maloperation such as flow diversions, loss of coolant, or other scenarios that could significantly impair the NPP's ability to achieve and maintain hot shutdown. When considering the potential consequence of such failures, the [analyst] should also consider the time at which the prevented operation or maloperation occurs. Failures that impede hot shutdown within the first hour of the fire tend to be most risk significant in a first-order evaluation. Consideration of cold-shutdown circuits is deferred pending additional research.

Alignment Basis:

As part of the NFPA 805 transition project, a review and evaluation of susceptibility to fire-induced MSOs was performed. The methodology for evaluation of BVPS-1 and BVPS-2 MSOs is documented in Transition Report Attachment F. Where multiple spurious operations result in potential loss of the credited safe shutdown flowpath, VFDRs are documented in the applicable Transition Report Attachment C record.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-010, Rev. C, "ARS-PI-0003, Task 2.3, Nuclear Safety Performance Criteria (Fire Area) Reviews"
- 2701.620-000-005, Rev. B, "BVPS-2 MSO Expert Panel Review Report "
- 2701.620-000-094, Rev. A, "BV Transition Report Att. F, Fire-Induced Multiple Spurious Operations Resolution"
- 2701.620-000-096, Rev. B, "Fire Area Transition Review"
- 8700-01.062-0002, Rev. B, "BVPS-1 MSO Expert Panel Review Report"
- RIS 2005-30, "Clarification of Post Fire Safe *Shutdown Circuit Regulatory Requirements*"
- SECY 08-0093, "Resolution of Issues Related to Fire Induced Circuit Failures"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.5.2 - Types of Circuit Failures

Alignment Statement: Aligns

Appendix R requires that nuclear power plants must be designed to prevent exposure fires from defeating the ability to achieve and maintain post-fire safe shutdown. Fire damage to circuits that provide control and power to equipment on the required safe shutdown path and any other equipment whose spurious operation/mal-operation could affect shutdown in each fire area must be evaluated for the effects of a fire in that fire area. Only one fire at a time is assumed to occur. The extent of fire damage is assumed to be limited by the boundaries of the fire area. Given this set of conditions, it must be assured that one redundant train of equipment capable of achieving hot shutdown is free of fire damage for fires in every plant location. To provide this assurance, Appendix R requires that equipment and circuits required for safe shutdown be free of fire damage and that these circuits be designed for the fire-induced effects of a hot short, short-to-ground, and open circuit. With respect to the electrical distribution system, the issue of breaker coordination must also be addressed.

This section will discuss specific examples of each of the following types of circuit failures:

- Open circuit
- Short-to-ground
- Hot short.

Alignment Basis:

This is an introductory paragraph and does not contain any specific guidance. The specific guidance, and references to the applicable BVPS-1 and BVPS-2 documents, are provided in the subsequent sections. Except as specifically noted below, the BVPS-1 and BVPS-2 methodology align with that provided in NEI 00-01.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- None

Open Items and VFDRs

-None

NEI 00-01 Section:

3.5.2.1 - Circuit Failures Due to an Open Circuit

Alignment Statement: Not in Alignment

This section provides guidance for addressing the effects of an open circuit for safe shutdown equipment. An open circuit is a fire induced break in a conductor resulting in the loss of circuit continuity. An open circuit will typically prevent the ability to control or power the affected equipment. An open circuit can also result in a change of state for normally energized equipment. For example, a loss of power to the main steam isolation valve (MSIV) solenoid valves [for BWRs] due to an open circuit will result in the closure of the MSIV.

NOTE: The EPRI circuit failure testing indicated that open circuits are not likely to be the initial fire-induced circuit failure mode. Consideration of this may be helpful within the safe shutdown analysis. Consider the following consequences in the safe shutdown circuit analysis when determining the effects of open circuits:

- Loss of electrical continuity may occur within a conductor resulting in deenergizing the circuit and causing a loss of power to, or control of, the required safe shutdown equipment.

- In selected cases, a loss of electrical continuity may result in loss of power to an interlocked relay or other device. This loss of power may change the state of the equipment. Evaluate this to determine if equipment fails safe.

- Open circuit on a high voltage (e.g., 4.16 kV) ammeter current transformer (CT) circuit may result in secondary damage.

See NEI 00-01 section 3.5.2.1 for additional information and examples.

Alignment Basis:

Safe shutdown analysis assumptions for BVPS-1 and BVPS-2 circuit failures due to an open circuit are functionally identical to the NEI guidance.

An analysis of high voltage current transformers at Beaver Valley has been performed. Attachment 2 of 2701.620-000-025 lists the components that have a cable with conductors connected to a current transformer circuit and leave the switchgear enclosure unprotected. Any modifications required will be determined when the guidance is finalized for which current transformers pose a credible risk of secondary damage upon an open circuit.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-025, Rev. A, "CT Investigation of BVPS"
- 8700-01.062-0009, Rev. A, "P1866-004-001, Post-fire Safe Shutdown Cable Identification"

Open Items and VFDRs

Item Number	BV1-2706	**Item Title:** Track Open Circuit CT Potential Modifications

NEI 00-01 Section:

3.5.2.2 - Circuit Failures Due to a Short-to-Ground

Alignment Statement: Aligns

This section provides guidance for addressing the effects of a short-to-ground on circuits for safe shutdown equipment. A short-to-ground is a fire-induced breakdown of a cable insulation system resulting in the potential on the conductor being applied to ground potential. A short-to-ground can cause a loss of power to or control of required safe shutdown equipment. In addition, a short-to-ground may affect other equipment in the electrical power distribution system in the cases where proper coordination does not exist. Consider the following consequences in the post-fire safe shutdown analysis when determining the effects of circuit failures related to shorts-to-ground:

- A short-to-ground in a power or a control circuit may result in tripping one or more isolation devices (i.e. breaker/fuse) and causing a loss of power to or control of required safe shutdown equipment.

- In the case of certain energized equipment such as HVAC dampers, a loss of control power may result in loss of power to an interlocked relay or other device that may cause one or more spurious operations.

See NEI 00-01 section 3.5.2.2 for additional information and examples.

Alignment Basis:

Safe shutdown analysis assumptions for BVPS-1 and BVPS-2 circuit failures due to a short-to-ground are functionally identical to the NEI guidance.

8700-01.062-0009 also states:

"Short-to-Ground on Grounded Circuits"

"Typically, in the case of a grounded circuit, a short-to-ground on any part of the circuit would present a concern for tripping the circuit isolation device thereby causing a loss of control power."

"Short-to-Ground on Ungrounded Circuits"

"In the case of an ungrounded circuit, postulating only a single short-to-ground on any part of the circuit may not result in tripping the circuit isolation device. Another short-to-ground on the circuit or another circuit from the same source would need to exist to cause a loss of control power to the circuit."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 8700-01.062-0009, Rev. A, "P1866-004-001, Post-fire Safe Shutdown Cable Identification"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.5.2.3 - Circuit Failures Due to a Hot Short

Alignment Statement: Aligns

This section provides guidance for analyzing the effects of a hot short on circuits for required safe shutdown equipment. A hot short is defined as a fire induced insulation breakdown between conductors of the same cable, a different cable or some other external source resulting in an undesired impressed voltage on a specific conductor. The potential effect of the undesired impressed voltage would be to cause equipment to operate or fail to operate in an undesired manner.

Consider the following specific circuit failures related to hot shorts as part of the post-fire safe shutdown analysis:

- A hot short between an energized conductor and a de-energized conductor within the same cable may cause a spurious actuation of equipment. The spuriously actuated device (e.g., relay) may be interlocked with another circuit that causes the spurious actuation of other equipment. This type of hot short is called a conductor-to-conductor hot short or an internal hot short.

- A hot short between any external energized source such as an energized conductor from another cable (thermoplastic cables only) and a de-energized conductor may also cause a spurious actuation of equipment. This is called a cable-to-cable hot short or an external hot short. Cable-to-cable hot shorts between thermoset cables are not postulated to occur pending additional research.

See NEI 00-01 section 3.5.2.3 for additional information and examples.

Alignment Basis:

Safe shutdown analysis assumptions for BVPS-1 and BVPS-2 circuit failures due to a hot short are functionally identical to the NEI guidance.

8700-01.062-0009 also states:

"A Hot Short on Grounded Circuits"

"A short-to-ground is a more likely failure mode for a grounded control circuit. A short-to-ground as described above would result in de-energizing the circuit. This would further reduce the likelihood for the circuit to change the state of the equipment either from a control switch or due to a hot short. Nevertheless, a hot short still needs to be considered."

"A Hot Short on Ungrounded Circuits"

"In the case of an ungrounded circuit, a single hot short may be sufficient to cause a spurious operation. A single hot short can cause a spurious operation if the hot short comes from a circuit from the positive leg of the same ungrounded source as the affected circuit."

For both units as part of the NFPA 805 transition project, a review and evaluation of susceptibility to fire-induced MSOs was performed. The methodology for evaluation of MSOs is documented in Transition Report Attachment F. Where multiple spurious operations result in potential loss of the credited safe shutdown

flowpath, VFDRs are documented in the applicable Transition Report Attachment C record.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-094, Rev. A, "BV Transition Report Att. F, Fire-Induced Multiple Spurious Operations Resolution"
- 2701.620-000-096, Rev. B, "Fire Area Transition Review"
- 8700-01.062-0009, Rev. A, "P1866-004-001, Post-fire Safe Shutdown Cable Identification"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.5.2.4 - Circuit Failures Due to Inadequate Circuit Coordination **Alignment Statement:** Aligns

The evaluation of associated circuits of a common power source consists of verifying proper coordination between the supply breaker/fuse and the load breakers/fuses for power sources that are required for safe shutdown. The concern is that, for fire damage to a single power cable, lack of coordination between the supply breaker/fuse and the load breakers/fuses can result in the loss of power to a safe shutdown power source that is required to provide power to safe shutdown equipment.

A coordination study should demonstrate the coordination status for each required common power source. For coordination to exist, the time-current curves for the breakers, fuses and/or protective relaying must demonstrate that a fault on the load circuits is isolated before tripping the upstream breaker that supplies the bus. Furthermore, the available short circuit current on the load circuit must be considered to ensure that coordination is demonstrated at the maximum fault level.

The methodology for identifying potential associated circuits of a common power source and evaluating circuit coordination cases of associated circuits on a single circuit fault basis is as follows:

- Identify the power sources required to supply power to safe shutdown equipment.

- For each power source, identify the breaker/fuse ratings, types, trip settings and coordination characteristics for the incoming source breaker supplying the bus and the breakers/fuses feeding the loads supplied by the bus.

- For each power source, demonstrate proper circuit coordination using acceptable industry methods.

- For power sources not properly coordinated, tabulate by fire area the routing of cables whose breaker/fuse is not properly coordinated with the supply breaker/fuse. Evaluate the potential for disabling power to the bus in each of the fire areas in which the associated circuit cables of concern are routed and the power source is required for safe shutdown. Prepare a list of the following information for each fire area:

- Cables of concern.
- Affected common power source and its path.
- Raceway in which the cable is enclosed.
- Sequence of the raceway in the cable route.
- Fire zone/area in which the raceway is located.

For fire zones/areas in which the power source is disabled, the effects are mitigated by appropriate methods.

- Develop analyzed safe shutdown circuit dispositions for the associated circuit of concern cables routed in an area of the same path as required by the power source. Evaluate adequate separation based upon the criteria in Appendix R, NRC staff guidance, and plant licensing bases.

Alignment Basis:

For both units as part of NFPA 805 transition, Beaver Valley has incorporated the post-fire safe shutdown analysis into a computerized safe shutdown analysis tool "SAFE" which maintains success path models of performance goals (methods), systems, equipment, and cables.

Procedure 8700.01.062-0009 [2701.620-000-016], "Post Fire Safe Shutdown [/ Fire PRA] Cable Identification," Section 5.2, states:
"Using the Component and Cable Data Sheet (Exhibit 1) or electronic equivalent, the electrical engineer will identify and review electrical drawings such as one lines, schematics, block diagrams, wiring connection diagrams, etc and the latest revision of the BVPS-1 Updated Fire Protection Appendix R Review [BVPS-2 Fire Protection Safe Shutdown Report]. The electrical engineer shall identify the cables that are associated with the component, and identify those cables that are required for safe shutdown. Required cables are those that are necessary for the proper operation of the circuit, so that it can perform its required function(s), or cables which may adversely affect the circuit and keep it from correctly performing its required function(s)."

The Breaker Coordination studies were performed for each unit for NFPA 805 transition. Reference 8700-01.062-0006, Revision B, "BVPS-1 NFPA 805 Associated Circuits Review," and 2701.620-000-006, Revision C, "BVPS-2 NFPA 805 Associated Circuits Review."

The purpose of the Breaker Coordination Study reports is to conduct a search to verify and document breaker coordination exists for BVPS fire PRA power supply components. Appropriate breaker coordination for each component was verified by reviewing electrical coordination sketches, and calculations, and relevant databases and producing a list of the fire PRA power supply components and applicable coordination curves.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-006, Rev. C, "BVPS-2 NFPA 805 Associated Circuits Review"
- 2701.620-000-016, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown and Fire PRA Cable Selection Report"
- 8700-01.062-0006, Rev. B, "BVPS-1 NFPA 805 Associated Circuits Review"
- 8700-01.062-0009, Rev. A, "P1866-004-001, Post-fire Safe Shutdown Cable Identification"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.5.2.5 - Circuit Failures Due to Common Enclosure Concerns

Alignment Statement: Aligns

The common enclosure associated circuit concern deals with the possibility of causing secondary failures due to fire damage to a circuit either whose isolation device fails to isolate the cable fault or protect the faulted cable from reaching its ignition temperature, or the fire somehow propagates along the cable into adjoining fire areas.

The electrical circuit design for most plants provides proper circuit protection in the form of circuit breakers, fuses and other devices that are designed to isolate cable faults before ignition temperature is reached. Adequate electrical circuit protection and cable sizing are included as part of the original plant electrical design maintained as part of the design change process. Proper protection can be verified by review of as-built drawings and change documentation. Review the fire rated barrier and penetration designs that preclude the propagation of fire from one fire area to the next to demonstrate that adequate measures are in place to alleviate fire propagation concerns.

Alignment Basis:

For both units as part of NFPA 805 transition, BVPS has incorporated the post-fire safe shutdown analyses into a computerized safe shutdown analysis tool "SAFE" which maintains success path models of performance goals (methods), systems, equipment, and cables, sorted by fire compartment and by equipment identification. The SAFE analysis software identifies the SSD equipment and cables that are located in the analysis fire compartment and fail as a direct consequence of the fire. The effect of these location failures is then propagated (by the software) through the cable logic, component logic, system logic, and finally the performance goal logic in order to evaluate the overall impact upon safe shutdown capability. This iterative process identifies the equipment, systems, and performance goals that fail as an indirect consequence of the fire. In the SAFE shutdown analysis reports, Attachment 7 identifies Failed Safe Shutdown Cables for each fire compartment and the impacted component(s).

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NFPA 805 Section: 2.4.2.3 - Nuclear Safety Equipment and Cable Location

Physical location of equipment and cables shall be identified.

NEI 00-01 Section:

3.3.3.4 - Identify Routing of Cables **Alignment Statement:** Aligns

Identify the routing for each cable including all raceway and cable endpoints. Typically, this information is obtained from joining the list of safe shutdown cables with an existing cable and raceway database.

Alignment Basis:

As part of NFPA 805 Transition, Beaver Valley has incorporated the post-fire safe shutdown analysis into a computerized safe shutdown analysis tool, "SAFE," which maintains success path models of performance goals (methods), systems, equipment, and cables. The BVPS-1 and BVPS-2 procedures titled "Post Fire Safe Shutdown Analysis" (8700-01.062-0011 and 2601.620-000-021) state:

"8.0 METHODOLOGY

"The SAFE analysis software identifies all of the SSD equipment and cables that are located in the analysis area and fail as a direct consequence of the fire (location failures). The effect of these location failures is then propagated (by the software) through the cable logic, component logic, system logic, and finally the performance goal logic in order to evaluate the overall impact upon safe shutdown capability. This iterative process identifies the equipment, systems, and performance goals that fail as an indirect consequence of the fire. These indirect failures are identified as logic failures.

"When performing a computer-assisted analysis, the software presumes that all of the SSD equipment and cable located in an analysis area (e.g., fire scenario, zone, and/or area) are involved in the fire, and have failed. The SSD engineer who resolves the analysis output should initially presume that all of the failed components have assumed the worst-case status or position with respect to achieving safe shutdown."

The BVPS-1 and BVPS-2 NFPA 805 Safe Shutdown Analysis Interim Reports (8700-01.062-0048 and 2701.620-000-105) indicate the Plant Data Management System (PDMS) was entered into the SAFE analysis software. The PDMS database was expanded to include a raceway by fire compartment file to facilitate automatic tracing of safe shutdown cables by fire compartment. A file of cable weight per foot by cable type was developed, and in conjunction with the raceway by fire compartment file, was used to develop cable weights by fire compartment for the Fire Hazards Analysis (8700-B-84).

"Loading of PDMS Cable and Raceway and SAP Equipment Data into SAFE-PB

"A data dump of applicable cable and raceway information from PDMS was received from FENOC at the start of the project (Reference 4) to support the loading of this information into SAFE-PB. Additionally, FENOC delivered a master equipment list data dump from SAP (Reference 4). These two data sets were electronically loaded into SAFE-PB and verified by a Data Transfer Verification Report, DTVR-P1866-001, Revision 0, (Reference 5). This information formed the foundation of data required to support the project when associating location information (fire zones) to cables and equipment and cable routing information."

It further states:

"Cable logics identify the relationship between cables and the component(s) which they support and were loaded directly from the 8700-E-305 Calculation (Reference 3) without review. The assumption is that the existing cable selection was correct and the function of the cables was properly identified. The cable logic statements were 'AND'ed together to depict that all cables for a given component must survive in order for the component to be considered available."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0011, Rev. A, "P1866-009-001, Post-Fire Safe Shutdown Analysis"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-B-084, Rev. 12, Add. 2, "Fire Hazards Analysis"
- 8700-E-305, Rev. 0, Add. 0, "Fire Protection Safe Shutdown Analysis"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.3.3.5 - Identify Location of Raceway and Cables by Fire Area **Alignment Statement:** Aligns

Identify the fire area location of each raceway and cable endpoint identified in the previous step and join this information with the cable routing data. In addition, identify the location of field-routed cable by fire area. This produces a database containing all of the cables requiring fire area analysis, their locations by fire area, and their raceway.

Alignment Basis:

As part of NFPA 805 Transition, Beaver Valley has incorporated the post-fire safe shutdown analysis into a computerized safe shutdown analysis tool, "SAFE," which maintains success path models of performance goals (methods), systems, equipment, and cables. The BVPS-1 and BVPS-2 procedures titled "Post Fire Safe Shutdown Analysis" (8700-01.062-0011 and 2601.620-000-021) state:

"8.0 METHODOLOGY

"The SAFE analysis software identifies all of the SSD equipment and cables that are located in the analysis area and fail as a direct consequence of the fire (location failures). The effect of these location failures is then propagated (by the software) through the cable logic, component logic, system logic, and finally the performance goal logic in order to evaluate the overall impact upon safe shutdown capability. This iterative process identifies the equipment, systems, and performance goals that fail as an indirect consequence of the fire. These indirect failures are identified as logic failures.

"When performing a computer-assisted analysis, the software presumes that all of the SSD equipment and cable located in an analysis area (e.g., fire scenario, zone, and/or area) are involved in the fire, and have failed. The SSD engineer who resolves the analysis output should initially presume that all of the failed components have assumed the worst-case status or position with respect to achieving safe shutdown."

The BVPS-1 and BVPS-2 NFPA 805 Safe Shutdown Analysis Interim Reports (8700-01.062-0048 and 2701.620-000-105) indicate The Plant Data Management System (PDMS) was entered into the SAFE analysis software. The PDMS database was expanded to include a raceway by fire compartment file to facilitate automatic tracing of safe shutdown cables by fire compartment. A file of cable weight per foot by cable type was developed, and in conjunction with the raceway by fire compartment file, was used to develop cable weights by fire compartment for the Fire Hazards Analysis (8700-B-84).

"Loading of PDMS Cable and Raceway and SAP Equipment Data into SAFE-PB

"A data dump of applicable cable and raceway information from PDMS was received from FENOC at the start of the project (Reference 4) to support the loading of this information into SAFE-PB. Additionally, FENOC delivered a master equipment list data dump from SAP (Reference 4). These two data sets were electronically loaded into SAFE-PB and verified by a Data Transfer Verification Report, DTVR-P1866-001, Revision 0, (Reference 5). This information formed the foundation of data required to support the project when associating location information (fire zones) to cables, equipment and cable routing information."

It further states:

"Cable logics identify the relationship between cables and the component(s) which they support and were loaded directly from the 8700-E-305 Calculation (Reference 3) without review. The assumption is that the existing cable selection was correct and the function of the cables was properly identified. The cable logic statements were 'AND'ed together to depict that all cables for a given component must survive in order for the component to be considered available."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0011, Rev. A, "P1866-009-001, Post-Fire Safe Shutdown Analysis"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-B-084, Rev. 12, Add. 2, "Fire Hazards Analysis"
- 8700-E-305, Rev. 0, Add. 0, "Fire Protection Safe Shutdown Analysis"

Open Items and VFDRs

-None

NFPA 805 Section: *2.4.2.4 - Fire Area Assessment*

An engineering analysis shall be performed in accordance with the requirements of Section 2.3 for each fire area to determine the effects of fire or fire suppression activities on the ability to achieve the nuclear safety performance criteria of Section 1.5. [See Chapter 4 for methods of achieving these performance criteria (performance-based or deterministic).

NEI 00-01 Section:

3.4 - Fire Area Assessment And Compliance Strategies

Alignment Statement: Aligns

By determining the location of each component and cable by fire area and using the cable to equipment relationships described above, the affected safe shutdown equipment in each fire area can be determined. Using the list of affected equipment in each fire area, the impacts to safe shutdown systems, paths and functions can be determined. Based on an assessment of the number and types of these impacts, the required safe shutdown path for each fire area can be determined. The specific impacts to the selected safe shutdown path can be evaluated using the circuit analysis and evaluation criteria contained in Section 3.5 of this document. *Having identified all impacts to the required safe shutdown path in a particular fire area, this section provides guidance on the techniques available for individually* mitigating the effects of each of the potential impacts.

Alignment Basis:

This is an introductory paragraph and does not contain any specific guidance. The specific guidance, and references to the applicable BVPS-1 and BVPS-2 documents, are provided in the subsequent sections. Except as specifically noted below, the BVPS-1 and BVPS-2 methodology align with that provided in NEI 00-01.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- None

Open Items and VFDRs

-None

NEI 00-01 Section:

3.4.1 - Criteria/Assumptions

Alignment Statement: Aligns

The following criteria and assumptions apply when performing fire area compliance assessment to mitigate the consequences of the circuit failures identified in the previous sections for the required safe shutdown path in each fire area.

Alignment Basis:

This is an introductory paragraph and does not contain any specific guidance. The specific guidance, and references to the applicable BVPS-1 and BVPS-2 documents, are provided in the subsequent sections. Except as specifically noted below, the BVPS-1 and BVPS-2 methodology align with that provided in NEI 00-01.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- None

Open Items and VFDRs

-None

NEI 00-01 Section:

3.4.1.1 - Assume Single Fire

Alignment Statement: Aligns

Assume only one fire in any single fire area at a time.

Alignment Basis:

Although not explicitly stated, for both units, the Beaver Valley safe shutdown analyses are consistent with this assumption.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 8700-01.062-0011, Rev. A, "P1866-009-001, Post-Fire Safe Shutdown Analysis"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.4.1.2 - Fully Involved Fire

Alignment Statement: Aligns

Assume that the fire may affect all unprotected cables and equipment within the fire area. This assumes that neither the fire size nor the fire intensity is known. This is conservative and bounds the exposure fire that is required by the regulation.

Alignment Basis:

As part of NFPA 805 Transition, Beaver Valley has incorporated the post-fire safe shutdown analysis into a computerized safe shutdown analysis tool, "SAFE," which maintains success path models of performance goals (methods), systems, equipment, and cables. The BVPS-1 and BVPS-2 procedures titled "Post Fire Safe Shutdown Analysis" (8700-01.062-0011 and 2601.620-000-021) state:

"When performing a computer-assisted analysis, the software presumes that all of the SSD equipment and cable located in an analysis area (e.g., fire scenario, zone, and/or area) are involved in the fire, and have failed. The SSD engineer who resolves the analysis output should initially presume that all of the failed components have assumed the worst-case status or position with respect to achieving safe shutdown."

Neither fire size nor fire intensity is needed to be known as worst-case status is assumed.

As part of the NFPA 805 transition project, a review and evaluation of susceptibility to fire-induced MSOs was performed. The methodology for evaluation of MSOs are documented in Transition Report Attachment F. Where multiple spurious operations result in potential loss of the credited safe shutdown flowpath, VFDRs are documented in the applicable Transition Report Attachment C record.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-010, Rev. C, "ARS-PI-0003, Task 2.3, Nuclear Safety Performance Criteria (Fire Area) Reviews"
- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 2701.620-000-094, Rev. A, "BV Transition Report Att. F, Fire-Induced Multiple Spurious Operations Resolution"
- 2701.620-000-096, Rev. B, "Fire Area Transition Review"
- 8700-01.062-0011, Rev. A, "P1866-009-001, Post-Fire Safe Shutdown Analysis"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.4.1.3 - All Potential Impacts

Alignment Statement: Aligns

Address all cable and equipment impacts affecting the required safe shutdown path in the fire area. All potential impacts within the fire area must be addressed. The focus of this section is to determine and assess the potential impacts to the required safe shutdown path selected for achieving post-fire safe shutdown and to assure that the required safe shutdown path for a given fire area is properly protected.

Alignment Basis:

The BVPS-1 and BVPS-2 safe shutdown analysis methodology is summarized in Section 8 of the procedures titled "Post Fire Safe Shutdown Analysis" (8700-01.062-0011 and 2601.620-000-021). The safe shutdown systems and equipment required for safe shutdown for each area are identified.

As part of NFPA 805 Transition, Beaver Valley has incorporated the post-fire safe shutdown analysis into a computerized safe shutdown analysis tool, "SAFE," which maintains success path models of performance goals (methods), systems, equipment, and cables. Where both trains of equipment were fire affected, the process of running the analysis to identify failures and applying the resolutions to recover required performance goals shall be iterated until required performance goals are satisfied.

The procedures state:

"8.0 METHODOLOGY

"The SAFE analysis software identifies all of the SSD equipment and cables that are located in the analysis area and fail as a direct consequence of the fire (location failures). The effect of these location failures is then propagated (by the software) through the cable logic, component logic, system logic, and finally the performance goal logic in order to evaluate the overall impact upon safe shutdown capability. This iterative process identifies the equipment, systems, and performance goals that fail as an indirect consequence of the fire. These indirect failures are identified as logic failures.

"When performing a computer-assisted analysis, the software presumes that all of the SSD equipment and cable located in an analysis area (e.g., fire scenario, zone, and/or area) are involved in the fire, and have failed. The SSD engineer who resolves the analysis output should initially presume that all of the failed components have assumed the worst-case status or position with respect to achieving safe shutdown."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.4.1.4 - Manual Actions

Alignment Statement: Aligns with Intent

Use manual actions where appropriate to achieve and maintain postfire safe shutdown conditions in accordance with NRC requirements.

Alignment Basis:

As part of NFPA 805 transition, BVPS-1 and BVPS-2 has incorporated the post-fire safe shutdown analyses into a computerized safe shutdown analysis tool "SAFE" which maintains success path models of performance goals (methods), systems, equipment, and cables, sorted by fire compartment and by equipment identification.

The "Post Fire Safe Shutdown Analysis" procedures (8700-01.062-0011 and 2601.620-000-021) state:

"8.0 METHODOLOGY

"The SAFE analysis software identifies all of the SSD equipment and cables that are located in the analysis area and fail as a direct consequence of the fire (location failures). The effect of these location failures is then propagated (by the software) through the cable logic, component logic, system logic, and finally the performance goal logic in order to evaluate the overall impact upon safe shutdown capability. This iterative process identifies the equipment, systems, and performance goals that fail as an indirect consequence of the fire. These indirect failures are identified as logic failures.

"When performing a computer-assisted analysis, the software presumes that all of the SSD equipment and cable located in an analysis area (e.g., fire scenario, zone, and/or area) are involved in the fire, and have failed. The SSD engineer who resolves the analysis output should initially presume that all of the failed components have assumed the worst-case status or position with respect to achieving safe shutdown."

The procedures further states that required operator manual actions are documents throughout SAFE whether they are credited in the Safe Shutdown Procedures or not.

The use of manual actions for III.G.2 areas is not consistent with recent NRC interpretations described in RIS 2006-10 and SECY 08-0093.

Current guidance, via R.G. 1.205, revision 1 regulatory position 2.4 documents that "primary control station actions" (actions taken in the main control room or at the primary control station) which meet the criteria of regulatory position 2.4 are not considered "recovery actions."

Recovery actions which are required because of a lack of separation in accordance with NFPA 805 Section 4.2.3 are identified in Att. C as potential variances from the deterministic requirements and evaluated via the fire risk evaluation process.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 2701.620-000-096, Rev. B, "Fire Area Transition Review"
- 8700-01.062-0011, Rev. A, "P1866-009-001, Post-Fire Safe Shutdown Analysis"
- RG 1.205, Rev. 1, "Risk-Informed, Performance-Based Fire Prot. for Existing Light Water NPPs"
- RIS 2006-10, "Regulatory Expectations with Appendix R Paragraph III.G.2 Operator Manual Actions"
- SECY 08-0093, "Resolution of Issues Related to Fire Induced Circuit Failures"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.4.1.5 - Repair Actions

Alignment Statement: Not Applicable

Where appropriate to achieve and maintain cold shutdown within 72 hours, use repairs to equipment required in support of post-fire shutdown.

Alignment Basis:

This item is not applicable to Beaver Valley for NFPA 805 transition based on the criteria provided in FAQ 07-0039, "Although NFPA 805 does not require cooldown to cold shutdown, the assessment of accomplishment of performance goals should document the equipment required to achieve 'a safe and stable' plant condition in accordance with NFPA 805 Section 1.3."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- FAQ 07-0039, "ML091320068 B-2 Table Closure Memo"
- FAQ 07-0039, Rev. 2, "ML091420138 Lessons Learned - NEI 04-02 B-2 Table"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.4.1.6 - Compliance Criteria

Alignment Statement: Aligns

Appendix R compliance requires that one train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage (III.G.1.a). When cables or equipment, including associated circuits, are within the same fire area outside primary containment and separation does not already exist, provide one of the following means of separation for the required safe shutdown path(s):

- Separation of cables and equipment and associated nonsafety circuits of redundant trains within the same fire area by a fire barrier having a 3-hour rating (III.G.2.a)

- Separation of cables and equipment and associated nonsafety circuits of redundant trains within the same fire area by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area (III.G.2.b).

- Enclosure of cable and equipment and associated non-safety circuits of one redundant train within a fire area in a fire barrier having a one-hour rating. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area (III.G.2.c).

For fire areas inside noninerted containments, the following additional options are also available:

- Separation of cables and equipment and associated nonsafety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards (III.G.2.d);

- Installation of fire detectors and an automatic fire suppression system in the fire area (III.G.2.e); or

- Separation of cables and equipment and associated non-safety circuits of redundant trains by a noncombustible radiant energy shield (III.G.2.f).

Use exemptions, deviations and licensing change processes to satisfy the requirements mentioned above and to demonstrate equivalency depending upon the plant's license requirements.

Alignment Basis:

The method of compliance strategies are described in the appropriate NEI 00-01 B-2 table section descriptions. This item provides a high level summary of compliance strategies based on 10 CFR 50, Appendix R, III.G.1 and III.G.2.

Section III.G is related to fire protection features for ensuring that systems and associated circuits used to achieve and maintain safe shutdown are free of fire damage. Fire protection configurations must either meet the specific requirements of Section III.G or an alternative fire protection configuration must be justified by a fire hazards analysis. The plant was divided into fire areas (Plant Boundary Calculation 10080-DEC-3560) in order to determine the effects of the associated circuits and separation criteria on safe shutdown capability, and to assess the impact on the compliance to the III.G.2 criteria for Units 1 and Unit 2.

Table B-2 Nuclear Safety Capability Assessment
Methodology Review
Transition Report

Beaver Valley Power Station

Areas where a potential loss of safe shutdown capability could occur were provided with alternate equipment or an alternative means of operation to comply with the intent of Appendix R, or an exemption/deviation was requested from requirements of Section III.G of Appendix R. Loss of safe shutdown capability were evaluated as potential variances from the deterministic criteria of NFPA 805 Section 4.2.3 and addressed in fire risk evaluations, as indicated in Transition Report Attachment C. Approved exemptions/deviations for Unit 1 and Unit 2 from requirements of Section III.G are addressed in Transition Report Attachment K.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 10080-DEC-3560, Rev. 1, "Fire PRA Task 1 - Plant Boundary Definition and Partitioning"
- 2701.620-000-091, Rev. A, "BV2 Transition Report Attachment K, Existing Licensing Action Transition"
- 2701.620-000-096, Rev. B, "Fire Area Transition Review"
- 8700-01.062-0045, Rev. A, "BV1 Transition Report Attachment K, Existing Licensing Action Transition"

Open Items and VFDRs

-None

Table B-2 Nuclear Safety Capability Assessment
Methodology Review
Transition Report

Beaver Valley Power Station

NEI 00-01 Section:

3.4.1.7 - Alternate/backup Selection

Alignment Statement: Aligns with Intent

Consider selecting other equipment that can perform the same safe shutdown function as the impacted equipment. In addressing this situation, each equipment impact, including spurious operations, is to be addressed in accordance with regulatory requirements and the NPP's current licensing basis.

Alignment Basis:

Beaver Valley safe shutdown analyses meet the intent because the analyses demonstrate that one train of equipment necessary to achieve safe shutdown is free of fire damage. They do not specify for a given fire compartment which equipment is the expected train, and which equipment is the alternate credited equipment. The BVPS-1 and BVPS-2 NFPA 805 Safe shutdown analysis interim transition reports (8700-01.062-0048 and 2701.620-000-105), Attachment 1 describe the systems that are required for post fire safe shutdown. The systems required for safe shutdown and the impact on these systems that a fire induced cable failure could have on the required safe shutdown path are identified. Although the analyses did credit the use of manual operator actions in some cases, these are evaluated on a fire compartment basis in Transition Report Attachment C as variances from the deterministic requirements (VFDRs) where the separation requirements of NFPA 805 Section 4.2.3 are not met.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-096, Rev. B, "Fire Area Transition Review"
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.4.1.8 - Fluid Density Effects

Alignment Statement: Aligns

Consider the effects of the fire on the density of the fluid in instrument tubing and any subsequent effects on instrument readings or signals associated with the protected safe shutdown path in evaluating postfire safe shutdown capability. This can be done systematically or via procedures such as Emergency Operating Procedures.

Alignment Basis:

A review of fire effects on instrument sensing lines was performed. Applicable transmitters were reviewed and found acceptable or satisfactorily dispositioned. The results of the analysis for BVPS-1 are found in 8700-01.062-0039, "BVPS-1 Instrument Tubing Locations for NFPA 805 Transition." For BVPS-2, the results of the review are dispositioned in the NFPA 805 SAFE shutdown analysis.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0039, Rev. B, "BVPS-1 Instrument Tubing Locations for NFPA-805"

Open Items and VFDRs

-None

Table B-2 Nuclear Safety Capability Assessment
Methodology Review
Transition Report

Beaver Valley Power Station

NEI 00-01 Section:

3.4.2 - Methodology for Fire Area Assessment

Alignment Statement: Aligns

Refer to NEI 00-01 Figure 3-5 for a flowchart illustrating the various steps involved in performing a fire area assessment.

Use the following methodology to assess the impact to safe shutdown and demonstrate Appendix R compliance:

Alignment Basis:

This is an introductory paragraph and does not contain any specific guidance. The specific guidance, and references to the applicable BVPS documents, is provided in the subsequent sections. Except as specifically noted below, the BVPS methodology aligns with that provided in NEI 00-01.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- None

Open Items and VFDRs

-None

NEI 00-01 Section:

3.4.2.1 - Identify the Affected Equipment by Fire Area

Alignment Statement: Aligns

Identify the safe shutdown cables, equipment and systems located in each fire area that may be potentially damaged by the fire. Provide this information in a report format. The report may be sorted by fire area and by system in order to understand the impact to each safe shutdown path within each fire area (see Attachment 5 for an example of an Affected Equipment Report).

Alignment Basis:

For both units, as part of NFPA 805 transition, Beaver Valley has incorporated the post-fire safe shutdown analysis into a computerized safe shutdown analysis tool "SAFE" which maintains success path models of performance goals (methods), systems, equipment, and cables. The SAFE analysis software identifies all of the SSD equipment and cables that are located in the analysis area and fail as a direct consequence of the fire. The effect of these location failures is then propagated (by the software) through the cable logic, component logic, system logic, and finally the performance goal logic in order to evaluate the overall impact upon safe shutdown capability. This iterative process identifies the equipment, systems, and performance goals that fail as an indirect consequence of the fire. Attachment 7 contains the fire compartment damage analyses sorted by fire compartment and by system.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.4.2.2 - Determine the Shutdown Paths Least Impacted By a Fire in Each Fire Area **Alignment Statement:** Aligns

Based on a review of the systems, equipment and cables within each fire area, determine which shutdown paths are either unaffected or least impacted by a postulated fire within the fire area. Typically, the safe shutdown path with the least number of cables and equipment in the fire area would be selected as the required safe shutdown path. Consider the circuit failure criteria and the possible mitigating strategies, however, in selecting the required safe shutdown path in a particular fire area. Review support systems as a part of this assessment since their availability will be important to the ability to achieve and maintain safe shutdown. For example, impacts to the electric power distribution system for a particular safe shutdown path could present a major impediment to using a particular path for safe shutdown. By identifying this early in the assessment process, an unnecessary amount of time is not spent assessing impacts to the frontline systems that will require this power to support their operation.

Based on an assessment as described above, designate the required safe shutdown path(s) for the fire area. Identify all equipment not in the safe shutdown path whose spurious operation or mal-operation could affect the shutdown function. Include these cables in the shutdown function list. For each of the safe shutdown cables (located in the fire area) that are part of the required safe shutdown path in the fire area, perform an evaluation to determine the impact of a fire-induced cable failure on the corresponding safe shutdown equipment and, ultimately, on the required safe shutdown path.

When evaluating the safe shutdown mode for a particular piece of equipment, it is important to consider the equipment's position for the specific safe shutdown scenario for the full duration of the shutdown scenario. It is possible for a piece of equipment to be in two different states depending on the shutdown scenario or the stage of shutdown within a particular shutdown scenario. Document information related to the normal and shutdown positions of equipment on the safe shutdown equipment list.

Alignment Basis:

The BVPS-1 and BVPS-2 NFPA 805 Safe shutdown analysis interim transition reports (8700-01.062-0048 and 2701.620-000-105), Attachment 1 describe the systems that are required for post fire safe shutdown. As part of NFPA 805 Transition, Beaver Valley has incorporated the post-fire safe shutdown analysis into a computerized safe shutdown analysis tool, "SAFE," which maintains success path models of performance goals (methods), systems, equipment, and cables for each fire compartment. The systems required for safe shutdown and the impact on these systems that a fire induced cable failure could have on the required safe shutdown path are identified. The BVPS-1 and BVPS-2 procedures titled "Post Fire Safe Shutdown Analysis" (8700-01.062-0011 and 2601.620-000-021) state:

"8.0 METHODOLOGY

"The SAFE analysis software identifies all of the SSD equipment and cables that are located in the analysis area and fail as a direct consequence of the fire (location failures). The effect of these location failures is then propagated (by the software) through the cable logic, component logic, system logic, and finally the performance goal logic in order to evaluate the overall impact upon safe shutdown capability. This iterative process identifies the equipment, systems, and performance goals that fail as an indirect consequence of the fire. These indirect failures are identified as logic failures.

"When performing a computer-assisted analysis, the software presumes that all of the SSD equipment and cable located in an analysis area (e.g., fire scenario, zone, and/or area) are involved in the fire, and have failed. The SSD engineer who resolves the analysis output should initially presume that all of the failed

components have assumed the worst-case status or position with respect to achieving safe shutdown."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0011, Rev. A, "P1866-009-001, Post-Fire Safe Shutdown Analysis"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.4.2.3 - Determine Safe Shutdown Equipment Impacts

Alignment Statement: Aligns

Using the circuit analysis and evaluation criteria contained in Section 3.5 of this document, determine the equipment that can impact safe shutdown and that can potentially be impacted by a fire in the fire area, and what those possible impacts are.

Alignment Basis:

The BVPS-1 and BVPS-2 NFPA 805 Safe shutdown analysis interim transition reports (8700-01.062-0048 and 2701.620-000-105), Attachment 1 describe the systems that are required for post fire safe shutdown. The safe shutdown equipment list (SSEL) required for safe shutdown for each fire compartment are identified in Attachment 2. This list identifies the components that are required to achieve safe shutdown. The types of equipment located on the SSEL include pumps, MOVs, manual valves, and indicators.

The BVPS-1 and BVPS-2 safe shutdown analysis methodology is summarized in Section 8 of the procedures titled "Post Fire Safe Shutdown Analysis" (8700-01.062-0011 and 2601.620-000-021). The safe shutdown systems and equipment required for safe shutdown for each fire compartment are identified. As part of NFPA 805 Transition, Beaver Valley has incorporated the post-fire safe shutdown analysis into a computerized safe shutdown analysis tool, "SAFE," which maintains success path models of performance goals (methods), systems, equipment and cables.

The procedures state:

"8.0 METHODOLOGY

"The SAFE *analysis software identifies all of the* SSD *equipment and cables that are located in the analysis area and fail as a direct consequence of the fire* (location failures). The effect of these location failures is then propagated (by the software) through the cable logic, component logic, system logic, and finally the performance goal logic in order to evaluate the overall impact upon safe shutdown capability. This iterative process identifies the equipment, systems, and performance goals that fail as an indirect consequence of the fire. These indirect failures are identified as logic failures.

"When *performing a computer-assisted analysis, the software presumes that all of the* SSD *equipment and cable located in an analysis area* (e.g., fire scenario, zone, and/or area) are involved in the fire, and have failed. The SSD engineer who resolves the analysis output should initially presume that all of the failed components have assumed the worst-case status or position with respect to achieving safe shutdown."

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0011, Rev. A, "P1866-009-001, Post-Fire Safe Shutdown Analysis"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.4.2.4 - Develop a Compliance Strategy or Disposition to Mitigate the Effects Due to Fire Damage to Each Required Component or Cable

Alignment Statement: Aligns

The available deterministic methods for mitigating the effects of circuit failures are summarized as follows (see Figure 1-2):

- Provide a qualified 3-fire rated barrier.
- Provide a 1-hour fire rated barrier with automatic suppression and detection.
- Provide separation of 20 feet or greater with automatic suppression and detection and demonstrate that there are no intervening combustibles within the 20 foot separation distance.
- Reroute or relocate the circuit/equipment, or perform other modifications to resolve vulnerability.
- Provide a procedural action in accordance with regulatory requirements.
- Perform a cold shutdown repair in accordance with regulatory requirements.
- Identify other equipment not affected by the fire capable of performing the same safe shutdown function.
- Develop exemptions, deviations, Generic Letter 86-10 evaluation or fire protection design change evaluations with a licensing change process.

Additional options are available for non-inerted containments as described in 10 CFR 50 Appendix R section III.G.2.d, e and f.

Alignment Basis:

The method of compliance strategies are described in the appropriate NEI 00-01 B-2 table section descriptions. This item provides a high level summary of potential compliance strategies based on 10 CFR 50, Appendix R, III.G.1 and III.G.2.

Variances from deterministic requirements are evaluated based upon the requirements of NFPA 805 Section 4.2.3.

Areas where a potential loss of safe shutdown capability could occur were evaluated as potential variances from the deterministic criteria of NFPA 805 Section 4.2.3 and addressed in fire risk evaluations, as indicated in Transition Report Attachment C.

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2701.620-000-096, Rev. B, "Fire Area Transition Review"
- NFPA 805, Rev. 2001, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants"

Open Items and VFDRs

-None

NEI 00-01 Section:

3.4.2.5 - Document the Compliance Strategy or Disposition Determined to Mitigate the Effects Due to Fire Damage to Each Required Component or Cable

Alignment Statement: Aligns

Assign compliance strategy statements or codes to components or cables to identify the justification or mitigating actions proposed for achieving safe shutdown. The justification should address the cumulative effect of the actions relied upon by the licensee to mitigate a fire in the area. Provide each piece of safe shutdown equipment, equipment not in the path whose spurious operation or mal-operation could affect safe shutdown, and/or cable for the required safe shutdown path with a specific compliance strategy or disposition. Refer to Attachment 6 for an example of a Fire Area Assessment Report documenting each cable disposition.

Alignment Basis:

The BVPS-1 and BVPS-2 safe shutdown analysis methodology is summarized in Section 8 of the procedures titled "Post Fire Safe Shutdown Analysis" (8700-01.062-0011 and 2601.620-000-021). The safe shutdown systems and equipment required for safe shutdown for each fire compartment are identified.

As part of NFPA 805 Transition, Beaver Valley has incorporated the post-fire safe shutdown analysis into a computerized safe shutdown analysis tool, "SAFE," which maintains success path models of performance goals (methods), systems, equipment and cables.

The procedures state:

"8.0 METHODOLOGY

"The SAFE analysis software identifies all of the SSD equipment and cables that are located in the analysis area and fail as a direct consequence of the fire (location failures). The effect of these location failures is then propagated (by the software) through the cable logic, component logic, system logic, and finally the performance goal logic in order to evaluate the overall impact upon safe shutdown capability. This iterative process identifies the equipment, systems, and performance goals that fail as an indirect consequence of the fire. These indirect failures are identified as logic failures.

"When performing a computer-assisted analysis, the software presumes that all of the SSD equipment and cable located in an analysis area (e.g., fire scenario, zone, and/or area) are involved in the fire, and have failed. The SSD engineer who resolves the analysis output should initially presume that all of the failed components have assumed the worst-case status or position with respect to achieving safe shutdown."

Table B-2 Nuclear Safety Capability Assessment
Methodology Review
Transition Report

Beaver Valley Power Station

Licensing Actions

- None

Supporting Documents

- No Documents
- No Evaluations

References

- 2601.620-000-021, Rev. A, "P1953-022-002, Post-Fire Safe Shutdown Analysis"
- 2701.620-000-105, Rev. A, "Beaver Valley Unit 2 NFPA 805 Safe Shutdown Analysis Interim Transition Report"
- 8700-01.062-0011, Rev. A, "P1866-009-001, Post-Fire Safe Shutdown Analysis"
- 8700-01.062-0048, Rev. A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report"

Open Items and VFDRs

-None

F. Fire-Induced Multiple Spurious Operations Resolution

6 Pages Attached

MSO Process Summary

The following provides the guidance from RG 1.205, Revision 1, as supplemented by FAQ 07-0038, Revision 3 (ML110140242), along with the process and results.

Step 1 – Identify potential MSOs of concern

Information sources that may be used as input include:

- Post-fire safe shutdown analysis (NEI 00-01, Revision 1, Chapter 3)
- Generic lists of MSOs (e.g., from Owners Groups and/or later versions of NEI 00-01, if endorsed by NRC for use in assessing MSOs)
- Self-assessment results (e.g., NEI 04-06 assessments performed to addressed RIS 2004-03)
- PRA insights (e.g., NEI 00-01 Revision 1, Appendix F)
- Operating Experience (e.g., licensee event reports, NRC Inspection Findings, etc.)

Results of Step 1:

The initial MSO identification review was conducted using extensive review of plant systems and drawings to determine potential pathways. This initial review was then supplemented by generic industry lists and the following data sources were used as input to the overall assessment of MSOs at Beaver Valley. The Beaver Valley plant MSO identification process resulted in a list of potential MSO pathways for consideration by the MSO expert panel. The following was used as input to the overall assessment of MSOs at BVPS-1 and BVPS-2:

- BVPS-1 Updated Fire Protection Appendix R Review and BVPS-2 Fire Protection Safe Shutdown Report
- Generic list of MSOs from PWR Owners Group (PWROG) (WCAP-16933-NP)
- BV1Rev5F, "Fire PRA Component Selection"
- BV2Rev5F, "Fire PRA Component Selection"
- Miscellaneous operating experience based on knowledge of review team members
- BVPS-1 and BVPS-2 Fire PRA Models and Insights

Following the initial expert panel in 2008 additional reviews were performed of the Generic PWROG generic list of MSOs.

Step 2 – Conduct an expert panel to assess plant specific vulnerabilities (e.g., per NEI 00-01, Rev. 1 Section F.4.2).

The expert panel should focus on system and component interactions that could impact nuclear safety. This information will be used in later tasks to identify cables and potential locations where vulnerabilities could exist.

The documentation of the results of the expert panel should include how the expert panel was conducted including the members of the expert panel, their experience, education, and areas of expertise. The documentation should include the list of MSOs reviewed as well as the source for each MSO. This documentation should provide a list the MSOs that were

included in the PRA and a separate list of MSOs that were not kept for further analysis (and the reasons for rejecting these MSOs for further analysis).

Describe the expert panel process (e.g., when it was held, what training was provided to the panel members, what analyses were reviewed to identify MSOs, how was consensus achieved on which MSOs to keep and any dispute resolution process criteria used in decision process, etc.).

[Note: The physical location of the cables of concern (e.g., fire zone/area routing of the identified MSO cables), if known, may be used at this step in the process to focus the scope of the detailed review in further steps.]

Results of Step 2:

An initial expert panel was conducted in accordance with project instructions 8700-01.062-0001, Revision A, "NFPA 805 - BV1 Multiple Spurious Operation (MSO) Expert Panel Instruction," dated April 9, 2008, for BVPS-1 and 2601.620-000-002, Revision A, "BV2 MSO Expert Panel Project Instruction," dated March 10, 2010, for BVPS-2, which followed the guidance of NEI 00-01, Revision 1, Section F.4.2, "Guidance for Post-Fire Safe Shutdown Circuit Analysis" and NEI 04-06, Revision L, "Guidance for Self-Assessment of Circuit Failure Issues." Prior to the meeting each of the expert panel members reviewed the MSO expert panel project instructions (8700-01.062-0001, Revision A, "NFPA 805 - BV1 Multiple Spurious Operation (MSO) Expert Panel Instruction," and 2601.620-000-002, Revision A, "BV2 MSO Expert Panel Project Instruction") to fully understand the intended final product of the expert panel deliberations.

The results are documented in FENOC reports 8700-01.062-0002, Revision A, for BVPS-1 dated August 28, 2009, and 2701.620-000-005, Revision A, for BVPS-2 dated October 8, 2010, both titled "Multiple Spurious Operation (MSO) Expert Panel Review Report."

A second MSO expert panel assessment was conducted at BVPS-1 and BVPS-2. The second MSO expert panel discussed and dispositioned open items from the original MSO expert panel and addressed new generic MSOs that had been identified since the first panel. The results of the second panel assessment were documented in an update to the original calculation in FENOC reports 8700-01.062-0002, Revision B, for BVPS-1 dated July 13, 2012, and 2701.620-000-005, Revision B, for BVPS-2 dated July 23, 2012, both titled "Multiple Spurious Operation (MSO) Expert Panel Review Report." The reports included:

- The list of Generic MSO functional scenarios considered for applicability to BVPS-1 and BVPS-2 and updated to reflect the PWR Owners Group Generic MSO list Revision 2.1 (March 2011) (which corresponds to WCAP 16933 Revision 1)
- The source of the MSOs that were reviewed (i.e., industry list, plant-specific, "what if" review, etc.)
- Identification and qualification (i.e., education, experience, and area of expertise) of each member of the MSO expert panel
- Description of the expert panel process
- Documentation of results (including disposition of potential MSOs)

The expert panel core structure consisted of an Appendix R/Safe Shutdown Engineer, Electrical Engineer, NFPA 805 Expert, PRA Engineer (Fire PRA lead), Fire PRA Consultant, a Senior Reactor Operator, and the Fire Protection Program Manager. In addition, the

expert panel had the ability to request supplemental engineering support (e.g., transient analysis, system engineers, etc.) on an as-needed basis to support the resolution of issues identified. Prior to the meeting, each of the expert panel members reviewed the MSO expert panel instruction to fully understand the intended final product of the expert panel deliberations. Work already accomplished in identifying potential spurious actuations by the Fire PRA team was also included in the MSO expert panel project instruction and reviewed by team members prior to the meeting.

The PWROG Generic MSO list that included scenarios was generated by a systems level review of each of the following nuclear safety performance criteria:

- Reactivity Control
- RCS Inventory Control (Makeup)
- RCS Pressure Control
- Decay Heat Removal
- Critical Support Functions
- Generic

By using the PWROG Generic MSO list as guidance, a step-by-step discussion was held, typically by postulating scenarios, discussing the potential consequences and likelihood, discussing operator response, and recommending additional courses of action. Key considerations, in addition to consequences were:

- Whether the scenario of concern was currently modeled in the Safe Shutdown Analysis
- Whether the scenario of concern was currently modeled in the Internal Events PRA
- Whether procedures addressed the potential scenarios of concern
- Additional analyses or justification that may be necessary to document exclusion of a particular scenario
- Potential generic issues that may be best resolved by PWROG analysis/justification

The MSO expert panel reports describe the processes used to achieve consensus and considered the dispositioning of potential scenarios identified in the existing fire PRA. The final product of this step was a report that assessed the MSO pathways that apply to both units of Beaver Valley.

Step 3 – Update the Fire PRA model and NSCA to include the MSOs of concern.

This includes the:

- Identification of equipment (NUREG/CR-6850 Task 2)
- Identification of cables that, if damaged by fire, could result in the spurious operation (NUREG/CR-6850 Task 3, Task 9)
- Identify routing of the cables identified above, including associating that routing with fire areas, fire zones and/or Fire PRA physical analysis units, as applicable.

Include the equipment/cables of concern in the Nuclear Safety Capability Assessment (NSCA). (Including the equipment and cable information in the NSCA does not necessarily

imply that the interaction is possible since separation/protection may exist throughout the plant fire areas such that the interaction is not possible.)

Note: Instances may exist where conditions associated with MSOs do not require update of the Fire PRA and NSCA analysis. For example, Fire PRA analysis in NUREG/CR-6850 Task 2, Component Selection, may determine that the particular interaction may not lead to core damage, or pre-existing equipment and cable routing information may determine that the particular MSO interaction is not physically possible. In other instances, the update of the PRA may not be warranted if the contribution is negligible. The rationale for exclusion of identified MSOs from the Fire PRA and NSCA was documented and the configuration control mechanisms were reviewed to provide reasonable confidence that the exclusion basis will remain valid.

Results of Step 3:

Task 5.2 (NUREG/CR-6850) of the BVPS-1 and BVPS-2 Fire PRA identified those component spurious operations to be included in the fire PRA model. This included multiple spurious operations identified in the expert panel review, which considered both generic information and plant specific insights. The MSO expert panel reports (8700-01.062-0002, Revision B, and 2701.620-000-005, Revision B) provide a rationale for exclusion of specific MSOs and associated individual spurious actions from the fire PRA on the basis that there is no impact on core damage or large early release frequency due to the specific plant configuration (e.g., impact is negated by a mechanical component such as manual valve) or very low probability of occurrence (e.g., MSO would require multiple proper polarity 3 phase hot shorts).

The MSO combinations of components of concern were then evaluated for inclusion into the Beaver Valley Plant NSCA model. As necessary, components were added to the NSCA Equipment List and Logics; and circuit analysis and cable routing was performed. The results are documented in the Beaver Valley SAFE and credible failures in SAFE are evaluated using the fire risk evaluation (FRE) process. The results of the component selection task are included in FENOC PRA Notebook entitled "Beaver Valley Unit 1 Component Selection Task Results of Task 5.2 Fire PRA" and "Beaver Valley Unit 2 Component Selection Task Results of Task 5.2 Fire PRA," which include:

- Correlation and reconciliation of safe shutdown and PRA components and failure modes.
- A listing of spurious actuations considered which are correlated to the MSOs considered in the expert panel review.

The MSO combinations included in the NSCA were evaluated with respect to compliance with the deterministic requirements of NFPA 805, as discussed in Section 4.2.3 of NFPA 805, by running the SAFE-PB analysis (8700.01.062-0044, "BV1 NFPA 805 MSO-to-SAFE Cross-Reference Report," and 2701.620-000-084, "BV2 NFPA 805 MSO-to-SAFE Cross-Reference Report") and identifying failures of required SAFE-PB Performance Goals. For those situations where the deterministic requirements of NFPA 805 are not met, whether due to an MSO or not, a VFDR was identified for further review by a fire risk evaluation. This process satisfies Step 4 of FAQ 07-0038.

As necessary, component and failure modes were added to the list to be considered in Task 5.3 (NUREG/CR-6850 Task 3) and cable selection and cable routing performed. The

results are subsequently in a relational database and used to identify fire scenario impacts in the Tasks 5.7 and 5.14 (NUREG/CR-6850 Task 7 and 14).

Spurious component actuations were added to the PRA fault tree logic in a manner which allows the correct probability and impact of MSOs to be propagated through the model. The MSO combinations of components of concern were then evaluated for inclusion into the NSCA model. As necessary, components were added to the NSCA Equipment List and logics and circuit analysis and cable routing were performed.

Step 4 – Evaluate for NFPA 805 Compliance

The MSO combinations included in the NSCA should be evaluated with respect to compliance with the deterministic requirements of NFPA 805, as discussed in Section 4.2.3 of NFPA 805. For those situations in which the MSO combination does not meet the deterministic requirements of NFPA 805 (VFDR), the issue with the components and associated cables should be mitigated by other means (e.g., performance-based approach per Section 4.2.4 of NFPA 805, plant modification, etc.).

The performance-based approach may include the use of feasible and reliable recovery actions. The use of recovery actions to demonstrate the availability of a success path for the nuclear safety performance criteria requires that the additional risk presented by the use of these recovery actions be evaluated (NFPA 805 Section 4.2.4).

Results of Step 4:

The Beaver Valley fire PRA quantified the fire-induced risk model containing the MSO pathways. The quantification addressed the specific electrical cables and the failure mode in each fire compartment that was quantified. Thus, the MSO contribution is included in the fire PRA results, and in the associated evaluation of VFDRs as documented in applicable FREs.

The MSO combination of components of concern were also evaluated as part of the Beaver Valley NSCA. For cases where the MSO combination of components did not meet the requirements for deterministic compliance, the MSO combination of components were identified as VFDRs and added to the scope of the fire risk evaluations. The process and results associated with the performance of fire risk evaluations are summarized in Section 4.5 of the Transition Report.

Step 5 - Document Results

The results of the process should be documented. The results should provide a detailed description of the MSO identification, analysis, disposition, and evaluation results (e.g., references used to identify MSOs; the composition of the expert panel, the expert panel process, and the results of the expert panel process; disposition and evaluation results for each MSO, etc.). High level methodology utilized as part of the transition process should be included in the 10 CFR 50.48(c) License Amendment Request/Transition Report.

Results of Step 5:

The process for identifying potential MSOs was conducted in accordance with Regulatory Guide 1.205 as supplemented by FAQ 07-0038, Revision 3 (ML110140242). The MSO process and results are documented in the following reports:

- "NFPA 805 - BV1 Multiple Spurious Operation (MSO) Expert Panel Instruction" (8700-01.062-0001, Revision A)

- "BV2 MSO Expert Panel Project Instruction" (2601.620-000-002, Revision A)
- "BVPS-1 MSO Expert Panel Review Report" (8700-01.062-0002, Revision B)
- "BVPS-2 MSO Expert Panel Review Report" (2701.620-000-005, Revision B)
- "BVPS-1 NFPA 805 MSO-to-SAFE Cross-Reference Report" (8700.01.062-0044, Revision A)
- "BVPS-2 NFPA 805 MSO-to-SAFE Cross-Reference Report" (2701.620-000-084, Revision A)

These reports include:

- Each of the functional MSO scenarios identified in the PWROG generic report, summarized and dispositioned with respect to the current BVPS-1 and BVPS-2 Fire PRA spurious actuation review, and is part of the MSO report.
- The results of the MSO expert panel discussions were added to each of these tables.
- The MSOs that were added to the NSCA and resulted in failures are documented as VFDRs and resolutions are documented in the B-3 table.

H. NFPA 805 Frequently Asked Question Summary Table

2 Pages Attached

Note: The NFPA 805 FAQ process will continue through the transition of non-pilot NFPA 805 plants. Final closure of the FAQs will occur when RG 1.205, which endorses the new revision of NEI 04-02, is approved by the NRC.

This table includes the approved FAQs that have not been incorporated into the current endorsed revision of NEI 04-02 and utilized in this submittal:

Table H-1 - NEI 04-02 FAQs Utilized in LAR Submittal

No.	Rev.	Title	FAQ Ref.	Closure Memo
06-0008	9	NFPA 805 Fire Protection Engineering Evaluations	ML090560170	ML073380976
06-0022	3	Acceptable Electrical Cable Construction Tests	ML090830220	ML091240278
07-0030	5	Establishing Recovery Actions	ML103090602	ML110070485
07-0032	2	Clarification of 10 CFR 50.48(c), 10 CFR 50.48(a) and GDC 3 clarification	ML081300697	ML081400292
07-0035	2	Bus Duct Counting Guidance for High Energy Arcing Faults	ML091610189	ML091620572
07-0038	3	Lessons learned on Multiple Spurious Operations	ML103090608	ML110140242
07-0039	2	Lessons Learned - NEI B-2 Table	ML091420138	ML091320068
07-0040	4	Non-Power Operations Clarification	ML082070249	ML082200528
08-0042	0	Fire Propagation from Electrical Cabinets	ML080230438 ML091460350	ML092110537
08-0043	1	Electrical Cabinet Fire Location	ML083540152 ML091470266	ML092120448
08-0044	0	Large Oil Fires	ML081200099 ML091540179	ML092110516
08-0046	0	Incipient Fire Detection Systems	ML081200120 ML093220197	ML093220426
08-0047	1	Spurious Operation Probability	ML082770662	ML082950750
08-0048	0	Fire Ignition Frequency	ML081200291 ML092180383	ML092190457
08-0049	0	Cable Fires	ML081200309 ML091470242	ML092100274
08-0050	0	Non Suppression Probability	ML081200318 ML092510044	ML092190555
08-0051	0	Hot Short Duration	ML083400188 ML100820346	ML100900052
08-0052	0	Transient Fire Growth Rates and Control Room Non-Suppression	ML081500500 ML091590505	ML092120501
08-0053	0	Kerite-FR Cable Failure Thresholds	ML082660021	ML121440155
07-0054*	1	Demonstrating Compliance with Chapter 4 of NFPA 805	ML103510379	ML110140183

Table H-1 - NEI 04-02 FAQs Utilized in LAR Submittal

No.	Rev.	Title	FAQ Ref.	Closure Memo
09-0056	2	Radioactive Release Transition	ML102810600	ML102920405
09-0057	3	Safe Shutdown Strategy Change	ML100330863	ML100960568
10-0059	5	NFPA 805 Monitoring Program	ML120410589	ML120750108
12-0062	1	Updated Final Safety Analysis Report Content	ML121430035	ML121980557
12-0063	1	Fire Brigade Make-Up	ML121670141	ML121980572
12-0064	1	Hot Work/Transient Fire Frequency Influence Factors	ML122550050	ML12346A488
12-0067	1	Transformer Oil Collection Drain Basin Inspections	ML13035A039	ML13037A425

*Note: The FAQ submittal number was 08-0054 but the NRC closure memo for the FAQ was listed as 07-0054. 07-0054 was used to be consistent with the Closure Memo.

I. Definition of Power Block

4 Pages Attached

The process used to classify the plant structures and fire compartments include the review of the following documents: (1) UFPARR for BVPS-1, (2) FPSSR for BVPS-2, (3) Radioactive Release Review (NEI 04-02, Table G-1), and (4) Plant Area Boundary & Partitioning Calculation (10080-DEC-3560).

For the purposes of establishing the structures included in the fire protection program in accordance with 10 CFR 50.48(c) and NFPA 805, BVPS-1 and BVPS-2 plant structures listed in the following tables are considered to be part of the power block.

Table I-1 – BVPS-1 Power Block Definition

Power Block Structures	Fire Compartment	Description
Service Building (Note 1)	3-CR-1	Main Control Room
	1-CR-2	Control Room HVAC Equipment Room
	1-CR-3	Communication Equipment and Relay Room
	1-CR-4	Process Instrumentation Room
	1-CS-1	Cable Spreading Area
	1-ES-1	Emergency Switchgear Room - Train A
	1-ES-2	Emergency Switchgear Room - Train B
	1-MG-1	Motor Generator Room
	1-NS-1	Normal Switchgear Area
	1-SB-GEN	Service Bldg & Pipe Chase
Safeguards Building	1-CV-1	West Cable Vault
	1-CV-2	East Cable Vault
	1-MS-1	Main Steam Valve Room
	1-PT-1	Pipe Tunnel Area (excludes 1-QP-1)
	1-QP-1	Quench Spray/AFW Pump Room
	1-SGPD-1	Steam Generator Blowdown Area
Diesel Generator Building	1-DG-1	Diesel Generator Room - Train A
	1-DG-2	Diesel Generator Room - Train B
Fuel Handling / Decontamination Building	1-FB-1	Fuel Handling / Decon Buildings
Primary Auxiliary Building (PAB)	1-PA-1A	Primary Auxiliary Building (includes 1-MF-1 and 1-MF-2)
	1-PA-1C	Primary Auxiliary Building
	1-PA-1E	Primary Auxiliary Building
	1-PA-1G	Primary Auxiliary Building (Excluding 1-PA-1GA, 1-PA-1GB, 1-PA-1GC)
	1-PA-1GA	Charging Pump Cubicle 1A
	1-PA-1GB	Charging Pump Cubicle 1B
	1-PA-1GC	Charging Pump Cubicle 1C
	1-S-1	PAB West Stairwell & PAB Elevator Shaft
Reactor Containment Bldg.	1-RC-1	Reactor Containment Building
River Water Valve Pits	1-VP-1	River Water Valve Pit - Train A
	1-VP-2	River Water Valve Pit - Train B
Turbine Building	1-TB-1	Turbine Building General Area (includes 1-TO-1)

Table I-1 – BVPS-1 Power Block Definition

Power Block Structures	Fire Compartment	Description
Intake Structure (Note 1)	3-IS-1	Intake Structure Cubicle 1
	3-IS-2	Intake Structure Cubicle 2
	3-IS-3	Intake Structure Cubicle 3
	3-IS-4	Intake Structure Cubicle 4
	3-IS-6	Intake Structure - Traveling Screens Area
Alternate Intake Structure (Note 1)	3-AIS-1	Alternate Intake Structure
Cable Tunnel	1-CV-3	Cable Tunnel
Cooling Tower Pump House	1-CTP-1	Cooling Tower Pump House & Cooling Tower
Transformers	1-TR-1	Main Transformer (TR-MT-1)
	1-TR-2	Unit Station Service Transformers (TR-1C)
	1-TR-3	Unit Station Service Transformers (TR-1D)
	1-TR-4	System Station Service Transformers (TR-1A)
	1-TR-5	System Station Service Transformers (TR-1B)
CO_2 Storage & PG Water Pump Room	1-CO-2	CO2 Storage & PG Water Pump Room
Hydrogen Storage Tanks	1-H-1	Bulk Hydrogen Storage Tanks in BVPS-1 Yard Area
ERF Substation, ESF Diesel Generator Bldg, and ERF Transformers	3-ER-1	ERF Substation
	3-ER-2	ERF Diesel Generator Building
	3-TR-6	ERF Offsite Power Transformer TRF-ERFS-3A
	3-TR-7	ERF Offsite Power Transformer TRF-ERFS-3B
Tanks (These tanks are located in BVPS-1 Yard Area)	1-WT-1	Refueling Water Storage Tank (1QS-TK-1)
	1-WT-10	Primary Plant Demineralized Water Storage Tank (1WT-TK-10)
	1-WT-11	Turbine Plant Demineralized Water Storage Tank (1WT-TK-11)
	1-WT-26	Auxiliary Demineralized Water Storage Tank (1WT-TK-26)
Warehouse	1-WH-1	Unit 1 Warehouse and Shop Area
Waste Handling Building	3-WHBS-1	Temporary Storage (Waste Handling Building - Switchyard)
Yard Area (Note 1)	3-YARD-1	Yard Area (Including Electrical Manholes & Ductlines)

Note 1 - Main Control Room (3-CR-1), Intake Structure, Alternate Intake Structure, and Yard Areas (3-YARD-1) are common to BVPS-1 and BVPS-2.

Note 2 - The Switchyard and Relay House (located in the Switchyard) are excluded from the definition of the "Power Block" because they are not required to meet either the nuclear safety performance criteria or the radioactive release performance criteria as described in NFPA 805, Section 1.5.

Table I-2 – BVPS-2 Power Block Definition

Power Block Structures	Fire Compartment	Description
Control Building (Note 2)	2-CB-1	Instrument and Relay Room and Cable Spreading Room
	2-CB-4	Control Building Computer Room
	2-CB-5	Control Building Fan Room
	2-CB-6	West Communication Room
	3-CR-1	Main Control Room
Service Building	2-SB-1	Service Bldg. Emergency Switchgear - Train A
	2-SB-2	Service Bldg. Emergency Switchgear - Train B
	2-SB-3	Service Bldg. Cable Tray Area
	2-SB-4	Service Bldg. Normal Switchgear Room
	2-SB-5	Service Bldg. MFRV
	2-SB-6	Service Bldg. Battery Room 2-1
	2-SB-7	Service Bldg. Battery Room 2-3
	2-SB-8	Service Bldg. Battery Room 2-2
	2-SB-9	Service Bldg. Battery Room 2-4
	2-SB-10	Service Bldg. Non-Safety Related Battery Room 2-5
Safeguards Building	2-SG-1N	North Safeguards Area
	2-SG-1S	South Safeguards Area
Main Steam & Cable Vault Building	2-ASP	Alternate Shutdown Panel Room
	2-CV-1	West Cable Vault & Rod Control Area
	2-CV-2	East Cable Vault & Rod Control Area
	2-CV-3	Cable Vault & Rod Control Area
	2-CV-4	South Cable Vault & Rod Control Area
	2-CV-5	North Cable Vault & Rod Control Area
	2-CV-6	Cable Vault & Rod Control Relay Room
	2-MS-1	Main Steam Valve Room
	2-PT-1	Pipe Tunnel Area
	2-S-1	Cable Vault Northwest Stairwell and Personnel Access Tunnel / Passageway
	2-S-4	Cable Vault West Stairwell
Waste Handling Building	2-WH-1	Waste Handling Building
Service Water Valve Pits	2-VP-1	Service Water Valve Pit East - Train A
	2-VP-2	Service Water Valve Pit West - Train B
Diesel Generator Building	2-DG-1	Diesel Generator Cubicle - Train A
	2-DG-2	Diesel Generator Cubicle - Train B
Fuel Handling & Decontamination Building	2-FB-1	Fuel Handling & Decontamination Building

Table I-2 – BVPS-2 Power Block Definition

Power Block Structures	Fire Compartment	Description
Primary Auxiliary Building (PAB)	2-CB-1	Cable Tunnel / Fan Room in the PAB (Note 1)
	2-PA-3	Primary Auxiliary Building General Area
	2-PA-3A	Charging Pump Cubicle A
	2-PA-3B	Charging Pump Cubicle B
	2-PA-3C	Charging Pump Cubicle C
	2-PA-4	Primary Auxiliary Building General Area
	2-PA-5	Primary Auxiliary Building General Area
	2-PA-6	Primary Auxiliary Building MCC Room -Train A
	2-PA-7	Primary Auxiliary Building MCC Room -Train B
Reactor Containment Bldg	2-RC-1	Reactor Containment Building
Turbine Building	2-TB-1	Turbine Building General Area (includes 2-TB-2)
Condensate Polishing Building	2-CP-1	Condensate Polishing Building
Cooling Tower Pump House	2-CTP-1	Cooling Tower Pump House & Cooling Tower
Intake Structure (Note 2)	3-IS-1	Intake Structure Cubicle 1
	3-IS-2	Intake Structure Cubicle 2
	3-IS-3	Intake Structure Cubicle 3
	3-IS-4	Intake Structure Cubicle 4
	3-IS-6	Intake Structure-Traveling Screens Area
Alternate Intake Structure (Note 2)	3-AIS-1	Alternate Intake Structure
Transformers	2-TR-1	Main Transformer (TR-MT-2)
	2-TR-2	Unit Station Service Transformer (TR-2C)
	2-TR-3	Unit Station Service Transformer (TR-2D)
	2-TR-4	System Station Service Transformer (TR-2A)
	2-TR-5	System Station Service Transformer (TR-2B)
Hydrogen Storage Tanks	2-H-1	Bulk Hydrogen Storage Tanks in BVPS-2 Yard Area
Tanks (These tanks are located in BVPS-2 Yard Area)	2-WT-21	Refueling Water Storage Tank (2QSS-TK21)
	2-WT-210	Primary Plant Demineralized Water Storage Tank (2FWE-TK210)
	2-WT-211	Turbine Plant Demineralized Water Storage Tank (2WTDTK211)
	2-WT-23	Demineralized Water Storage Tank (2WTD-TK23)
Long Term Storage Building	2-SGRPW	Long Term Storage Building
Yard Area (Note 2)	3-YARD-1	Yard Area (includes Electrical Manholes & Ductlines)

Note 1 - 2-CB-1 is comprised of fire areas CB-1 (Instrument and Relay Room), CB-2 (Control Building Cable Spreading Room), and CT-1 (Cable Tunnel and Fan Room in the PAB).

Note 2 - Main Control Room (3-CR-1), Intake Structure, Alternate Intake Structure, and Yard Areas (3-YARD-1) are common to BVPS-1 and BVPS-2.

Note 3 - The Switchyard and Relay House (located in the Switchyard) are excluded from the definition of the "Power Block" *because they are not required to meet either the nuclear safety performance criteria or the radioactive release* performance criteria as described in NFPA 805, Section 1.5.

J. Fire Modeling V&V

12 Pages Attached

Table J-1 V & V Basis for Fire Models / Model Correlations Used

Calculation	Application	V & V Basis	Discussion
Flame Height (Method of Heskestad)	Calculates the vertical extension of the flame region of a fire.	• NUREG-1805, Chapter 3, 2004 • NUREG-1824, Volume 3, 2007 • NUREG-1934, Chapter 2, 2012 • Society of Fire Protection Engineers (SFPE) Handbook of Fire Protection Engineering, 4th Edition, Chapter 2-1, Heskestad, 2008 • R1989-511-001, "Verification and Validation of Fire Modeling Tools and Approaches for Use in NFPA 805 and Fire PRA", Revision 3, Sections 5.1 and E.1. • 2701.620-000-050 "Task 5.11 Fire Modeling Verification and Validation" Revision A, Sections 2.1, 2.2, 2.3	• The correlation is contained in NUREG-1805, for which V&V is documented in NUREG-1824. • The correlation is documented in an authoritative publication of the "SFPE Handbook of Fire Protection Engineering." • The correlation has been applied within its limits of applicability and the validated range reported in NUREG-1824 or, if applied outside the validated range, the model has been justified as acceptable, either by qualitative analysis, or by quantitative sensitivity analysis. The methodology for justifying application of the fire model outside the range is in accordance with methods documented in NUREG-1934.
Plume Centerline Temperature (Method of Heskestad)	Calculates the vertical separation distance, based on temperature, to a target in order to determine the vertical extent of the zone of influence (ZOI).	• NUREG-1805, Chapter 9, 2004 • NUREG-1824, Volume 3, 2007 • NUREG-1934, Chapter 2, 2012 • SFPE Handbook of Fire Protection Engineering, 4th Edition, Chapter 2-1, Heskestad, 2008 • NUREG/CR-6850, Volume 2, Appendix H, 2005 • R1989-511-001, "Verification and Validation of Fire Modeling Tools and Approaches for Use in NFPA 805 and Fire PRA", Revision 3, Sections 5.2 and E.1. • 2701.620-000-050 "Task 5.11 Fire Modeling Verification and Validation" Revision A, Sections 2.1, 2.2, 2.3	• The correlation is contained in NUREG-1805, for which V&V is documented in NUREG-1824. • The correlation is documented in an authoritative publication of the "SFPE Handbook of Fire Protection Engineering." • The correlation has been applied within its limits of applicability and the validated range reported in NUREG-1824 or, if applied outside the validated range, the model has been justified as acceptable, either by qualitative analysis, or by quantitative sensitivity analysis. The methodology for justifying application of the fire model outside the range is in accordance with methods documented in NUREG-1934. • NUREG/CR-6850 generic screening damage criteria are used, which is considered conservative.

Table J-1 V & V Basis for Fire Models / Model Correlations Used

Calculation	Application	V & V Basis	Discussion
Radiant Heat Flux (Point Source Method)	Calculates the horizontal separation distance, based on heat flux, to a target in order to determine the horizontal extent of the ZOI.	• NUREG-1805, Chapter 5. 2004 • NUREG-1824, Volume 3, 2007 • NUREG-1934, Chapter 2, 2012 • SFPE Handbook of Fire Protection Engineering, 4^{th} Edition, Chapter 3-10, Beyler, C., 2008 • NUREG/CR-6850, Volume 2, Appendix H, 2005 • R1989-511-001, "Verification and Validation of Fire Modeling Tools and Approaches for Use in NFPA 805 and Fire PRA", Revision 3, Section 5.5 and E.1. • 2701.620-000-050 "Task 5.11 Fire Modeling Verification and Validation" Revision A, Sections 2.1, 2.2 & 2.3	• The correlation is contained in NUREG-1805, for which V&V is documented in NUREG-1824. • The correlation is documented in an authoritative publication of the "SFPE Handbook of Fire Protection Engineering." • The correlation has been applied within its limits of applicability and the validated range reported in NUREG-1824 or, if applied outside the validated range, the model has been justified as acceptable, either by qualitative analysis, or by quantitative sensitivity analysis. The methodology for justifying application of the fire model outside the range is in accordance with methods documented in NUREG-1934. • NUREG/CR-6850 generic screening damage criteria are used, which is considered conservative.

Table J-1 V & V Basis for Fire Models / Model Correlations Used

Calculation	Application	V & V Basis	Discussion
Plume Radius (Method of Heskestad)	Calculates the horizontal radius, based on temperature, of the plume at a given height. The correlation is derived from the Heskestad centerline plume correlation.	• FIVE-Rev1, Referenced by EPRI Report 1002981, 2002 • NUREG-1824, Volume 4, 2007 • NUREG-1934, Chapter 2, 2012 • SFPE Handbook of Fire Protection Engineering, 4th Edition, Chapter 2-1, Heskestad, G., 2008 • NUREG/CR-6850, Volume 2, Appendix H, 2005 • R1989-511-001, "Verification and Validation of Fire Modeling Tools and Approaches for Use in NFPA 805 and Fire PRA", Revision 3, Section 5.3 • 2701.620-000-050 "Task 5.11 Fire Modeling Verification and Validation" Revision A, Section 2.1	• The correlation is contained in the FIVE-Rev1 fire model, for which V&V is documented in NUREG-1824. • The correlation is documented in an authoritative publication of the "SFPE Handbook of Fire Protection Engineering." • Although not specifically verified and validated in NUREG-1824, Page 2-7 of the 4th Edition of the SFPE Handbook of Fire Protection Engineering states that the value calculated by this correlation is the point where the temperature has declined to half of the centerline plume temperature. The Heskestad centerline plume correlation is verified and validated in NUREG-1824. • The correlation has been applied within its limits of applicability and the validated range reported in NUREG-1824 or, if applied outside the validated range, the model has been justified as acceptable, either by qualitative analysis, or by quantitative sensitivity analysis. The methodology for justifying application of the fire model outside the range is in accordance with methods documented in NUREG-1934. • NUREG/CR-6850 generic screening damage criteria are used, which is considered conservative.

Table J-1 V & V Basis for Fire Models / Model Correlations Used

Calculation	Application	V & V Basis	Discussion
Hot Gas Layer (Method of McCaffrey, Quintiere, and Harkleroad (MQH))	Calculates the hot gas layer temperature for a room with natural ventilation.	• NUREG-1805, Chapter 2, 2004 • NUREG-1824, Volume 3, 2007 • NUREG-1934, Chapter 2, 2012 • SFPE Handbook of Fire Protection Engineering, 4th Edition, Chapter 3-6, Walton W. and Thomas, P., 2008 • R1989-511-001, "Verification and Validation of Fire Modeling Tools and Approaches for Use in NFPA 805 and Fire PRA", Revision 3, Sections 5.6 and E.1 • 2701.620-000-050 "Task 5.11 Fire Modeling Verification and Validation" Revision A, Sections 2.1, 2.4 & 2.5	• The correlation is contained in NUREG-1805, for which V&V is documented in NUREG-1824. • The correlation is documented in an authoritative publication of the "SFPE Handbook of Fire Protection Engineering." • The correlation has been applied within its limits of applicability and the validated range reported in NUREG-1824 or, if applied outside the validated range, the model has been justified as acceptable, either by qualitative analysis, or by quantitative sensitivity analysis. The methodology for justifying application of the fire model outside the range is in accordance with methods documented in NUREG-1934.
Ceiling Jet Temperature (Method of Alpert)	Calculates the horizontal separation distance, based on temperature at the ceiling of a room, to a target in order to determine the horizontal extent of the ZOI.	• FIVE-Rev1, Referenced by EPRI Report 1002981, 2002 • NUREG-1824, Volume 4, 2007 • NUREG-1934, Chapter 2, 2012 • SFPE Handbook of Fire Protection Engineering, 4th Edition, Chapter 2-2, Alpert, R., 2008 • NUREG/CR-6850, Volume 2, Appendix H, 2005 • R1989-511-001, "Verification and Validation of Fire Modeling Tools and Approaches for Use in NFPA 805 and Fire PRA", Revision 3, Sections 5.4, E.1 and E.3. • 2701.620-000-050 "Task 5.11 Fire Modeling Verification and Validation" Revision A, Section 2.1.	• The correlation is used in the FIVE-Rev1 fire model, for which V&V is documented in NUREG-1824. • The correlation is documented in an authoritative publication of the "SFPE Handbook of Fire Protection Engineering." • The correlation has been applied within its limits of applicability and the validated range reported in NUREG-1824 or, if applied outside the validated range, the model has been justified as acceptable, either by qualitative analysis, or by quantitative sensitivity analysis. The methodology for justifying application of the fire model outside the range is in accordance with methods documented in NUREG-1934. • NUREG/CR-6850 generic screening damage criteria are used, which is considered conservative.

Table J-1 V & V Basis for Fire Models / Model Correlations Used

Calculation	Application	V & V Basis	Discussion
HGL Calculations using Consolidated Model of Fire Growth and Smoke Transport (CFAST)	Calculates the upper and lower gas layer temperature and interface height.	• NIST Special Publication 1086, 2008 • CFAST Version 6 • NUREG-1824, Volume 5, 2007 • NUREG-1934, Chapter 2, 2012 • R1989-511-001, "Verification and Validation of Fire Modeling Tools and Approaches for Use in NFPA 805 and Fire PRA", Revision 3, Section F.1 • 2701.620-000-050 "Task 5.11 Fire Modeling Verification and Validation" Revision A, Sections 2.4 & 2.5.	• V&V of the CFAST code is documented in the NIST Special Publication 1086. • The V&V of CFAST specifically for Nuclear Power Plant applications is documented in NUREG-1824. • It is concluded in NUREG-1824, Volume 5, Chapter 6, "Model Validation", that CFAST models the HGL height, temperature and smoke concentration in an appropriate manner. • The model has been applied within its limits of applicability and within the validated range reported in NUREG-1824 or, if applied outside the validated range, the model has been justified as acceptable, either by qualitative analysis, or by quantitative sensitivity analysis. The methodology for justifying application of the fire model outside the range is in accordance with methods documented in NUREG-1934.
Smoke Detection Actuation Correlation (Method of Heskestad and Delichatsios)	Alpert Ceiling Jet correlation is used to determine temperature and the Heskestad and Delichatsios temperature to smoke density correlation for smoke detection timing estimates.	• NUREG-1805, Chapter 11, 2004 • NUREG-1824, Volume 4, 2007 • NUREG-1934, Chapter 2, 2012 • SFPE Handbook of Fire Protection Engineering, 4th Edition, Chapter 4-1, Custer R., Meacham B., and Schifiliti, R., 2008 • SFPE Handbook of Fire Protection Engineering, 4th Edition, Chapter 2-2, Alpert, R., 2008 • R1989-511-001, "Verification and Validation of Fire Modeling Tools and Approaches for Use in NFPA 805 and Fire PRA", Revision 3, Section E.1	• The smoke detection correlation is contained in NUREG-1805. • Alpert's ceiling jet correlation V&V is documented in NUREG-1824. • The correlation has been applied within its limits of applicability and the validated range reported in NUREG-1824 or, if applied outside the validated range, the model has been justified as acceptable, either by qualitative analysis, or by quantitative sensitivity analysis. The methodology for justifying application of the fire model outside the range is in accordance with methods documented in NUREG-1934. • The temperature to smoke density correlation is documented in an authoritative publication of the "SFPE Handbook of Fire Protection Engineering."

Table J-1 V & V Basis for Fire Models / Model Correlations Used

Calculation	Application	V & V Basis	Discussion
Heat Detection Actuation Correlation	Estimates heat detector timing based on the Alpert ceiling jet temperature, velocity, and thermal response of sprinkler.	• NUREG-1805, Chapter 11, 2004 • NFPA Fire Protection Handbook, 19th Edition, Chapter 3-9, Budnick, E., Evans, D., and Nelson, H., 2003 • NUREG-1824, Volume 4, 2007 • NUREG-1934, Chapter 2, 2012 • R1989-511-001, "Verification and Validation of Fire Modeling Tools and Approaches for Use in NFPA 805 and Fire PRA", Revision 3, Section E.1	• The heat detection correlation is contained in NUREG-1805. • The correlation is documented in an authoritative publication of the NFPA Fire Protection Handbook. • Alpert's ceiling jet correlation V&V is documented in NUREG-1824. • The correlation has been applied within its limits of applicability and the validated range reported in NUREG-1824 or, if applied outside the validated range, the model has been justified as acceptable, either by qualitative analysis, or by quantitative sensitivity analysis. The methodology for justifying application of the fire model outside the range is in accordance with methods documented in NUREG-1934.
Sprinkler Activation Correlation	Estimates sprinkler actuation timing based on the Alpert ceiling jet temperature, velocity, and thermal response of sprinkler.	• NUREG-1805, Chapter 10, 2004 • NFPA Fire Protection Handbook, 19th Edition, Chapter 3-9, Budnick, E., Evans, D., and Nelson, H., 2003 • NUREG-1824, Volume 4, 2007 • NUREG-1934, Chapter 2, 2012 • R1989-511-001, "Verification and Validation of Fire Modeling Tools and Approaches for Use in NFPA 805 and Fire PRA", Revision 3, Section E.2	• The sprinkler actuation correlation is contained in NUREG-1805. • The correlation is documented in an authoritative publication of the NFPA Fire Protection Handbook. • Alpert's ceiling jet correlation V&V is documented in NUREG-1824. • The correlation has been applied within its limits of applicability and the validated range reported in NUREG-1824 or, if applied outside the validated range, the model has been justified as acceptable, either by qualitative analysis, or by quantitative sensitivity analysis. The methodology for justifying application of the fire model outside the range is in accordance with methods documented in NUREG-1934.

Table J-1 V & V Basis for Fire Models / Model Correlations Used

Calculation	Application	V & V Basis	Discussion
Control Room Abandonment Calculation using CFAST	Evaluates the time at which control room abandonment is necessary based on smoke obscuration and average HGL temperature.	• NIST Special Publication 1086, 2008 • CFAST Version 6 • NUREG-1824, Volume 6, 2007 • NUREG/CR-6850, Volume 2, Section 11.5.2.11, 2005 • 2701.620-000-050 "Task 5.11 Fire Modeling Verification and Validation" Revision A, Section 2.2 & 2.3	• V&V of the CFAST code is documented in the NIST Special Publication 1086. • The V&V of CFAST specifically for Nuclear Power Plant applications is documented in NUREG-1824. • The model has been applied within its limits of applicability. • NUREG/CR-6850 habitability criteria are used, which is considered conservative.
Temperature Sensitive Equipment Hot Gas Layer Study using CFAST	Determines the temperature and interface height of the upper and lower gas layers for various compartments, for use in assessing damage to temperature sensitive equipment.	• NIST Special Publication 1086, 2008 • CFAST Version 6 • NUREG-1824, Volume 5, 2007 • NUREG-1934, Chapter 2, 2012 • NUREG/CR-6850, Volume 2, Appendix H, 2005 • R1989-511-001, "Verification and Validation of Fire Modeling Tools and Approaches for Use in NFPA 805 and Fire PRA", Revision 3, Section D.4	• V&V of the CFAST code is documented in the NIST Special Publication 1086. • The V&V of CFAST specifically for Nuclear Power Plant applications is documented in NUREG-1824. • The model has been applied within its limits of applicability and the validated range reported in NUREG-1824 or, if applied outside the validated range, the model has been justified as acceptable, either by qualitative analysis, or by quantitative sensitivity analysis. The methodology for justifying application of the fire model outside the range is in accordance with methods documented in NUREG-1934. • NUREG/CR-6850 generic screening damage criteria are used, which is considered conservative.

Table J-1 V & V Basis for Fire Models / Model Correlations Used

Calculation	Application	V & V Basis	Discussion
Temperature Sensitive Equipment Zone of Influence Study using FDS	Determines the radiant heat flux ZOI at which temperature sensitive equipment will reach damage thresholds.	• FDS Version 5 • NIST Special Publication 1018-5, Volume 2, 2010 • NIST Special Publication 1018-5, Volume 3, 2010 • NUREG-1824, Volume 7, 2007 • NUREG-1934, Chapter 2, 2012 • NUREG/CR-6850, Volume 2, Appendix H, 2005 • R1989-511-001, "Verification and Validation of Fire Modeling Tools and Approaches for Use in NFPA 805 and Fire PRA", Revision 3, Section C.5.2	• V&V of the FDS is documented in the NIST Special Publication 1018-5. • The V&V of FDS specifically for Nuclear Power Plant applications is documented in NUREG-1824. • The model has been applied within its limits of applicability and the validated range reported in NUREG-1824 or, if applied outside the validated range, the model has been justified as acceptable, either by qualitative analysis, or by quantitative sensitivity analysis. The methodology for justifying application of the fire model outside the range is in accordance with methods documented in NUREG-1934. • NUREG/CR-6850 generic screening damage criteria are used, which is considered conservative.
Plume/Hot Gas Layer Interaction Study using FDS	Determines the point at which hot gas layer and plume interact and establish limits for plume temperature application.	• FDS Version 5 • NIST Special Publication 1018-5, Volume 2, 2010 • NIST Special Publication 1018-5, Volume 3, 2010 • NUREG-1824, Volume 7, 2007 • NUREG-1934, Chapter 2, 2012 • NUREG/CR-6850, Volume 2, Appendix H, 2005 • R1989-511-001, "Verification and Validation of Fire Modeling Tools and Approaches for Use in NFPA 805 and Fire PRA", Revision 3, Section B.4.2	• V&V of the FDS is documented in NIST Special Publication 1018-5. • The V&V of FDS specifically for Nuclear Power Plant applications is documented in NUREG-1824. • The model has been applied within its limits of applicability and the validated range reported in NUREG-1824 or, if applied outside the validated range, the model has been justified as acceptable, either by qualitative analysis, or by quantitative sensitivity analysis. The methodology for justifying application of the fire model outside the range is in accordance with methods documented in NUREG-1934. • NUREG/CR-6850 generic screening damage criteria are used, which is considered conservative.

Table J-1 V & V Basis for Fire Models / Model Correlations Used

Calculation	Application	V & V Basis	Discussion
Correlation for Heat Release Rates (HRR) of Cables (Method of Lee)	Used to correlate bench-scale data to heat release rates from cable tray fires.	• NUREG/CR-6850, Volume 2, Appendix R, 2005 • SFPE Handbook of Fire Protection Engineering, 4th Edition, Chapter 3-1, Babrauskas, 2008 • National Bureau of Standards Report (NBISR) 85-3195, July 1985 • R1989-511-001, "Verification and Validation of Fire Modeling Tools and Approaches for Use in NFPA 805 and Fire PRA", Revision 3, Section E.5	• The correlation is recommended by NUREG/CR-6850. • The correlation is documented in an authoritative publication of the "SFPE Handbook of Fire Protection Engineering." • The correlation has been applied to cable tray arrangements, cable packing densities, and exposure fires consistent with those reported in NBISR 85-3195, or the model has been qualitatively justified as acceptable.

Table J-1 V & V Basis for Fire Models / Model Correlations Used

Calculation	Application	V & V Basis	Discussion
Corner and Wall HRR	Determines a heat release rate *adjustment factor for* fires that are proximate to a wall or corner.	• SFPE Handbook of Fire Protection Engineering, 4th Edition, Chapter 2-14, Lattimer, 2008 • Zukoski, E.E., "Properties of Fire Plumes," *Combustion Fundamentals of Fire*, Cox, G., Ed., Academic Press, London, 1995 • Sargent, W.S., "Natural Convection Flows and Associated Heat Transfer Processes in Room Fires," Ph.D. thesis, California Institute of Technology, Pasadena, CA 1983 • Cetegen, B.M., "Entrainment and Flame Geometry of Fire Plumes," Ph.D. thesis, California Institute of Technology, Pasadena, CA, 1982 • Williamson, R.B. Revenaugh, A. and Mowrer, F.W., "Ignition Sources in Room Fire Tests and Some Implications for Flame Spread Evaluation," International Association of Fire Safety Science, Proceedings of the Third International Symposium, New York, pp. 657-666, 1991 • IMC 0609, Appendix G, "Fire Protection Significance Determination Process," Issue Date 02/28/05 • R1989-511-001, "Verification and Validation of Fire Modeling Tools and Approaches for Use in NFPA 805 and Fire PRA", Revision 3, Section E.4	• The correlation is documented in an authoritative publication of the "SFPE Handbook of Fire Protection Engineering." • The heat release rate input to plume and ceiling jet correlations is adjusted by using a "location factor" when the fire is located within two feet of a wall or corner. This location factor doubled the heat release rate for both the plume and ceiling jet correlations for a fire near a wall, *and quadrupled it for a fire near a corner.* • Although not specifically Verified and Validated in NUREG-1824, the correlation is documented in recognized Fire Protection Engineering publications. • The correlation is widely accepted and utilized in the industry, for example, it is recommended by IMC 0609. • The correlation has been applied within its limits of applicability and in a manner consistent with the referenced studies or has been qualitatively justified as acceptable.

Table J-1 V & V Basis for Fire Models / Model Correlations Used

Calculation	Application	V & V Basis	Discussion
Correlation for Flame Spread over Horizontal Cable Trays (FLASH-CAT)	Predicts the growth and spread of a fire within a vertical stack of horizontal cable trays.	• NUREG/CR-7010, Section 9, 2012 • NUREG/CR-6850, Volume 2, Appendix R, 2005 • R1989-511-001, "Verification and Validation of Fire Modeling Tools and Approaches for Use in NFPA 805 and Fire PRA", Revision 3, Section E.6	• The correlation is recommended by NUREG/CR-7010 and follows guidance set forth in NUREG/CR-6850. • The FLASH-CAT model is validated in NUREG/CR-7010, Section 9.2.3, through experimentally measured HRRs compared with the predictions of the FLASH-CAT model. • The correlation has been applied to configurations consistent with those reported in NUREG/CR-7010 or the correlation has been qualitatively justified as acceptable.
Pyrosim	Used to create FDS input files.	• R1989-511-001, "Verification and Validation of Fire Modeling Tools and Approaches for Use in NFPA 805 and Fire PRA", Revision 0, Section B.4.2.1	• Pyrosim software is a graphical interface used to create FDS input files. • The developers of Pyrosim (Thunderhead Engineering) confirmed that Pyrosim is verified to build the input file correctly. A multi-level process is used to do this, including testing during development and running example problems through the software to ensure the correct input data is written and results obtained. • The software is benchmarked against selected examples from NUREG-1824, "Verification & Validation of Selected Fire Models for Nuclear Power Plant Applications, Volume 7: Fire Dynamics Simulator," to ensure the input is written correctly. • In addition, Pyrosim has been widely used since 2006 and any discrepancies identified by users are addressed in subsequent releases of the software via a software maintenance agreement.

Table J-1 V & V Basis for Fire Models / Model Correlations Used

Calculation	Application	V & V Basis	Discussion
Engineering Planning and Management (EPM) Fire Modeling Workbook (FMWB)	Used to calculate the zone of influence associated with fire scenarios.	• R1989-511-001, "Verification and Validation of Fire Modeling Tools and Approaches for Use in NFPA 805 and Fire PRA", Revision 0, Appendix A	• The FMWB is a collection of fire modeling correlations that are already documented in NUREG-1805 FDTs, "Fire Dynamics Tools (FDTs),:Quantitative Fire Hazard Analysis Methods for the US Nuclear Regulatory *Commission Fire Protection Inspection Program,"* December 2004, and Fire Induced Vulnerability Evaluation (FIVE), "EPRI Fire Induced • Vulnerability Evaluation Methodology", Revision 1, Referenced by EPRI Report 1002981, 2002. • *The fire modeling correlations within the Fire Modeling* Workbook (FMWB) have been verified, by "black box" testing, to ensure that the results were identical to the *verified and validated models.* "Black box" testing (or functional testing) is testing that ignores the internal mechanism of a system or component and focuses solely on the outputs generated in response to selected inputs and execution conditions. • The results from the FMWB were compared to those produced by the NUREG-1805 FDTs and FIVE-Rev1, when identical inputs were entered into both. Since the correlations from NUREG-1805 FDTs and FIVE, Rev1, *were verified and validated in* NUREG-1824, *"Verification* and Validation of Selected Fire Models for Nuclear Power Plant Applications," Final Report, April 2007, and the *results match the results produced by the FMWB,* the FMWB is verified and validated with respect to NUREG-1824.

K. Existing Licensing Action Transition

186 Pages Attached

BVPS-1

Licensing Action #: 11.01

Licensing Action: Control Room (1-CR-1) - Lack of Automatic Suppression (III.G.3 criteria)

Basis Date: March 14, 1983

To Be Transitioned?: No

Basis:

III.G.3 requires that alternate or dedicated shutdown capability and its associated circuits shall be provided where protection of redundant trains required for hot shutdown does not satisfy the requirements of III.G.2. In addition, fire detection and a fixed fire suppression system shall be installed in the area, room, or zone under consideration. Control Room (1-CR-1) does not comply with Section III.G.3 because it is not provided with an automatic suppression system.

Exemption request transmitted by BVPS letter dated June 30, 1982, and supplemented by letters dated October 22, 1982, October 28, 1982, December 10, 1982, and December 21, 1982, provided the justification for lack of automatic fire suppression required by Appendix R, Section III.G.3. The exemption approval was provided by NRC in SER's dated January 5, 1983 and March 14, 1983.

The following conditions were cited in the NRC SER as the bases for the exemption approval relative to the control room:

- The Control Room is separated from other plant compartments by 3-hour rated fire barriers.* [see updated Exemption 11.18 for fire doors, and Exemption 11.21 for interconnecting ventilation]
- The licensee has permanently installed and hardwired a backup instrumentation panel for one train of equipment. The new backup indicating panel (BIP) is electrically isolated from the control room.
- The control room is equipped with area fire detectors.
- The control room is provided with both a hose station and fire extinguishers for manual fire fighting.
- The fire load in the area is low.
- Plant technical specifications require continuous occupancy of the control room by the operators. Because the operators constitute a continuous fire watch, manual fire suppression in event of a fire would be prompt and effective.

*Information relative to separation from adjacent fire compartments by 3-hour rated fire barriers was updated by later submittals (BVPS submittal dated January 14, 1985 and NRC SER dated December 4, 1986). Exemption 11.18 identified deficiencies with fire doors which were subsequently determined acceptable by the NRC. Exemption 11.21 identified interconnecting ventilation between the control room and the HVAC room (fire compartment 1-CR-2) without adequate fire-rated dampers, and was subsequently determined acceptable by the NRC.

BVPS-1

Licensing Action #: 11.01

Licensing Action: Control Room (1-CR-1) - Lack of Automatic Suppression (III.G.3 criteria)

Evaluation:

The NRC SER dated January 5, 1983 stated:

By submittals dated June 30, October 22 and October 28, 1982 the Licensee described the means by which safe shutdown can be achieved in the event of fire, and proposed modifications to the Beaver Valley Nuclear Power Station Unit 1 to meet the requirements of Appendix R to 10 CFR 50, Items III.G.3 and III.L. Additional information and clarification was obtained through a meeting held on November 30, 1982 and through telephone conference calls on December 6 and 9, 1982. The licensee subsequently documented his response in Letters dated December 10 and 21, 1982.

The licensee has provided safe shutdown analyses for the fire events and has demonstrated adequate redundancy in the proposed design of the Beaver Valley Nuclear Power Station Unit 1. The proposed modifications resolve previous SER open items on alternate shutdown.

The NRC SER dated March 14, 1983 stated:

The fire protection features currently installed in the control room and the continuous manning of the control room provide adequate defense-in-depth fire fighting capability for these areas. The control room is equipped with area fire detectors. The control room is provided with both a hose station and fire extinguishers for manual fire fighting. The fire load in the area is low.

In addition, the new proposed backup indicating panel is an alternate shutdown system which provides remote control capabilities for those systems necessary to maintain safe-shutdown capability from outside the main control room.

Plant Technical Specifications require continuous occupancy of the control room by the operators. Because the operators constitute a continuous fire watch, manual fire suppression in event of a fire would be prompt and effective and, thus, a fixed suppression system is not necessary to achieve adequate fire protection in this area.

Based on the above evaluation, the existing fire protection program for the control room provides a level-of fire protection equivalent to the technical requirements of Section III.G. The exemption should, therefore, be granted.

In conclusion, the SER stated:

The Control Room is separated from other plant areas by three-hour rated fire barriers, is manned continuously, has low combustible loading, and is equipped with fire detectors and portable fire extinguishers. A remote emergency auxiliary shutdown panel and a backup instrument panel are provided away from the control room. An exemption from Subsection III.G.3.b is granted to the extent that an automatic suppression system is not needed.

BVPS-1

Licensing Action #: 11.01

Licensing Action: Control Room (1-CR-1) - Lack of Automatic Suppression (III.G.3 criteria)

Validation/Conclusions:

The Fire Compartment was evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- 82-06-30, "Fire Protection - Response to Appendix R Requirements and Generic Letter 81-12."
- 82-10-22, "Supplemental Information to Fire Protection - Appendix R Review Report."
- 82-10-28, "Supplemental Information to Fire Protection - Appendix R Review Report: Allowable Time to Achieve Cold Shutdown."
- 82-12-21, "Appendix R~ to 10 CFR 50 - Exemptions."
- 83-01-05, "SER for Appendix R to 10 CFR Part 50, Items III.G and III.L - BVPS-1."
- 83-03-14, "BVPS-1 - Request for Exemption from Some Requirements of Appendix R to 10 CFR Part 50."
- 85-01-14, "Appendix R - Additional Exemption Requests."
- TER-12661, Revision 0, "Appendix R Report Update for CR971034."

Associations:

None

BVPS-1

Licensing Action #: 11.02

Licensing Action: Reactor Containment (1-RC-1) - Lack of 20 foot Separation (III.G.2 criteria)

Basis Date: March 14, 1983

To Be Transitioned?: Yes

Basis:

Reactor Containment (1-RC-1) does not comply with III.G.2, which requires that redundant trains of safe shutdown cables and equipment inside non-inerted containments be separated by 20 feet with no intervening combustible materials or fire hazards, or separated by noncombustible radiant energy shields, or an automatic suppression and detection system must be installed in the compartment. The following safe shutdown circuits inside containment were identified:

- Pressurizer PORVs (PCV-RC-455C, -D, and -456 and SOV-RC-544)
- Pressurizer Relief Blocking Valves (MOV-RC-535, -536, -537)
- Pressurizer heaters A, B, D, and E
- Steam Generator Level (LT-FW-474, -475, -476, -477, -484, -485, -486, -487, -494, -495, -496, -497)
- Pressurizer Level (LT-RC-459 and -460)
- Reactor Coolant Hot and Cold Leg Temperature (TRB-RC-410, -420, -430, -413, -423, -433)
- Reactor Coolant Gas Ventilation Solenoids

Exemption request transmitted by BVPS-1 letter dated June 30, 1982, and supplemented by letters dated October 22, 1982, December 16, 1983, and January 14, 1985, provided the justification for lack of 20 foot separation free of intervening combustibles between redundant trains required by Appendix R, Section III.G.2.

The exemption approval was provided by NRC in SER dated March 14, 1983.

The following conditions were cited in the NRC SER as the bases for the exemption approval relative to the Reactor Containment:

- Due to the configuration and location within the containment and to the restricted access of these sub-areas during plant operations, an exposure fire is unlikely.
- All cable insulation is qualified to a test comparable to IEEE standard 383 and routed in conduit.*
- The reactor coolant pump is fitted with an oil collection system.
- Smoke detection and water deluge systems are provided in the cable penetration area and the RHR pump area.
- Portable fire extinguishers and manual hose stations are provided throughout the area.

BVPS-1

Licensing Action #: 11.02

Licensing Action: Reactor Containment (1-RC-1) - Lack of 20 foot Separation (III.G.2 criteria)

- Pressurizer PORV cables are run in conduit inside the crane wall, are 20 feet above the floor outside the crane wall, and are separated by 25' at the penetration area.
- Pressurizer PORV blocking valve power cables are run in conduit approximately 20 feet above the floor to the penetration area where they are separated by a fire barrier and automatic suppression and detection system.
- Pressurizer heater power cables are in covered horizontal trays 20 feet above the floor, and in vertical trays separated by 18'.
- Steam generator level channels are protected by suppression and detection in the penetration area and routed in conduit elsewhere. Conduits for
- Channels I and III are routed in opposite directions than Channel II around the Containment.
- Pressurizer level transmitter cables are enclosed in conduit where they are in close proximity. In the penetration area they are separated by a fire barrier and protected by a fire detection and suppression system.
- Reactor coolant hot and cold leg temperature channels I and II are in separate conduit and approach the penetration area from different directions. Neutral temperature indication from the bypass manifold is routed in conduit to the penetration area.

*Approval of clarifications relative to this exemption is being requested as part of this LAR submittal and transition to NFPA 805 (See Attachment T "Clarification of Prior NRC Approvals").

Evaluation:

NRC SER dated March 14, 1983 details the safe shutdown equipment and the combustible loading inside containment. The SER states:

> *The redundant trains of safe shutdown components in this area include the containment ventilation, pressurizer pressure controls, pressurizer power operated relief valves, pressurizer relief blocking valves, pressurizer heaters, steam generator level transmitters, pressurizer level transmitters, reactor coolant hot and cold leg temperature instrumentation, pressurizer and reactor vessel vents, and associated cables.*

The SER also states:

> *All cable insulation is qualified to a test comparable to IEEE Standard 383. The reactor coolant pumps are fitted with an oil collection system.*
>
> *Smoke detection systems and water deluge systems are provided only in the cable penetration area and in the residual heat removal pump area.*
>
> *Portable fire extinguishers and manual hose stations are provided throughout the fire area.*

BVPS-1

Licensing Action #: 11.02

Licensing Action: Reactor Containment (1-RC-1) - Lack of 20 foot Separation (III.G.2 criteria)

The NRC SER continues with descriptions of the location and separation of redundant cables of equipment as follows:

1. *Pressurizer Power Operated Relief Valves*
2. *Pressurizer Relief Blocking Valves*
3. *Pressurizer Heaters*
4. *Steam Generator Level*
5. *Pressurizer Level Transmitters*
6. *Reactor Coolant Hot and Cold Leg Temperature*

NRC SER further states:

The protection for redundant trains of safe shutdown equipment inside containment does not meet the technical requirements of Section III.G because there is not twenty feet of separation between redundant power cables free of intervening combustibles. Due to their configuration and location within the containment and to the restricted access of these sub-areas during plant operations, an exposure fire involving the accumulation of significant quantities of transient combustible materials is unlikely. Because there are only a few cables in these sub-areas and all cables inside containment are qualified to a test comparable to that of IEEE Standard 383 and routed in conduit, a fire of sufficient magnitude to damage redundant cables or components is also unlikely.

Based on the above evaluation, the existing protection for the containment area provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R. Therefore, the exemption should be granted.

Validation/Conclusions:

Conformance with the Appendix R exemption bases reached with the NRC regarding Reactor Containment (1-RC-1); lack of 20 foot separation (III.G.2 criteria) as stated in the NRC SER dated March 14, 1983, was verified. Safety-related cables used in the plant were procured using specifications that required the use of fire retardant cable material, thermo-set, in the manufacture of the cables for safety-related applications. Fire performance of the thermo-set material was tested using a flame test that preceded IEEE 383-1974 and, at the time of the exemption approval, was considered an equivalent fire test to that required by IEEE 383.

The exemption for the Reactor Containment (1-RC-1) is being transitioned to the new licensing basis under NFPA 805.

Disposition:

Licensing Action acceptable for transition

BVPS-1

Licensing Action #: 11.02

Licensing Action: Reactor Containment (1-RC-1) - Lack of 20 foot Separation (III.G.2 criteria)

References:

- 1OST-33.21, Revision 7, "Containment Fire Protection System Refueling Outage Test."
- 1OST-33.21A, Revision 8, "Containment Area Smoke Detection Instrumentation Test."
- 1PFP-RCBX-692, Revision 1, "Reactor Containment Building Fire Area RC-1."
- 1PFP-RCBX-718, Revision 1, "Reactor Containment Building Fire Area RC-1."
- 1PFP-RCBX-738, Revision 1, "Reactor Containment Building Fire Area RC-1."
- 1PFP-RCBX-767, Revision 1, "Reactor Containment Building Fire Area RC-1."
- 82-06-30, "Fire Protection - Response to Appendix R Requirements and Generic Letter 81-12."
- 85-01-14, "Appendix R - Additional Exemption Requests."
- 83-12-16, "Appendix R - Additional Exemption Requests Based on Generic Letter 83-33."
- 83-03-14, "BVPS-1 - Request for Exemption from Some Requirements of Appendix R to 10 CFR Part 50."
- 82-10-22, "Supplemental Information to Fire Protection - Appendix R Review Report."
- 8700-B-084, Revision 12, "Fire Hazards Analysis."
- 8700-RB-0140A, Revision 3, "Oil Collection System for Reactor Coolant Pump."
- 8700-RE-0004F, Revision 11, "External Connections Instrument XMTR Racks 11 to 116."
- 8700-RE-0004K, Sheet 2, Revision 30, "External Connections Miscellaneous Instruments."
- 8700-RE-0004L, Sheet 3, Revision 30, "External Connections Miscellaneous Instruments."
- 8700-RE-0018A, Revision 9, "Wiring Diagram Pressurized Heater Distribution Panels."
- 8700-RE-0034AF, Revision 11, "Cable Tray Designations Reactor Containment 767'-10"."
- 8700-RE-0034AG, Revision 9, "Cable Tray Designations Reactor Containment 738'-10"."
- 8700-RE-0034AK, Sheet 1, Revision 9, "Cable Tray Section Designations Reactor Containment."

BVPS-1

Licensing Action #: 11.02

Licensing Action: Reactor Containment (1-RC-1) - Lack of 20 foot Separation (III.G.2 criteria)

- 8700-RE-0034AX, Revision 7, "Cable Tray Designation Containment & CV 735'-6"."
- 8700-RE-0034AY, Revision 7, "Cable Tray Section Designations Reactor Containment."
- 8700-RE-0034G, Revision 10, "CH Cable Tray Plan Reactor Containment 738'-10" N."
- 8700-RE-0035B, Revision 7, "Electrical Penetration Terminal Boxes Reactor Containment."
- 8700-RE-0037BD, Revision 7, "Sleeve Designations Reactor Containment."
- 8700-RE-0046A, Revision 13, "Conduit Plan Reactor Containment 767'-10"."
- 8700-RE-0057Q, Revision 13, "Instrumentation Conduit Reactor Containment 692'-11" N."
- 8700-RE-0057R, Revision 14, "Instrumentation Conduit Reactor Containment 692'-11" S."
- 8700-RE-0057S, Revision 12, "Instrumentation Conduit-Reactor Containment 718'-6" N."
- 8700-RE-0057T, Revision 10, "Instrumentation Conduit Reactor Containment 718'-6" S."
- 8700-RE-0057U, Revision 16, "Instrumentation Conduit Reactor Containment 738'-10" N."
- 8700-RM-0433-002, Revision 19, "Valve Operation Number Diagram Fire Protection Water."
- 8700-RM-0433-008, Revision 13, "Valve Operation Number Diagram Fire Protection Details."
- DCP-0194, Revision 1, "Oil Collection System for Reactor Coolant Pump."
- ECP 07-0044-28, Revision 0, "Replace the Conduit Seals on Barton EQ Transmitters in Containment."
- ECP 07-0044-29, Revision 0, "Replace the Conduit Seals on Barton EQ Transmitters in Containment."
- ECP 07-0044-RD, Revision 1, "Replace the Conduit Seals on Barton EQ Transmitters in Containment."
- NOP-CC-2003, Revision 17, "Engineering Changes."
- NOP-CC-2004, Revision 10, "Design Interface Reviews and Evaluations."
- TER-06263, Revision 0, "Evaluate Drawing Errors Found while Working with DCP's 1731 & 1755."

BVPS-1

Licensing Action #: 11.02

Licensing Action: Reactor Containment (1-RC-1) - Lack of 20 foot Separation (III.G.2 criteria)

- TER-12661, Revision 0, "Appendix R Report Update for CR971034."
- UFPARR, Revision 30, "Updated Fire Protection Appendix R Review."

Associations:

Ch.4 - Compartment: 1-RC-1
Fire Protection - Fire Compartment: 1-RC-1 / Form: Detection
Fire Protection - Fire Compartment: 1-RC-1 / Form: Water-Based Suppression

BVPS-1

Licensing Action #: 11.03

Licensing Action: Blender Room (1-PA-1G) - Lack of 20 foot Separation and Automatic Suppression and Detection (III.G.2 criteria)

Basis Date: March 14, 1983

To Be Transitioned?: No

Basis:

This compartment does not comply with Section III.G.2 because the separation is less than 20 feet between redundant trains of safe shutdown equipment, the compartment is not provided with an automatic suppression system and it does not have fire detection coverage throughout the fire compartment.

The potentially affected safe shutdown equipment from a fire in the Blender Room located in Auxiliary Building, Elevation 722'-6" (1-PA-1G) is MOV-CH-115B & 115D (RWST Discharge to Charging Pump Suction Valves).

Exemption request transmitted by BVPS-1 letter dated June 30, 1982, and supplemented by letters dated October 22, 1982, October 28, 1982, and December 21, 1982, provided the justification for lack of 20 foot separation with no automatic suppression system and lack of full area fire detection coverage required by Appendix R, Section III.G.2 for fire compartment 1-PA-1G. BVPS-1 letter dated December 21, 1982 addressed the commitment to fire wrap charging pump power cables with a 1-hour fire barrier, and the use of low head safety injection (LHSI) pumps as an alternative charging pump suction flow path in the event a fire affects the normal flow path via the RWST Discharge to Charging Pump Suction Valves (MOV-CH-115B & 115D).

The exemption approval was provided by NRC in SER dated March 14, 1983.

The following conditions were cited in the NRC SER as the bases for the exemption approval relative to the Blender Room located in Auxiliary Building, Elevation 722'-6" (1-PA-1G):

- Low combustible loading.
- Partial height walls separating the charging pumps.
- 1-hour fire barrier on charging pump power cables.
- Smoke detectors in the vicinity of the pumps.
- Use of alternate charging suction flow path through the low head safety injection pumps.

Evaluation:

Regarding the Primary Auxiliary Building - 1-PA-1G, the NRC SER dated March 14, 1983 states:

This area does not comply with Section III.G.2.b because an automatic suppression system is not provided. Because the combustible loading is low, partial height walls between the charging pumps and one-hour barriers and smoke detectors are provided these alternative features will provide reasonable assurance that one train of charging pumps will be maintained free of fire damage for a sufficient period to

BVPS-1

Licensing Action #: 11.03

Licensing Action: Blender Room (1-PA-1G) - Lack of 20 foot Separation and Automatic Suppression and Detection (III.G.2 criteria)

enable the fire brigade to respond and manually extinguish a fire. This exemption is granted.

Validation/Conclusions:

The Fire Compartment was evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- 1OST-33.16, Revision 14, "Smoke Detector Instrumentation Test."
- 1OST-33.35, Revision 0, "Fire Rated Assemblies Visual Inspection."
- 82-06-30, "Fire Protection - Response to Appendix R Requirements and Generic Letter 81-12."
- 83-03-14, "BVPS-1 - Request for Exemption from Some Requirements of Appendix R to 10 CFR Part 50."
- 8700-B-084, Revision 11, Addendum 1, "Fire Hazards Analysis."
- UFSAR, Revision 25, "Beaver Valley Power Station Unit 1 Updated Final Safety Analysis Report."

Associations:

None

BVPS-1

Licensing Action #: 11.04

Licensing Action: Pipe Tunnel (1-PT-1) - Lack of 20 foot Separation and Automatic Suppression and Detection (III.G.2 criteria)

Basis Date: March 14, 1983

To Be Transitioned?: No

Basis:

This compartment does not comply with Section III.G.2 because the equipment and cabling of interest (TV-CC-110E2, F2, TV-CC-110F1) are not physically separated or protected with fire barriers or suppression and detection systems. TV-CC-110E2, F1, F2 are functionally associated with backup cooling to the containment air recirculation coils.

NOTE: This exemption specifically addressed the physical separation of equipment and cables for component cooling to RHR valves on Elevation 722'-6" of the pipe tunnel. The potentially affected safe shutdown equipment was related to the Containment Air Cooling System, which was deleted from the safe shutdown equipment list via BVPS clarification letter to the NRC dated January 14, 1985. Since these circuits of interest are no longer considered necessary for post-fire safe shutdown, the exemption request no longer applies.

The potentially affected safe shutdown equipment from a fire in the Pipe Tunnel, Elevation 722'-6" (1-PT-1) was previously identified as TV-CC-110E2, F2, TV-CC-110F1 (backup cooling to the containment air recirculation coils).

Exemption request transmitted by BVPS-1 letter dated June 30, 1982 provided the justification for lack of 20 foot separation with no automatic suppression system and lack of full area fire detection coverage required by Appendix R, Section III.G.2 for fire compartment 1-PT-1.

The exemption approval was provided by NRC in SER dated March 14, 1983.

NOTE: BVPS-1 letter to the NRC dated January 14, 1985 provided clarification for the components associated with backup cooling to the containment air recirculation coils, which negated the need for this exemption.

The following condition was cited in the NRC SER as the bases for the exemption approval relative to the Pipe Tunnel, Elevation 722'-6" (1-PT-1): If a fire occurs, there is approximately 0.5 hour to manually operate the valves for containment air cooling. Because of the time available to take manual control of the backup system, there is reasonable assurance that one train of components will be available for cooling the containment air recirculation coils.

Evaluation:

Regarding the Pipe Tunnel, the NRC SER dated March 14, 1983 states:

> *This area is not provided with an automatic suppression system and 20 feet of separation free of intervening combustibles between redundant components of alternative shutdown capability. If a fire did occur, there is approximately 1/2-hour to manually operate the necessary valves if a loss of offsite power occurs; if such a loss does not occur these valves would remain operable. Because of the time available to take manual control of the backup system, there is reasonable*

BVPS-1

Licensing Action #: 11.04

Licensing Action: Pipe Tunnel (1-PT-1) - Lack of 20 foot Separation and Automatic Suppression and Detection (III.G.2 criteria)

assurance that one train of components will be available for cooling the containment air recirculation coils. This exemption to Subsection III.G.2.b is granted.

Validation/Conclusions:

The Fire Compartment was evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- 82-06-30, "Fire Protection - Response to Appendix R Requirements and Generic Letter 81-12."
- 83-03-14, "BVPS-1 - Request for Exemption from Some Requirements of Appendix R to 10 CFR Part 50."
- 85-01-14, "Appendix R - Additional Exemption Requests."

Associations:

None

BVPS-1

Licensing Action #: 11.05

Licensing Action: Cable Tunnel (1-CV-3) - Lack of 20 foot Separation (III.G.2 criteria)

Basis Date: March 14, 1983

To Be Transitioned?: Yes

Basis:

This compartment does not comply with Section III.G.2 because the separation is less than 20 feet between redundant trains of safe shutdown equipment, and the compartment is not provided with an automatic suppression system.

The cable tunnel functions primarily as a transition area for cables routed from the service building to the electrical underground ductbanks in the north yard. The redundant cables routed within the tunnel area include the Class 1E power and control cable associated with the river water pumps, the essential support equipment located in the intake structure, the alternate intake structure, and the emergency diesel generators.

Exemption request transmitted by BVPS-1 letter dated June 30, 1982, and supplemented by letters dated October 22, 1982, October 28, 1982, and December 21, 1982, provided the justification for lack of 20 foot separation with no automatic suppression system required by Appendix R, Section III.G.2 for fire compartment 1-CV-3. In addition, the licensee committed to install a total flooding Halon 1301 system in fire compartment 1-CV-3.

The exemption approval was provided by NRC in SER dated March 14, 1983.

The following conditions were cited in the NRC SER as the bases for the exemption approval relative to the Cable Tunnel (1-CV-3):

- All cables are qualified to a test comparable to IEEE standard 383.*
- Each redundant function has at least one train of cables installed in conduit.
- Access to the area is restricted.
- A smoke detection system is provided in the Cable Tunnel (1-CV-3).
- The licensee proposes to install a total flooding Halon 1301 system.
- The restricted access minimizes the possibility of a severe exposure fire due to accumulated transient combustibles.
- The metal conduit will delay the onset of cable damage for a limited time period for small exposure fires.
- The Halon system should promptly extinguish a fire.
- Low in-situ combustibles.

Among the conditions cited in the NRC SER dated March 14, 1983, that requires clarification relative to qualification of cables is that "all" cables are qualified to a test comparable to that of IEEE Standard 383 and are routed in conduit. The statement was applicable to the cable jacket flame retardancy testing and qualifications relative to fire protection for safety-related applications.

BVPS-1

Licensing Action #: 11.05

Licensing Action: Cable Tunnel (1-CV-3) - Lack of 20 foot Separation (III.G.2 criteria)

SER dated June 6, 1979, stated, "We find that retest of cables to IEEE-383 Standard would not provide information that would change our recommendation or conclusions. Accordingly, we find the safety-related electrical cables used at Beaver Valley Power Station, Unit 1, acceptable."

*Approval of clarifications relative to this exemption is being requested as part of this LAR submittal and transition to NFPA 805 (See Attachment T "Clarification of Prior NRC Approvals").

Evaluation:

The NRC SER dated March 14, 1983 states:

> *All cables are qualified to a test comparable to IEEE Standard 383. Each redundant function has at least one train of cables installed in conduit. Access to the area is restricted via a metal hatch and vertical ladder. A smoke detection system is provided in the cable tunnel.*
>
> *The licensee proposes to install a total flooding Halon 1301 system.*
>
> *The licensee states that restricted access to the area minimizes the potential for the accumulation of transient combustible materials, and that one train of cables for each redundant function is routed in conduit, therefore, the probability of both trains sustaining fire damage from an exposure fire is reduced to a level equivalent to that provided by the protective features of Section III.G.*
>
> *This fire area with the proposed modifications does not comply with the technical requirement of Section III.G.*
>
> *The 1-hour rated fire barrier or twenty feet of separation free of intervening combustibles required by Section III.G provides the benefit of a protective feature to prevent cable damage until the automatic suppression system extinguishes the fire. In this fire area, the restricted access minimizes the probability of a severe exposure fire due to accumulated transient combustibles. In addition, the metal conduit will delay the onset of cable damage for a limited time period for small exposure fires. The proposed Halon 1301 system should promptly extinguish a fire in this area. Because of the restricted access, low in-situ combustibles and automatic suppression, there is reasonable assurance that one train of cables will remain free of fire damage.*
>
> *Based on our evaluation, the level of existing protection in cable tunnel CV-3 in conjunction with the proposed Halon 1301 system provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R. Therefore, the exemption should be granted.*

And, in summary:

> *Subsection III.G.2.b requires 20 feet of separation free of intervening combustibles between cables. Based on our evaluation, the level of existing protection in cable tunnel CV-3 in conjunction with the proposed Halon 1301 system provides a level of*

BVPS-1

Licensing Action #: 11.05

Licensing Action: Cable Tunnel (1-CV-3) - Lack of 20 foot Separation (III.G.2 criteria)

fire protection equivalent to the technical requirements of Section III.G of Appendix R. Therefore, the exemption is granted.

Validation/Conclusions:

Conformance with the Appendix R exemption bases reached with the NRC regarding the Cable Tunnel (1-CV-3); lack of 20 foot separation (III.G.2 criteria) as stated in the NRC SERs dated March 14, 1983 was verified. Gaseous suppression (Halon) is available to meet the performance-based analysis and is allowed by NFPA 805. The exemption for lack of 20 foot separation for the Cable Tunnel (1-CV-3) is being transitioned to the new licensing basis under NFPA 805.

Disposition:

Licensing Action acceptable for transition

References:

- 79-06-06, "SER by the Office of Nuclear Reactor Regulation Related to Amendment No. 18 to Facility Operating License No. DPR-66."
- 82-06-30, "Fire Protection - Response to Appendix R Requirements and Generic Letter 81-12."
- 82-10-22, "Supplemental Information to Fire Protection - Appendix R Review Report."
- 82-10-28, "Supplemental Information to Fire Protection - Appendix R Review Report: Allowable Time to Achieve Cold Shutdown."
- 82-12-21, "Appendix R~ to 10 CFR 50 - Exemptions."
- 83-03-14, "BVPS-1 - Request for Exemption from Some Requirements of Appendix R to 10 CFR Part 50."
- UFPARR, Revision 30, "Updated Fire Protection Appendix R Review."

Associations:

Ch.4 - Compartment: 1-CV-3
Fire Protection - Fire Compartment: 1-CV-3 / Form: Detection
Fire Protection - Fire Compartment: 1-CV-3 / Form: ERFBS
Fire Protection - Fire Compartment: 1-CV-3 / Form: Gaseous Suppression

BVPS-1

Licensing Action #: 11.06

Licensing Action: Primary Auxiliary Building (1-PA-1G) - Lack of 20 foot Separation and Automatic Suppression and Detection (III.G.2 criteria)

Basis Date: March 14, 1983

To Be Transitioned?: No

Basis:

This compartment does not comply with Section III.G.2 because the separation is less than 20 feet between redundant trains of safe shutdown equipment, the compartment is not provided with an automatic suppression system, and it does not have fire detection coverage throughout the fire compartment.

The potentially affected safe shutdown equipment from a fire in the Primary Auxiliary Building; Elevation 722'-6" (1-PA-1G) is 1-PA-1GA, 1-PA-1GB, and 1-PA-1GC (High Head Safety Injection - Charging Pumps).

Exemption request transmitted by BVPS letter dated June 30, 1982, and supplemented by letters dated October 22, 1982, and December 21, 1982, provided the justification for lack of 20 foot separation with no automatic suppression system and lack of full area fire detection coverage required by Appendix R, Section III.G.2 for fire compartment 1-PA-1G. BVPS letter dated December 21, 1982, addressed the commitment to fire wrap charging pump power cables with a 1-hour fire barrier, the use of portable ventilation fans, and the use of the low head safety injection (LHSI) pumps as an alternative charging pump suction flow path in the event a fire affects the normal flow path via the RWST Discharge to Charging Pump Suction Valves (MOV-CH-115B & 115D).

The exemption approval was provided by NRC in SER dated March 14, 1983.

The following conditions were cited in the NRC SER dated March 14, 1983 as the bases for the exemption approval relative to the Primary Auxiliary Building, Elevation 722'-6" (1-PA-1G):

- Low combustible loading.
- Partial height walls separating the charging pumps.
- 1-hour fire barrier on charging pump power cables.
- Smoke detectors in the vicinity of the pumps.
- Use of alternate charging suction flow path through the low head safety injection pumps.

The following condition was cited in the NRC SER dated March 14, 1983, as the basis for use of portable ventilation for the Charging Pump Cubicles (PA-1f, 1g, & 1h). The licensee proposed the use of portable fans as a redundant means of supplying essential ventilation to the charging pump cubicles and emergency switchgear rooms. The NRC determined the use of portable gasoline powered ventilation fans for ventilation of the charging pump cubicles and emergency switchgear rooms was acceptable because the licensee demonstrated by analysis that there was a time period of approximately one to two hours

BVPS-1

Licensing Action #: 11.06

Licensing Action: Primary Auxiliary Building (1-PA-1G) - Lack of 20 foot Separation and Automatic Suppression and Detection (III.G.2 criteria)

during which these fans would not need to be employed. The NRC accepted the use of portable fans as backup HVAC equipment for these compartments.

In addition, the initial exemption request transmitted by BVPS letter to NRC dated June 30, 1982, and supplemented by letter dated October 22, 1982 proposed the installation of 1.5-hour fire dampers in common ductwork that penetrates the 3-hour-rated fire barriers for the Charging Pump Cubicles. The NRC SER dated March 14, 1983, did note that this does not comply with the Section III.G requirements for 3-hour-rated fire barriers between redundant components. The licensee did not formally request an exemption for this compartment; however, the NRC evaluated this proposal as such. The SER stated that because smoke detection, 1.5-hour rated fire dampers, and duct insulation are provided, there is reasonable assurance that a fire in one charging pump cubicle will be promptly detected and extinguished by the fire brigade before the redundant pumps are damaged. The NRC concluded that the licensee's proposed modification provides a level of fire protection equivalent to the technical requirements of Section III.G.2. This approval was documented in the SER dated March 14, 1983.

Evaluation:

Regarding the Primary Auxiliary Building (1-PA-1G), the NRC SER dated March 14, 1983 states:

> *This area does not comply with Section III.G.2.b because an automatic suppression system is not provided. Because the combustible loading is low, partial height walls between the charging pumps and one-hour barriers and smoke detectors are provided, these alternative features will provide reasonable assurance that one train of charging pumps will be maintained free of fire damage for a sufficient period to enable the fire brigade to respond and manually extinguish a fire. This exemption is granted.*

Regarding the HVAC Ductwork for the Charging Pump Cubicles (PA-1f, 1g, & 1h), it states:

> *The licensee has proposed to install 1 1/2-hour fire dampers in common ductwork that penetrates 3-hour-rated fire barriers.*
>
> *We note that this does not comply with the Section III.G requirements for 3-hour-rated fire barriers between redundant components. The licensee has not formally requested an exemption for this area, however, we have evaluated this proposal as such. Because smoke detection, 1 1/2-hour -rated fire dampers, and duct insulation are provided, there is reasonable assurance that a fire in one charging pump cubicle will be promptly detected and extinguished by the fire brigade before the redundant pumps are damaged. The licensee's proposed modification, therefore, provides a level of fire protection equivalent to the technical requirements of Section III.G.2.*
>
> *This exemption should be granted.*

Regarding the Charging Pump Cubicles and Emergency Switchgear Rooms (portable ventilation), the SER states:

BVPS-1

Licensing Action #: 11.06

Licensing Action: Primary Auxiliary Building (1-PA-1G) - Lack of 20 foot Separation and Automatic Suppression and Detection (III.G.2 criteria)

The licensee proposes to use portable gasoline-powered fans as a redundant means of supplying essential ventilation to the charging pump cubicles and the emergency switchgear rooms. The portable fans will be placed in position and operated by the plant fire brigade.

These areas contain equipment essential for hot shutdown. Loss of their normal HVAC systems means that the temperature will rise rapidly, thus damaging or prematurely aging the equipment housed inside these areas. The proposed use of the gasoline-powered fans is considered a repair, which is not allowed by the requirement of III.G.1.a. Repairs which can be accomplished within 72 hours are permitted for cold-shutdown-related equipment. However, the licensee has shown, by analysis, that there is a time period of approximately 1 to 2 hours during which these fans would not need to be employed. Because of this time factor, we accept the use of portable fans as backup HVAC equipment for these areas.

This exemption should be granted.

Validation/Conclusions:

The Fire Compartment was evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- 1OST-33.16, Revision 14, "Smoke Detector Instrumentation Test."
- 82-06-30, "Fire Protection - Response to Appendix R Requirements and Generic Letter 81-12."
- 82-10-22, "Supplemental Information to Fire Protection - Appendix R Review Report."
- 82-12-21, "Appendix R~ to 10 CFR 50 - Exemptions."
- 83-03-14, "BVPS-1 - Request for Exemption from Some Requirements of Appendix R to 10 CFR Part 50."
- 8700-B-084, Revision 11, Addendum 1, "Fire Hazards Analysis."
- UFSAR, Revision 25, "BVPS-1 Updated Final Safety Analysis Report."

Associations:

None

BVPS-1

Licensing Action #: 11.07

Licensing Action: Primary Auxiliary Building (1-PA-1A) - Lack of Automatic Suppression and Detection (III.G.3 criteria)

Basis Date: March 14, 1983, and August 30, 1984

To Be Transitioned?: No

Basis:

III.G.3 requires automatic fire suppression and detection in fire compartments for which alternate shutdown has been provided. Primary Auxiliary Building (1-PA-1A), Elevation 768'-7" does not comply with Section III.G.3 because the compartment is not provided with automatic fire suppression and detection coverage. BVPS-1 letter dated December 16, 1983 (Attachment 1) requested an exemption from the requirement for fixed suppression and detection on Primary Auxiliary Building 768' floor level.

The potentially affected safe shutdown equipment from a fire in the Primary Auxiliary Building, Elevation 768'-7" (1-PA-1A) is the Ventilation Fans for the Charging Pump Cubicles.*

*Even though this fire compartment (1-PA-1A) does not contain safe shutdown cables/equipment, the ventilation exhaust fans (VS-F-7A and-7B, and VS-F-4A and 4B) located in fire compartment 1-PA-1G service the Charging Pump Cubicles (PA-1f, 1g, & 1h) located three floors below at elevation 722' in the Primary Auxiliary Building (PAB). The use of portable ventilation fans as a means of providing an alternate method for essential air flow to the Charging Pump Cubicles to ensure continued operation of the pumps was approved in NRC SER as an exemption per NRC letter dated March 14, 1983. However, since Appendix R requires fixed suppression and detection for the original area under consideration (in this case the PAB 768' floor level), an additional exemption request was initiated by BVPS-1 letter dated December 16, 1983, for the PAB elevation 768' floor level.

The exemption for the Primary Auxiliary Building (1-PA-1A), Elevation 768'-7" was approved and documented in NRC SER dated August 30, 1984.

The following conditions were cited in the NRC SER as the bases for the exemption approval relative to the Primary Auxiliary Building (1-PA-1A), Elevation 768'-7":

- Combustible loading is light.
- There is alternate shutdown capability.
- Detection and manual fire suppression equipment is available.

In addition, the following condition was cited in the NRC SER dated March 14, 1983, as the basis for use of portable ventilation for the Charging Pump Cubicles (PA-1f, 1g, & 1h):

The licensee proposed the use of portable fans as a redundant means of supplying essential ventilation to the charging pump cubicles and emergency switchgear rooms. The NRC determined the use of portable gasoline powered ventilation fans for ventilation of the charging pump cubicles and emergency switchgear rooms was acceptable because the licensee demonstrated by analysis that there was a time period of approximately one to two hours during which these fans would not need to be employed. The NRC accepted the use of portable fans as backup HVAC equipment for these compartments.

BVPS-1

Licensing Action #: 11.07

Licensing Action: Primary Auxiliary Building (1-PA-1A) - Lack of Automatic Suppression and Detection (III.G.3 criteria)

Evaluation:

The NRC SER dated August 30, 1984, states:

We have reviewed the licensee's exemption requests and evaluation of these requests is as follows:

1. Fixed Suppression and Detection Systems

For the following areas, an exemption is requested from Section III.G.3 to the extent it requires fixed suppression and detection to be provided throughout a fire area for which alternative shutdown has been provided:

Primary Auxiliary Building (1-PA-1A), Elev. 768

....

All of the fire areas for which exemptions have been requested represent a similar configuration, i.e., combustible loading is light, there is alternate shutdown capability, detection (except CO2 storage area) and manual fire suppression equipment is available.... The low combustible loading in these areas ensures that safety-related equipment in adjacent areas will not be threatened. The installation of a fixed fire suppression system would not significantly increase the level of fire protection in these areas.

Based on our evaluation, we find that the existing fire protection in conjunction with alternate shutdown capability in the eight areas for which an exemption has been requested provides a level of fire protection equivalent to the technical requirements of Section III.G.3 of Appendix R and, therefore, the exemptions should be granted.

Regarding portable ventilation, the NRC SER dated March 14, 1983 states:

7. Charging Pump Cubicle and Emergency Switchgear Room

The licensee proposes to use portable gasoline-powered fans as a redundant means of supplying essential ventilation to the charging pump cubicles and the emergency switchgear rooms. The portable fans will be placed in position and operated by the plant fire brigade.

These areas contain equipment essential for hot shutdown. Loss of their normal HVAC systems means that the temperature will rise rapidly, thus damaging or prematurely aging the equipment housed inside these areas. The proposed use of the gasoline-powered fans is considered a repair, which is not allowed by the requirement of III.G.1.a. Repairs which can be accomplished within 72 hours are permitted for cold-shutdown-related equipment. However, the licensee has shown, by analysis, that there is a time period of approximately 1 to 2 hours during which these fans would not need to be employed. Because of this time factor, we accept the use of portable fans as backup HVAC equipment for these areas.

This exemption should be granted.

BVPS-1

Licensing Action #: 11.07

Licensing Action: Primary Auxiliary Building (1-PA-1A) - Lack of Automatic Suppression and Detection (III.G.3 criteria)

Validation/Conclusions:

The Fire Compartment was evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- 1OST-33.1B, Revision 8, "Fire Protection System Water Flow & Drain Test."
- 1OST-33.15A, Revision 15, "Fire Extinguisher Monthly Inspection."
- 1OST-33.16, Revision 14, "Smoke Detector Instrumentation Test."
- 1OST-33.2A, Revision 4, "Fire Protection System Monthly Hose Stations Test."
- 1PFP-AXLB-768-Aux Building General Area, Revision 2, "Fire Area PA-1A."
- 82-06-30, "Fire Protection - Response to Appendix R Requirements and Generic Letter 81-12."
- 83-01-05, "SER for Appendix R to 10 CFR Part 50, Items III.G and III.L - BVPS-1."
- 83-03-14, "BVPS-1 - Request for Exemption from Some Requirements of Appendix R to 10 CFR Part 50."
- 83-12-16, "Appendix R - Additional Exemption Requests Based on Generic Letter 83-33."
- 84-08-30, "BVPS-1 Request for Additional Informations from Some Requirements of Appendix R to 10 CFR Part 50."
- 8700-B-084, Revision 11, Addendum 1, "Fire Hazards Analysis."

Associations:

None

BVPS-1

Licensing Action #: 11.08

Licensing Action: Control Room HVAC Equipment Room (1-CR-2) - Lack of Automatic Suppression (III.G.3 criteria)

Basis Date: August 30, 1984

To Be Transitioned?: No

Basis:

III.G.3 requires automatic fire suppression and detection in fire compartments for which alternate shutdown has been provided. Control Room HVAC Equipment Room (1-CR-2), Elevation 713' does not comply with Section III.G.3 because the compartment is not provided with fixed automatic fire suppression. BVPS-1 letter dated December 16, 1983, requested an exemption from the requirement for fixed automatic fire suppression for 1-CR-2. An exemption was also requested from the requirements of Section III.G.2 for 1-CR-2 because of a fire compartment boundary (fire door) with a rating less than three hours.

The potentially affected safe shutdown equipment from a fire in the Control Room HVAC Equipment Room (1-CR-2) is HVAC equipment for the Control Room.

The exemption for the Control Room HVAC Equipment Room (1-CR-2) was approved and documented in the NRC SER dated August 30, 1984.

The following conditions were cited in the NRC SER as the bases for the exemption approval relative to the Control Room HVAC Equipment Room (1-CR-2):

- Combustible loading is light.
- Alternate shutdown capability is provided independent of the fire area.
- Detection and manual fire suppression equipment is available.
- The fire door rating exceeds the loading on each side with considerable margin.

Evaluation:

The NRC SER dated August 30, 1984, states:

We have reviewed the licensee's exemption requests and evaluation of these requests is as follows:

1. Fixed Suppression and Detection Systems

For the following areas, an exemption is requested from Section III.G.3 to the extent it requires fixed suppression and detection to be provided throughout a fire area for which alternative shutdown has been provided:

Control Room HVAC Equipment Room (1-CR-2), Elev. 713

....

All of the fire areas for which exemptions have been requested represent a similar configuration, i.e., combustible loading is light, there is alternate shutdown capability, detection (except CO2 storage area) and manual fire suppression equipment is available.... The low combustible loading in these areas ensures that safety-related

BVPS-1

Licensing Action #: 11.08

Licensing Action: Control Room HVAC Equipment Room (1-CR-2) - Lack of Automatic Suppression (III.G.3 criteria)

equipment in adjacent areas will not be threatened. The installation of a fixed fire suppression system would not significantly increase the level of fire protection in these areas.

Based on our evaluation, we find that the existing fire protection in conjunction with alternate shutdown capability in the eight areas for which an exemption has been requested provides a level of fire protection equivalent to the technical requirements of Section III.G.3 of Appendix R and, therefore, the exemptions should be granted.

The NRC SER also states:

2. Control Room HVAC Equipment Room (CR-2), Elevation 713

An exemption is requested from Section III.G.2 to the extent it requires the separation of adjacent fire areas by 3-hour rated fire barriers.

The control room HVAC equipment room is separated from other areas by 3-hour rated fire barriers with the exception of a 1 1/2-hour rated fire door which leads to the Relay Room (CR-3). The combustible loading in both areas (CR-3 and CR-2), if totally consumed, would correspond to an equivalent fire severity of approximately 40-50 minutes on the ASTM E-119 Standard Time-Temperature Curve. Smoke detection and manual fire suppression equipment is provided in each area. Alternate shutdown capability is provided independent of the fire area.

The 1 1/2-hour rated fire door which leads to the relay room exceeds the combustible loading in both the HVAC equipment room and the relay room with considerable margin. In the event a fire occurred in either room, there is reasonable assurance that the installed smoke detection system would alarm and alert the fire brigade before the door's integrity is challenged. Replacing the existing door with a 3-hour rated assembly would not significantly enhance fire protection safety.

Based on our evaluation, we find that the existing fire door in the HVAC equipment room (CR-2) provides a level of fire protection equivalent to the technical requirements of Section III.G. The exemption should, therefore, be granted.

Validation/Conclusions:

The Fire Compartment was evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- 1OST-33.15A, Revision 15, "Fire Extinguisher Monthly Inspection."
- 1OST-33.2A, Revision 4, "Fire Protection System Monthly Hose Stations Test."
- 82-06-30, "Fire Protection - Response to Appendix R Requirements and Generic Letter 81-12."

BVPS-1

Licensing Action #: 11.08

Licensing Action: Control Room HVAC Equipment Room (1-CR-2) - Lack of Automatic Suppression (III.G.3 criteria)

- 83-01-05, "SER for Appendix R to 10 CFR Part 50, Items III.G and III.L - BVPS-1"
- 83-12-16, "Appendix R - Additional Exemption Requests Based on Generic Letter 83-33."
- 84-08-30, "BVPS-1 Request for Additional Informations from Some Requirements of Appendix R to 10 CFR Part 50."
- 8700-B-084, Revision 11, Addendum 1, "Fire Hazards Analysis."

Associations:

None

BVPS-1

Licensing Action #: 11.09

Licensing Action: Emergency Switchgear Rooms (1-ES-1 and 1-ES-2) - Lack of Automatic Suppression (III.G.3 criteria) and Lack of 3-Hour Fire Barriers (III.G.2 criteria)

Basis Date: March 14, 1983, and August 30, 1984

To Be Transitioned?: Yes

Basis:

III.G.3 requires automatic fire suppression and detection in fire compartments for which alternate shutdown has been provided. Emergency Switchgear Rooms (1-ES-1 and 1-ES-2), Elevation 713' does not comply with Section III.G.3 because the compartment is not provided with fixed automatic fire suppression. BVPS-1 letter dated December 16, 1983 requested an exemption from the requirement for fixed automatic fire suppression for 1-ES-1 and 1-ES-2. An exemption was also requested from the requirements of Section III.G.2 for 1-ES-1 and 1-ES-2 because of fire barriers (ceiling and fire dampers) that have a fire rating of 1.5 hours (less than three hours).

The potentially affected safe shutdown equipment from a fire in the Emergency Switchgear Rooms (1-ES-1 and 1-ES-2) is redundant safety-related 4-kV switchgear and 480-V substations located in each of these separate fire compartments (1-ES-1 & 1-ES-2) that supply power to Class 1E circuits required for safe shutdown.

The exemptions for the Emergency Switchgear Rooms (1-ES-1 and 1-ES-2) were approved and documented in the NRC SER dated August 30, 1984.

The following conditions were cited in the NRC SER as the bases for the exemption approval relative to the Emergency Switchgear Rooms (1-ES-1 and 1-ES-2):

- Combustible loading is light.
- Alternate shutdown capability is provided independent of the fire area.
- Detection and manual fire suppression equipment is available.
- The ceiling rating exceeds the combustible loading with considerable margin.

In addition, the following condition was cited in the NRC SER dated March 14, 1983 as the basis for use of portable ventilation for the Emergency Switchgear Rooms (1-ES-1 and 1-ES-2):

The BVPS-1 letter dated December 21, 1982, identified the use of portable fans as a redundant means of supplying essential ventilation to the charging pump cubicles and emergency switchgear rooms. The NRC determined the use of portable gasoline powered ventilation fans for ventilation of the charging pump cubicles and emergency switchgear rooms was acceptable because the licensee demonstrated by analysis that there was a time period of approximately one to two hours during which these fans would not need to be employed. The NRC accepted the use of portable fans as backup HVAC equipment for these compartments, and the exemption approval was provided by NRC in the SER dated March 14, 1983.

BVPS-1

Licensing Action #: 11.09

Licensing Action: Emergency Switchgear Rooms (1-ES-1 and 1-ES-2) - Lack of Automatic Suppression (III.G.3 criteria) and Lack of 3-Hour Fire Barriers (III.G.2 criteria)

Approval of clarifications relative to this exemption is being requested as part of this LAR submittal and transition to NFPA 805 (See Attachment T "Clarification of Prior NRC Approvals").

Evaluation:

The NRC SER dated August 30, 1984 states:

We have reviewed the licensee's exemption requests and evaluation of these requests is as follows:

1. Fixed Suppression and Detection Systems

For the following area, an exemption was requested from Section III.G.3 to the extent it requires fixed suppression and detection to be provided throughout a fire area for which alternative shutdown has been provided:

Emergency Switchgear Rooms (ES-1 & 2), Elev. 713

....

All of the fire areas for which exemptions have been requested represent a similar configuration, i.e. combustible loading is light, there is alternate shutdown capability, detection (except CO2 storage area) and manual fire suppression equipment is available.... The low combustible loading in these areas ensures that safety-related equipment in adjacent areas will not be threatened. The installation of a fixed fire suppression system would not significantly increase the level of fire protection in these areas.

Based on our evaluation, we find that the existing fire protection in conjunction with alternate shutdown capability in the eight areas for which an exemption has been requested provides a level of fire protection equivalent to the technical requirements of Section III.G.3 of Appendix R and, therefore, the exemptions should be granted.

Regarding the Emergency Switchgear Rooms, the NRC SER also states:

3. Emergency Switchgear Rooms (ES-1 and ES-2) Elevation 713:

An exemption is requested from Section III.G.2 to the extent it requires the separation of adjacent fire areas by 3-hour rated fire barriers.

The Emergency Switchgear Rooms are located on the 713 elev. beneath the cable spreading room. The ceiling which forms a boundary between the two areas constitutes a 1 1/2-hour fire barrier. All other adjacent boundaries are 3-hour rated. The combustible loading in the emergency switchgear room, if totally consumed, would correspond to an equivalent fire severity of approximately 25 minutes on the ASTM E-119 Standard Time-Temperature Curve.

Smoke detection and manual fire suppression equipment are provided in the area. The 1 1/2-hour rated ceiling exceeds the combustible loading in the switchgear room with considerable margin. In the event a fire occurred, there is reasonable

BVPS-1

Licensing Action #: 11.09

Licensing Action: Emergency Switchgear Rooms (1-ES-1 and 1-ES-2) - Lack of Automatic Suppression (III.G.3 criteria) and Lack of 3-Hour Fire Barriers (III.G.2 criteria)

assurance that the installed smoke detection system would alarm and alert the fire brigade before the ceiling's integrity is challenged. Replacing the existing ceiling with 3-hour rated assemblies would not significantly enhance fire protection safety.

Based on our evaluation, we find that the protection provided for the emergency switchgear room ceiling provides a level of fire protection equivalent to the technical requirements of Section III.G.2. The exemption should, therefore, be granted.

Regarding portable ventilation, the NRC SER dated March 14, 1983, states:

7. Charging Pump Cubicle and Emergency Switchgear Room

The licensee proposes to use portable gasoline-powered fans as a redundant means of supplying essential ventilation to the charging pump cubicles and the emergency switchgear rooms. The portable fans will be placed in position and operated by the plant fire brigade.

These areas contain equipment essential for hot shutdown. Loss of their normal HVAC systems means that the temperature will rise rapidly, thus damaging or prematurely aging the equipment housed inside these areas. The proposed use of the gasoline-powered fans is considered a repair, which is not allowed by the requirement of III.G.1.a. Repairs which can be accomplished within 72 hours are permitted for cold-shutdown-related equipment. However, the licensee has shown, by analysis, that there is a time period of approximately 1 to 2 hours during which these fans would not need to be employed. Because of this time factor, we accept the use of portable fans as backup HVAC equipment for these areas.

This exemption should be granted.

Validation/Conclusions:

Conformance with the Appendix R exemption bases reached with the NRC regarding Emergency Switchgear Rooms (1-ES-1 and 1-ES-2), Elevation 713'; lack of automatic suppression (III.G.3 criteria) and lack of 3-hour fire barriers (III.G.2 criteria) as stated in the NRC SERs dated March 14, 1983, and August 30, 1984, was verified. Automatic Suppression in these two Fire Compartments is not required by performance-based analysis NFPA 805; therefore, approval for automatic suppression portion of the licensing action is no longer necessary. The exemption for lack of 3-hour Fire Barriers (III.G.2 criteria) for the Emergency Switchgear Rooms (1-ES-1 and 1-ES-2) is being transitioned to the new licensing basis under NFPA 805.

Disposition:

Licensing Action acceptable for transition

References:

- 1OST-33.15A, Revision 18, "Fire Extinguisher Monthly Inspection."
- 1OST-33.16, Revision 15, "Smoke Detector Instrumentation Test."

BVPS-1

Licensing Action #: 11.09

Licensing Action: Emergency Switchgear Rooms (1-ES-1 and 1-ES-2) - Lack of Automatic Suppression (III.G.3 criteria) and Lack of 3-Hour Fire Barriers (III.G.2 criteria)

- 1OST-33.16F, Revision 4, "Early Warning Smoke Detection Instrumentation Test Service Building and Control Room."
- 1OST-33.2A, Revision 5, "Fire Protection System Monthly Hose Stations Test."
- 1OM-56C.4.F-12, Revision 9, "Establishing Portable Emergency Ventilation."
- 1PFP-SRVB-713-AE, Revision 1, "Switchgear Room Fire Area ES-1."
- 1PFP-SRVB-713-DF, Revision 1, "Switchgear Room Fire Area ES-2."
- 2OM-56B.4.2.E1, Revision 6, "Setting Up Portable Ventilation."
- 82-12-21, "Appendix R~ to 10 CFR 50 - Exemptions."
- 83-01-05, "SER for Appendix R to 10 CFR Part 50, Items III.G and III.L - BVPS-1."
- 83-03-14, "BVPS-1 - Request for Exemption from Some Requirements of Appendix R to 10 CFR Part 50."
- 83-12-16, "Appendix R - Additional Exemption Requests Based on Generic Letter 83-33."
- 84-08-30, "BVPS-1 Request for Additional Informations from Some Requirements of Appendix R to 10 CFR Part 50."
- 8700-B-084, Revision 12, "Fire Hazards Analysis."
- 8700-DMC-1559, Revision 0, Addendum 0, "Charging Pump Cubicle Heatup Following a DBA and Loss of All Ventilation."
- 8700-DMC-2341, Revision 1, "Basis for Exemption of Non-Qualified Fire Damper VS-D-263 and VS-D-266."
- 8700-DMC-2864, Revision 0, "Emergency Switchgear Room Temperatures During CIB/Loss of Normal Switchgear HVAC."

Associations:

Ch.4 - Compartment: 1-ES-1
Ch.4 - Compartment: 1-ES-2
Fire Protection - Fire Compartment: 1-ES-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 1-ES-1 / Form: Water-Based Suppression
Fire Protection - Fire Compartment: 1-ES-2 / Form: Passive Protection
Fire Protection - Fire Compartment: 1-ES-2 / Form: Water-Based Suppression

BVPS-1

Licensing Action #: 11.10

Licensing Action: Process Instrumentation Room (1-CR-4) - Lack of Automatic Suppression (III.G.3 criteria) and Lack of 3-Hour Fire Barriers (III.G.2 criteria)

Basis Date: August 30, 1984

To Be Transitioned?: Yes

Basis:

III.G.3 requires automatic fire suppression and detection in fire compartments for which alternate shutdown has been provided. Process Instrument Room (1-CR-4), Elevation 713' does not comply with Section III.G.3 because the compartment is not provided with fixed automatic fire suppression.

The BVPS-1 letter dated December 16, 1983, requested an exemption from the requirement for fixed automatic fire suppression for 1-CR-4. An exemption was also requested from the requirements of Section III.G.2 for fire compartment 1-CR-4 because of fire barriers (ceiling and doors) that have a fire rating of 1.5 hours (less than three hours).*

The potentially affected safe shutdown equipment from a fire in the Process Instrument Room (1-CR-4) includes the primary and secondary process racks, reactor protection racks, emergency auxiliary shutdown panel, and Class 1E and non-Class 1E equipment and cable.

The exemptions for the Process Instrument Room (1-CR-4), Elevation 713' were approved and documented in the NRC SER dated August 30, 1984.

The following conditions were cited in the NRC SER as the bases for the exemption approval relative to the Process Instrument Room (1-CR-4), Elevation 713':

- Combustible loading is light.
- Alternate shutdown capability is provided independent of the fire area.
- Detection and manual fire suppression equipment is available.
- The doors and ceiling exceed the combustible loading in the process rack room and relay room with considerable margin.

Approval of clarifications relative to this exemption is being requested as part of this LAR submittal and transition to NFPA 805 (See Attachment T "Clarification of Prior NRC Approvals").

Evaluation:

The NRC SER dated August 30, 1984, states:

We have reviewed the licensee's exemption requests and evaluation of these requests is as follows:

1. Fixed Suppression and Detection Systems

For the following area, an exemption is requested from Section III.G.3 to the extent it requires fixed suppression and detection to be provided throughout a fire area for which alternative shutdown has been provided:

Process Instrument Room (CR-4), Elev. 713

BVPS-1

Licensing Action #: 11.10

Licensing Action: Process Instrumentation Room (1-CR-4) - Lack of Automatic Suppression (III.G.3 criteria) and Lack of 3-Hour Fire Barriers (III.G.2 criteria)

....

All of the fire areas for which exemptions have been requested represent a similar configuration, i.e., combustible loading is light, there is alternate shutdown capability, detection (except CO2 storage area) and manual fire suppression equipment is available.... The low combustible loading in these areas ensures that safety-related equipment in adjacent areas will not be threatened. The installation of a fixed fire suppression system would not significantly increase the level of fire protection in these areas.

Based on our evaluation, we find that the existing fire protection in conjunction with alternate shutdown capability in the eight areas for which an exemption has been requested provides a level of fire protection equivalent to the technical requirements of Section III.G.3 of Appendix R and, therefore, the exemptions should be granted.

Regarding the Process Instrument Room (1-CR-4) Elevation 713', the NRC SER states:

An exemption is requested from Section III.G.2 to the extent it requires the separation of adjacent fire areas by 3-hour rated fire barriers.

The process instrument room is located on the 713 elev. beneath the cable spreading room. The ceiling which forms a barrier between the process instrument room and the cable spreading room is a 1 1/2-hour rated fire barrier. In addition, three doors which communicate to the adjacent relay room (CR-3) are 1 1/2-hour rated fire doors. All other boundaries are 3-hour rated.

The combustible loading in the area, if totally consumed, would correspond to an equivalent fire severity of approximately 45 minutes on the ASTM E-119 Standard Time-Temperature Curve. Smoke detection and manual fire suppression equipment are provided in the area. Alternate shutdown capability independent of the area is also provided.

The 1 1/2-hour rated fire doors which lead to the relay room and 1 1/2-hour rated ceiling exceed the combustible loading in both the process instrument room and the relay room with considerable margin. In the event a fire occurred in either room, there is reasonable assurance that the installed smoke detection system would alarm and alert the fire brigade before the door's or ceiling's integrity is challenged. Replacing the existing doors and ceiling with a 3-hour rated assemblies would not significantly enhance fire protection safety.

Based on our evaluation, we conclude that the protection provided for the process instrument room provides a level of fire protection equivalent to the technical requirements of Section III.G. The exemption should, therefore, be granted.

Validation/Conclusions:

Conformance with the Appendix R exemption bases reached with the NRC regarding Process Instrument Room (1-CR-4) Elevation 713'; lack of automatic suppression (III.G.3

BVPS-1

Licensing Action #: 11.10

Licensing Action: Process Instrumentation Room (1-CR-4) - Lack of Automatic Suppression (III.G.3 criteria) and Lack of 3-Hour Fire Barriers (III.G.2 criteria)

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criteria), and lack of 3-hour fire barriers (III.G.2 criteria) as stated in NRC SER dated August 30, 1984, was verified. Automatic Suppression in the Fire Compartment is not required by performance-based analysis NFPA 805; therefore, approval for automatic suppression portion of the licensing action is no longer necessary. The exemption for lack of 3-hour Fire Barriers (III.G.2 criteria) for the Process Instrument Room (1-CR-4) is being transitioned to the new licensing basis under NFPA 805.

Disposition:

Licensing Action acceptable for transition

References:

- 1OST-33.15A, Revision 18, "Fire Extinguisher Monthly Inspection."
- 1OST-33.16F, Revision 4, "Early Warning Smoke Detection Instrumentation Test Service Building and Control Room."
- 1OST-33.2A, Revision 5, "Fire Protection System Monthly Hose Stations Test."
- 1PFP-SRVB-713-Process, Revision 2, "Process Rack Room Fire Area CR-4."
- 83-01-05, "SER for Appendix R to 10 CFR Part 50, Items III.G and III.L - BVPS-1."
- 83-12-16, "Appendix R - Additional Exemption Requests Based on Generic Letter 83-33."
- 84-08-30, "BVPS-1 Request for Additional Informations from Some Requirements of Appendix R to 10 CFR Part 50."
- 8700-B-084, Revision 12, "Fire Hazards Analysis."
- 8700-DMC-2840, Revision 0, Addendum 2, "Engineering Evaluation of Non-Rated Fire Assemblies."

Associations:

Ch.4 - Compartment: 1-CR-4
Ch.4 - Compartment: 1-MG-1
Fire Protection - Fire Compartment: 1-CR-4 / Form: Detection
Fire Protection - Fire Compartment: 1-CR-4 / Form: Passive Protection
Fire Protection - Fire Compartment: 1-MG-1 / Form: Passive Protection

BVPS-1

Licensing Action #: 11.11

Licensing Action: Communication Equipment and Relay Panel Room (1-CR-3) - Lack of Automatic Suppression (III.G.3 criteria) and Lack of 3-Hour Fire Barriers (III.G.2 criteria)

Basis Date: August 30, 1984

To Be Transitioned?: No

Basis:

III.G.3 requires automatic fire suppression and detection in fire compartments for which alternate shutdown has been provided. Communication Equipment and Relay Panel Room (1-CR-3), Elevation 713' does not comply with Section III.G.3 because the compartment is not provided with fixed automatic fire suppression. The BVPS-1 letter dated December 16, 1983, requested an exemption from the requirement for fixed automatic fire suppression for 1-CR-3. An exemption was also requested from the requirements of Section III.G.2 for fire compartment 1-CR-3 because of fire barriers (ceiling and doors), which have a fire rating of 1.5 hours (less than three hours).

The potentially affected safe shutdown equipment from a fire in the Communication Equipment and Relay Panel Room (1-CR-3) is limited because equipment located in this compartment is mainly relay and communication panels. The primary components, located in this compartment, required for safe shutdown are the diesel generator protection panels.

The exemptions for the Communication Equipment and Relay Panel Room (1-CR-3), Elevation 713' were approved and documented in the NRC SER dated August 30, 1984.

The following conditions were cited in the NRC SER as the bases for the exemption approval relative to the Communication Equipment and Relay Panel Room (1-CR-3), Elevation 713':

- Combustible loading is light.
- Alternate shutdown capability is provided independent of the fire area.
- Detection and manual fire suppression equipment is available.
- The doors and ceiling exceed the combustible loading in the Communication Equipment and Relay Panel Room with considerable margin.

Evaluation:

The NRC SER dated August 30, 1984, states:

We have reviewed the licensee's exemption requests and evaluation of these requests is as follows:

1. Fixed Suppression and Detection Systems

For the following area, an exemption is requested from Section III.G.3 to the extent it requires fixed suppression and detection to be provided throughout a fire area for which alternative shutdown has been provided:

Communications Equipment & Relay Panel Room (CR-3), Elev. 713

....

BVPS-1

Licensing Action #: 11.11

Licensing Action: Communication Equipment and Relay Panel Room (1-CR-3) - Lack of Automatic Suppression (III.G.3 criteria) and Lack of 3-Hour Fire Barriers (III.G.2 criteria)

All of the fire areas for which exemptions have been requested represent a similar configuration, i.e., combustible loading is light, there is alternate shutdown capability, detection (except CO2 storage area) and manual fire suppression equipment is available.... The low combustible loading in these areas ensures that safety-related equipment in adjacent areas will not be threatened. The installation of a fixed fire suppression system would not significantly increase the level of fire protection in these areas.

Based on our evaluation, we find that the existing fire protection in conjunction with alternate shutdown capability in the eight areas for which an exemption has been requested provides a level of fire protection equivalent to the technical requirements of Section III.G.3 of Appendix R and, therefore, the exemptions should be granted.

Regarding the Communications Equipment & Relay Panel Room (1-CR-3), Elevation 713', the NRC SER also states:

An exemption is requested from Section III.G.2 to the extent it requires the separation of adjacent fire areas by 3-hour rated fire barriers.

The communications equipment and relay panel room is located on the 713' elev. beneath the cable spreading room. The ceiling that separates the relay room from the cable spreading room is a 1 1/2-hour rated fire barrier. In addition, two doors that communicate with the adjacent process instrument room (CR-4) carry a 1 1/2-hour rating.

Smoke detection and manual fire suppression equipment are provided in the area. The combustible loading in the area, if totally consumed, would correspond to an equivalent fire severity of approximately fifty minutes on the ASTM E-119 Standard Time-Temperature Curve. Alternate shutdown capability independent of the area is provided.

The 1 1/2-hour rated fire doors which lead to the process instrument room and the 1 1/2-hour rated ceiling exceed the combustible loading in both the process instrument room and the relay room with considerable margin. In the event a fire occurred in either room, there is reasonable assurance that the installed smoke detection system would alarm and alert the fire brigade before the door's integrity is challenged. Replacing the existing doors and ceiling with 3-hour rated assemblies would not significantly enhance fire protection safety.

Based on our evaluation, we conclude that the protection provided for the Communications Equipment & Relay Panel Room provides a level of fire protection equivalent to the technical requirements of Section III.G. The exemption should, therefore, be granted.

Validation/Conclusions:

The Fire Compartment was evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

BVPS-1

Licensing Action #: 11.11

Licensing Action: Communication Equipment and Relay Panel Room (1-CR-3) - Lack of Automatic Suppression (III.G.3 criteria) and Lack of 3-Hour Fire Barriers (III.G.2 criteria)

Disposition:

Not being transitioned

References:

- 1OST-33.15A, Revision 15, "Fire Extinguisher Monthly Inspection."
- 1OST-33.2A, Revision 4, "Fire Protection System Monthly Hose Stations Test."
- 1PFP-SRVB-713-Relay Room, Revision 0, "Fire Area CR-3."
- 82-06-30, "Fire Protection - Response to Appendix R Requirements and Generic Letter 81-12."
- 83-01-05, "SER for Appendix R to 10 CFR Part 50, Items III.G and III.L - BVPS-1."
- 84-08-30, "BVPS-1 Request for Additional Informations from Some Requirements of Appendix R to 10 CFR Part 50."
- 8700-B-084, Revision 11, Addendum 1, "Fire Hazards Analysis."

Associations:

None

BVPS-1

Licensing Action #: 11.12

Licensing Action: Normal Switchgear Room (1-NS-1) - Lack of Automatic Suppression (III.G.3 criteria) and Lack of 3-Hour Fire Barriers (III.G.2 criteria)

Basis Date: August 30, 1984

To Be Transitioned?: No

Basis:

III.G.3 requires automatic fire suppression and detection in fire compartments for which alternate shutdown has been provided. Normal Switchgear Room (1-NS-1), Elevation 713' does not comply with Section III.G.3 because the compartment is not provided with fixed automatic fire suppression.

The BVPS-1 letter dated December 16, 1983, requested an exemption from the requirement for fixed automatic fire suppression for NS-1. An exemption was also requested from the requirements of Section III.G.2 for fire compartment NS-1 because of fire barriers (fire dampers) that have a fire rating of less than three hours.

The potentially affected safe shutdown equipment from a fire in the Normal Switchgear Room (1-NS-1) are various control and protection circuits for both emergency diesels routed through this compartment. Potential loss of safe shutdown instrumentation may be lost for a fire in this compartment, which would require use of the Backup Indicating Panel.

The exemptions for the Normal Switchgear Room (1-NS-1), Elevation 713' were approved and documented in the NRC SER dated August 30, 1984.

The following conditions were cited in the NRC SER as the bases for the exemption approval relative to the Normal Switchgear Room (1-NS-1), Elevation 713':

- Combustible loading is light.
- Alternate shutdown capability is provided independent of the fire area.
- Detection and manual fire suppression equipment is available.
- The dampers exceed the combustible loading with considerable margin.

Evaluation:

The NRC SER dated August 30, 1984, states:

> *We have reviewed the licensee's exemption requests and evaluation of these requests is as follows:*
>
> *1. Fixed Suppression and Detection Systems*
>
> *For the following area, an exemption is requested from Section III.G.3 to the extent it requires fixed suppression and detection to be provided throughout a fire area for which alternative shutdown has been provided:*
>
> *Normal Switchgear Room (NS-1), Elev. 713*
>
> ....

BVPS-1

Licensing Action #: 11.12

Licensing Action: Normal Switchgear Room (1-NS-1) - Lack of Automatic Suppression (III.G.3 criteria) and Lack of 3-Hour Fire Barriers (III.G.2 criteria)

All of the fire areas for which exemptions have been requested represent a similar configuration, i.e., combustible loading is light, there is alternate shutdown capability, detection (except CO2 storage area) and manual fire suppression equipment is available.... The low combustible loading in these areas ensures that safety-related equipment in adjacent areas will not be threatened. The installation of a fixed fire suppression system would not significantly increase the level of fire protection in these areas.

Based on our evaluation, we find that the existing fire protection in conjunction with alternate shutdown capability in the eight areas for which an exemption has been requested provides a level of fire protection equivalent to the technical requirements of Section III.G.3 of Appendix R and, therefore, the exemptions should be granted.

Regarding the Normal Switchgear Room, the NRC SER also states:

6. Normal Switchgear Room NS-1 Elev. 713

An exemption is requested from Section 111.G.2 to the extent it requires the separation of adjacent fire areas by 3-hour rated fire barriers.

The normal switchgear room is located on the 713 elev. of the service building, one floor below the cable spreading room. The normal switchgear room is surrounded by 3-hour rated barriers with the exception of 1 1/2-hour rated fire dampers installed in the ductwork that penetrates the cable spreading room.

Smoke detection and manual fire suppression equipment are provided in the area. The combustible loading in the area, if totally consumed, would correspond to an equivalent fire severity of approximately 50 minutes on the ASTM E-119 Standard Time-Temperature Curve. Alternate shutdown capability independent of the area is also provided.

The 1 1/2-hour rated fire dampers which lead to the cable spreading room exceed the combustible loading in the normal switchgear room with considerable margin. In the event a fire occurred in the switchgear room, there is reasonable assurance that the installed smoke detection system would alarm and alert the fire brigade before the dampers' integrity is challenged. Replacing the existing dampers with 3-hour rated assemblies would not significantly enhance fire protection safety.

Based on our evaluation, we conclude that the protection provided for the normal switchgear room provides a level of fire protection equivalent to the technical requirements of Section III.G. The exemption should, therefore, be granted.

Validation/Conclusions:

The Fire Compartment was evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

BVPS-1

Licensing Action #: 11.12

Licensing Action: Normal Switchgear Room (1-NS-1) - Lack of Automatic Suppression (III.G.3 criteria) and Lack of 3-Hour Fire Barriers (III.G.2 criteria)

Disposition:

Not being transitioned

References:

- 1OST-33.15A, Revision 15, "Fire Extinguisher Monthly Inspection."
- 1OST-33.2A, Revision 4, "Fire Protection System Monthly Hose Stations Test."
- 82-06-30, "Fire Protection - Response to Appendix R Requirements and Generic Letter 81-12."
- 83-01-05, "SER for Appendix R to 10 CFR Part 50, Items III.G and III.L - BVPS-1."
- 84-08-30, "BVPS-1 Request for Additional Informations from Some Requirements of Appendix R to 10 CFR Part 50."
- 8700-B-084, Revision 11, Addendum 1, "Fire Hazards Analysis."
- DCP-1482, Revision 0, "Group 1 Fire Damper Replacement."

Associations:

None

BVPS-1

Licensing Action #: 11.13

Licensing Action: Service Building Structural Steel (Area Below 1-CS-1) - Lack of Fire Protection for Structural Steel (III.G.2a criteria)

Basis Date: November 21, 1985

To Be Transitioned?: No

Basis:

III.G.2a requires that structural steel forming a part of or supporting a fire barrier shall be protected to provide fire resistance equivalent to that required of the barrier. Service Building, Elevation 713' did not comply with Section III.G.2a because the compartment did not have a fire resistant coating on the structural steel supporting the ceiling. The BVPS-1 letter dated December 16, 1983, requested an exemption from the requirement because the structural steel in the compartments below fire compartment 1-CS-1 (1-ES-1, 1-ES-2, 1-MG-1, 1-CR-3, and 1-CR-4) did not have a fire resistant coating on the structural steel supporting the ceiling.

Evaluation:

Via subsequent correspondence, the exemption request was resolved by completion of a plant modification which involved fire coating the structural steel. The BVPS-1 letter dated November 21, 1985, confirmed that the schedule for completion of structural steel fire protection and, in the interim, instituting a 1-hour fire watch in those areas (as required by Technical Specifications 3.7.15) a reasonable approach to resolution of providing the structural steel with a fire resistance equivalent to that required of the barrier as committed to in a BVPS-1 letter dated July 10, 1985.

Validation/Conclusions:

Compliance with III.G.2a criteria was established by completing plant modifications to provide protection for the subject structural steel; therefore, this licensing action is no longer necessary. This exemption request will not appear in LAR TR Section 2.2.

Disposition:

Not being transitioned

References:

- 82-06-30, "Fire Protection - Response to Appendix R Requirements and Generic Letter 81-12."
- UFPARR, Revision 27, "Updated Fire Protection Appendix R Review."
- 84-08-30, "BVPS-1 Request for Additional Informations from Some Requirements of Appendix R to 10 CFR Part 50."
- 85-07-10, "BVPS-1 Appendix R - Fire Protection."
- 85-11-21, "Structural Steel Fire Protection Exemption Request for Beaver Valley 1 (Licensing Actions TAC 53694 and 59067)."
- 83-12-16, "Appendix R - Additional Exemption Requests Based on Generic Letter 83-33."

BVPS-1

Licensing Action #: 11.13

Licensing Action: Service Building Structural Steel (Area Below 1-CS-1) - Lack of Fire Protection for Structural Steel (III.G.2a criteria)

Associations:

None

BVPS-1

Licensing Action #: 11.14

Licensing Action: Carbon Dioxide Storage/PG Pump Room (1-CO-2) - Lack of Automatic Suppression and Detection (III.G.3 criteria)

Basis Date: August 30, 1984

To Be Transitioned?: No

Basis:

III.G.3 requires automatic fire suppression and detection in fire compartments for which alternate shutdown has been provided. Carbon Dioxide Storage/PG Pump Room (1-CO-2) does not comply with Section III.G.3 because the compartment is not provided with fixed automatic fire suppression or fire detection. The BVPS-1 letter dated December 16, 1983 requested an exemption from the requirement for fixed automatic fire suppression and detection for 1-CO-2.

The original Appendix R submittal dated June 30, 1982, (Section 6.9) identified potential loss of all four river water supply valves to the emergency diesel generator heat exchangers given a fire in compartment 1-CO-2 and proposed to relocate one valve, MOV-RW113D, to the diesel generator building. A subsequent design change (DCP 2104) has relocated all of the valves out of fire compartment 1-CO-2, and into their respective diesel generator buildings.

The exemption for the Carbon Dioxide Storage/PG Pump Room (1-CO-2) was approved and documented in the NRC SER dated August 30, 1984.

The following conditions were cited in the NRC SER as the bases for the exemption approval relative to the Carbon Dioxide Storage/PG Pump Room (1-CO-2):

- Combustible loading is light.
- Alternate shutdown capability is provided independent of the fire area.
- The carbon dioxide storage area (1-CO-2) is in a separate building adjacent to the diesel generator building. A fire in this area would not threaten safe shutdown equipment.

Evaluation:

The NRC SER dated August 30, 1984 states:

We have reviewed the licensee's exemption requests and evaluation of these requests is as follows:

1. Fixed Suppression and Detection Systems

For the following area, an exemption is requested from Section III.G.3 to the extent it requires fixed suppression and detection to be provided throughout a fire area for which alternative shutdown has been provided:

Carbon Dioxide Storage/PG Pump Room (CO-2)...

With the exception of the Carbon Dioxide Storage/PG Pump Room (CO-2), all of these areas are provided with either partial or complete fire detection systems. The

BVPS-1

Licensing Action #: 11.14

Licensing Action: Carbon Dioxide Storage/PG Pump Room (1-CO-2) - Lack of Automatic Suppression and Detection (III.G.3 criteria)

carbon dioxide storage area is in a separate building adjacent to the diesel generator buildings. A fire in this area would not threaten safe-shutdown equipment.

All of the fire areas for which exemptions have been requested represent a similar configuration, i.e., combustible loading is light, there is alternate shutdown capability, detection (except CO2 storage area) and manual fire suppression equipment is available.... The low combustible loading in these areas ensures that safety-related equipment in adjacent areas will not be threatened. The installation of a fixed fire suppression system would not significantly increase the level of fire protection in these areas.

Based on our evaluation, we find that the existing fire protection in conjunction with alternate shutdown capability in the eight areas for which an exemption has been requested provides a level of fire protection equivalent to the technical requirements of Section III.G.3 of Appendix R and, therefore, the exemptions should be granted.

Validation/Conclusions:

Safe shutdown circuits and equipment have been removed from fire compartment (1-CO-2) due to plant modifications; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- 82-06-30, "Fire Protection - Response to Appendix R Requirements and Generic Letter 81-12."
- 83-12-16, "Appendix R - Additional Exemption Requests Based on Generic Letter 83-33."
- 84-08-30, "BVPS-1 Request for Additional Informations from Some Requirements of Appendix R to 10 CFR Part 50."
- UFPARR, Revision 27, "Updated Fire Protection Appendix R Review."

Associations:

None

BVPS-1

Licensing Action #: 11.15

Licensing Action: Pipe Tunnel (Subarea 1-QP-1) - Lack of Automatic Suppression (III.G.3 criteria)

Basis Date: August 30, 1984

To Be Transitioned?: No

Basis:

III.G.3 requires automatic fire suppression and detection in fire compartments for which alternate shutdown has been provided. Pipe Tunnel (Sub-compartment 1-QP-1) Elevation 735' does not comply with Section III.G.3 because the compartment is not provided with fixed automatic fire suppression throughout the fire compartment. The BVPS-1 letter dated December 16, 1983, requested an exemption from the requirement for fixed automatic fire suppression for 1-NS-1.

The potentially affected safe shutdown equipment from a fire in the Pipe Tunnel (Sub-compartment 1-QP-1) are the Redundant Auxiliary Feedwater Pumps.

The exemption for the Pipe Tunnel (Sub-compartment 1-QP-1), Elevation 735' was approved and documented in the NRC SER dated August 30, 1984.

The following conditions were cited in the NRC SER as the bases for the exemption approval relative to the Pipe Tunnel (Sub-compartment 1-QP-1), Elevation 735':

- Combustible loading is light.
- Alternate shutdown capability is provided independent of the fire area.
- Detection and manual fire suppression equipment is available.

Evaluation:

The NRC SER dated August 30, 1984, states:

We have reviewed the licensee's exemption requests and evaluation of these requests is as follows:

1. Fixed Suppression and Detection Systems

For the following area, an exemption is requested from Section III.G.3 to the extent it requires fixed suppression and detection to be provided throughout a fire area for which alternative shutdown has been provided:

Pipe Tunnel (Sub-area QP-1), Elev. 735

....

All of the fire areas for which exemptions have been requested represent a similar configuration, i.e., combustible loading is light, there is alternate shutdown capability, detection (except CO2 storage area) and manual fire suppression equipment is available.... The low combustible loading in these areas ensures that safety-related equipment in adjacent areas will not be threatened. The installation of a fixed fire suppression system would not significantly increase the level of fire protection in these areas.

BVPS-1

Licensing Action #: 11.15

Licensing Action: Pipe Tunnel (Subarea 1-QP-1) - Lack of Automatic Suppression (III.G.3 criteria)

Based on our evaluation, we find that the existing fire protection in conjunction with alternate shutdown capability in the eight areas for which an exemption has been requested provides a level of fire protection equivalent to the technical requirements of Section III.G.3 of Appendix R and, therefore, the exemptions should be granted.

Validation/Conclusions:

The Fire Compartment was evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- 1OST-33.15A, Revision 15, "Fire Extinguisher Monthly Inspection."
- 1OST-33.16, Revision 14, "Smoke Detector Instrumentation Test."
- 1PFP-SFGB-735-Aux FW & QS Pumps, Revision 0, "Fire Area QP-1."
- 82-06-30, "Fire Protection - Response to Appendix R Requirements and Generic Letter 81-12."
- 83-01-05, "SER for Appendix R to 10 CFR Part 50, Items III.G and III.L - BVPS-1."
- 84-08-30, "BVPS-1 Request for Additional Informations from Some Requirements of Appendix R to 10 CFR Part 50."
- 8700-B-084, Revision 11, Addendum 1, "Fire Hazards Analysis."

Associations:

None

BVPS-1

Licensing Action #: 11.16

Licensing Action: Reactor Containment (1-RC-1) - Lack of 20 foot Separation of Redundant Trains of Circuits Associated with Source Range Monitoring Within Containment (III.G.2 criteria)

Basis Date: August 30, 1984

To Be Transitioned?: Yes

Basis:

Reactor Containment (1-RC-1) does not comply with III.G.2, which requires that redundant trains of safe shutdown cables and equipment inside non-inerted containments be separated by 20 feet with no intervening combustible materials or fire hazards, or separated by noncombustible radiant energy shields, or an automatic suppression and detection system must be installed in the compartment. The original exemption request for the Reactor Containment is described in Licensing Action No. 2. Clarifications of cable routing in Containment were provided in the BVPS-1 letter dated October 22, 1982. The exemption approval was provided by the NRC in the SER dated March 14, 1983.

The BVPS-1 letter dated December 16, 1983, requested an additional exemption from the requirements of Section III.G.2 for RC-1 because the original submittal did not include the source range nuclear instrumentation as a required safe shutdown parameter. The cables for the redundant source range nuclear instrument channels are in separate conduits, but do not meet the 20 foot separation criteria.

The potentially affected safe shutdown equipment from a fire in the Reactor Containment (1-RC-1) for this specific exemption is the source range nuclear instrumentation.

The exemption for the Reactor Containment (1-RC-1) source range nuclear instrumentation was approved and documented in the NRC SER dated August 30, 1984.

The following conditions were cited in the NRC SER as the bases for the exemption approval relative to the Reactor Containment (1-RC-1) source range nuclear instrumentation:

- All cable insulation is qualified to a test comparable to IEEE standard 383.*
- The reactor coolant pumps are fitted with an oil collection system.
- Smoke detection systems and water deluge systems are provided in the cable penetration area and in the residual heat removal pump area.
- Portable fire extinguishers and manual hose stations are provided throughout the fire area.
- Separation of approximately 5 feet is maintained between source range channels.
- *Source range cables are in conduit.*

*Approval of clarifications relative to this exemption is being requested as part of this LAR submittal and transition to NFPA 805 (See Attachment T "Clarification of Prior NRC Approvals").

BVPS-1

Licensing Action #: 11.16

Licensing Action: Reactor Containment (1-RC-1) - Lack of 20 foot Separation of Redundant Trains of Circuits Associated with Source Range Monitoring Within Containment (III.G.2 criteria)

Evaluation:

The NRC SER dated August 30, 1984 states:

8. Reactor Containment RC-1

An exemption is requested from Section III.G to the extent it requires the separation of redundant trains of the source range monitor within containment by greater than 20 feet.

This fire area includes the entire area inside containment. The redundant trains of safe shutdown components in this area include the containment ventilation, pressurizer pressure controls, pressurizer power operated relief valves, pressurizer relief blocking valves, pressurizer heaters, steam generator level transmitters, pressurizer level transmitters, reactor coolant hot and cold leg temperature instrumentation, and associated cables.

The combustible loading in this area consists of approximately 48,000 pounds of cable insulation, 265 gallons of lubricating oil for each of the three reactor coolant pumps, and 200 pounds of charcoal in the containment air filter cubicles.

All cable insulation is qualified to a test comparable to IEEE Standard 383. The reactor coolant pumps are fitted with an oil collection system. Smoke detection systems and water deluge systems are provided only in the cable penetration area and in the residual heat removal pump area. Portable fire extinguishers and manual hose stations are provided throughout the fire area.

We had previously approved an exemption for the separation of redundant equipment and cables inside containment. At our request, the licensee has added an additional channel of source range neutron detection. Due to the physical arrangement inside containment, separation of the redundant cables by more than 20-feet is not possible. A minimum separation of approximately five feet is maintained. Each channel of neutron detection is in a separate conduit."

The protection for redundant trains of safe shutdown equipment inside containment does not meet the technical requirements of Section III.G because redundant power cables are not separated by at least 20 feet free of combustibles. Due to the configuration and location of the cables within the containment and to the restricted access of these sub-areas during plant operation, an exposure fire involving the accumulation of significant quantities of transient combustible materials is unlikely. Because there are only a few cables in these sub-areas and all cables inside containment are qualified to a test comparable to that of IEEE Standard 383 and routed in conduit, a fire of sufficient magnitude to damage redundant cables or components is also unlikely.

Based on the above evaluation, the existing protection for the containment area provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R. Therefore, the exemption should be granted.

BVPS-1

Licensing Action #: 11.16

Licensing Action: Reactor Containment (1-RC-1) - Lack of 20 foot Separation of Redundant Trains of Circuits Associated with Source Range Monitoring Within Containment (III.G.2 criteria)

Validation/Conclusions:

Conformance with the Appendix R exemption bases reached with the NRC regarding Reactor Containment (1-RC-1); Lack of 20 foot Separation of Redundant Trains of Circuits Associated with Source Range Monitoring Within Containment (III.G.2 criteria), as stated in the NRC SER dated August 30, 1984, was verified. The exemption for Reactor Containment (1-RC-1) is being transitioned to the new licensing basis under NFPA 805.

Disposition:

Licensing Action acceptable for transition

References:

- 1OST-33.13B, Revision 14, "Deluge Valve Fire Protection System Instrument Test."
- 1OST-33.15A, Revision 18, "Fire Extinguisher Monthly Inspection."
- 1OST-33.2A, Revision 5, "Fire Protection System Monthly Hose Stations Test."
- 1OST-33.21A, Revision 8, "Containment Area Smoke Detection Instrumentation Test."
- 82-10-22, "Supplemental Information to Fire Protection - Appendix R Review Report."
- 83-03-14, "BVPS-1 - Request for Exemption from Some Requirements of Appendix R to 10 CFR Part 50."
- 83-12-16, "Appendix R - Additional Exemption Requests Based on Generic Letter 83-33."
- 84-08-30, "BVPS-1 Request for Additional Informations from Some Requirements of Appendix R to 10 CFR Part 50."
- 8700-RB-0002L, Revision 6, "Fire Protection Arrangement."
- 8700-RB-0140A, Revision 3, "Oil Collection System for Reactor Coolant Pump."
- 8700-RE-0035A, Revision 7, "Arrangement - Electrical Penetrations Reactor Containment."
- 8700-RE-0035B, Revision 7, "Electrical Penetration Terminal Boxes Reactor Containment."
- 8700-RE-0046J, Revision 4, "Conduit Plan Nuclear Instrumentation."
- 8700-RE-0046K, Revision 3, "Conduit Plan Nuclear Instrumentation."
- TER-12661, Revision 0, "Appendix R Report Update for CR971034."
- TER-13757, Revision 0, "Revise Appendix 'R' Report Statements for Flame Retardancy."

BVPS-1

Licensing Action #: 11.16

Licensing Action: Reactor Containment (1-RC-1) - Lack of 20 foot Separation of Redundant Trains of Circuits Associated with Source Range Monitoring Within Containment (III.G.2 criteria)

- UFSAR, Revision 26, "BVPS-1 Updated Final Safety Analysis Report."

Associations:

Ch.4 - Compartment: 1-RC-1
Fire Protection - Fire Compartment: 1-RC-1 / Form: Water-Based Suppression

BVPS-1

Licensing Action #: 11.17

Licensing Action: Cable Spreading Room (1-CS-1) - Lack of 3-Hour Fire Barriers (III.G.2 criteria)

Basis Date: August 30, 1984

To Be Transitioned?: Yes

Basis:

The BVPS-1 letter dated December 16, 1983, requested an exemption from the requirement of Section III.G.2 for fire compartment 1-CS-1 because of fire barriers (doors, dampers, and floor) that have a fire rating of 1.5 hours (less than three hours).

The potentially affected safe shutdown equipment from a fire in the Cable Spreading Room (1-CS-1) is as follows:

- The cable spreading compartment contains safety related redundant instrument, control, and power cables that are required for attaining safe shutdown.
- Emergency powered redundant supply and exhaust fans for the emergency switchgear and battery rooms.

The exemption for the Cable Spreading Room (1-CS-1) was approved and documented in the NRC SER dated August 30, 1984.

The following conditions were cited in the NRC SER as the bases for the exemption approval relative to the Cable Spreading Room (1-CS-1):

- Combustible loading is light.
- Alternate shutdown capability is provided independent of the fire area.
- Detection and manual fire suppression equipment is available.

Approval of clarifications relative to this exemption is being requested as part of this LAR submittal and transition to NFPA 805 (See Attachment T "Clarification of Prior NRC Approvals").

Evaluation:

Regarding the Cable Spreading Room (1-CS-1), Elevation 725'-6" the NRC SER dated August 30, 1984 states:

An exemption is requested from Section III.G.2 to the extent it requires the separation of adjacent fire areas by complete 3-hour rated barriers.

The cable spreading room is located on the 725' 6" elev. of the service building. The walls and ceiling constitute 3-hour rated barriers. The floor is a 1 1/2-hour rated floor. Ductwork is provided with 3-hour rated dampers except those ducts which penetrate the floor and the west wall which separates the cable spreading room from the normal switchgear room. These ducts are provided with 1 1/2-hour rated dampers. All cables and equipment needed for safe-shutdown will be removed from the normal switchgear room and relocated at the next refueling outage. The cable spreading room doors are 3-hour rated except for the 1 1/2-hour rated door that opens in the east stairtower.

BVPS-1

Licensing Action #: 11.17

Licensing Action: Cable Spreading Room (1-CS-1) - Lack of 3-Hour Fire Barriers (III.G.2 criteria)

The combustible loading in the cable spreading room, if totally consumed, would correspond to an equivalent fire severity of approximately 1-hour and twenty minutes on the ASTM E-119 Standard Time-Temperature Curve.

To approve fire area boundaries of less than a 3-hour rating, we need reasonable assurance that the proposed boundaries will exceed the in-situ fuel load with margin. In the cable spreading room, the margin proposed is not considered adequate for the general case. However, in the three specific cases cited, we have evaluated the location and configuration of the 1 1/2-hour rated components and consider them acceptable for the following reasons:

- *1 1/2-hour rated stairtower door - Section C.5.a of our guidelines recommends the use of 2-hour rated concrete stairtower enclosures with self-closing Class B (1 1/2-hour) fire doors. The licensee has provided this level of protection. We, therefore, find the 1 1/2-hour rated fire doors acceptable.*
- *1 1/2-hour rated floor and 1 1/2-hour rated fire dampers in the floor. In the event of a fire in the cable spreading room, the heat from the fire would rise and challenge the ceiling and upper wall areas of the cable spreading room. Only after a considerable time period will the heat transfer down through the floor become significant. With the added benefit of the installed smoke detection system, automatic suppression system and response of the fire brigade, there is reasonable assurance that the 1 1/2-hour rated floor and dampers will remain functional.*
- *1 1/2-hour rated dampers penetrating the wall to the normal switchgear room. The licensee has committed to remove all cables and equipment from the normal switchgear room needed for safe-shutdown. Therefore, if a fire propagated to this area, by the failure of the 1 1/2-hour rated damper, no safe-shutdown equipment would be damaged. The walls of the normal switchgear room that separate it from the remainder of the plant are 3-hour rated barriers. Therefore, a cable spreading room fire which spreads to the switchgear room by failure of the 1 1/2-hour rated dampers will not spread beyond the normal switchgear room.*

Based on our evaluation, we conclude that the protection provided for the cable spreading room provides a level of fire protection equivalent to the technical requirements of Section III.G. The exemption should, therefore, be granted.

Validation/Conclusions:

Conformance with the Appendix R exemption bases reached with the NRC regarding Cable Spreading Room (1-CS-1), Elevation 725'-6"; lack of three-hour barriers (III.G.2 criteria), as stated in the NRC SER dated August 30, 1984, was verified. Automatic detection and CO2 suppression are available to meet the performance-based analysis and are allowed by NFPA 805. The exemption for lack of 3-hour Fire Barriers (III.G.2 criteria) for the Cable Spreading Room (1-CS-1) is being transitioned to the new licensing basis per NFPA 805.

BVPS-1

Licensing Action #: 11.17

Licensing Action: Cable Spreading Room (1-CS-1) - Lack of 3-Hour Fire Barriers (III.G.2 criteria)

Disposition:

Licensing Action acceptable for transition

References:

- 1OST-33.16, Revision 15, "Smoke Detector Instrumentation Test."
- 1OST-33.16B, Revision 2, "Early Warning Smoke Detection Instrumentation Test Diesel Generator Rooms Cable Vaults and Cable Mezzanine."
- 1OST-33.2A, Revision 5, "Fire Protection System Monthly Hose Stations Test."
- 83-01-05, "SER for Appendix R to 10 CFR Part 50, Items III.G and III.L - BVPS-1."
- 83-12-16, "Appendix R - Additional Exemption Requests Based on Generic Letter 83-33."
- 84-08-30, "BVPS-1 Request for Additional Informations from Some Requirements of Appendix R to 10 CFR Part 50."
- 8700-B-084, Revision 12, Addendum 1, "Fire Hazards Analysis."

Associations:

Ch.4 - Compartment: 1-CS-1
Ch.4 - Compartment: 1-CR-2
Ch.4 - Compartment: 1-CR-3
Ch.4 - Compartment: 1-CR-4
Ch.4 - Compartment: 1-ES-1
Ch.4 - Compartment: 1-ES-2
Ch.4 - Compartment: 1-MG-1
Fire Protection - Fire Compartment: 1-CR-2 / Form: Detection
Fire Protection - Fire Compartment: 1-CR-2 / Form: Passive Protection
Fire Protection - Fire Compartment: 1-CR-3 / Form: Detection
Fire Protection - Fire Compartment: 1-CR-3 / Form: Passive Protection
Fire Protection - Fire Compartment: 1-CR-4 / Form: Detection
Fire Protection - Fire Compartment: 1-CS-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 1-CR-2 / Form: Water-Based Suppression
Fire Protection - Fire Compartment: 1-ES-1 / Form: Detection
Fire Protection - Fire Compartment: 1-ES-2 / Form: Detection
Fire Protection - Fire Compartment: 1-MG-1 / Form: Detection
Fire Protection - Fire Compartment: 1-MG-1 / Form: Passive Protection

BVPS-1

Licensing Action #: 11.18

Licensing Action: Fire Doors - Lack of 3-Hour Fire Barriers (III.G.2 criteria)

Basis Date: December 4, 1986

To Be Transitioned?: Yes

Basis:

The BVPS-1 letter dated January 14, 1985, requested an exemption from the requirement of Section III.G.2 for various fire doors because the doors in question do not have UL labels and/or modifications have been made to the rated fire doors. In addition, various discrepancies to the doors were identified, that includes security modifications, unlabeled frames, and conduit/pipe penetrations through the frames. Supplemental submittals, dated October 16, 1985, and October 28, 1986, were provided to support the justification for the subject configurations. The NRC letter dated December 4, 1986, stated that Section III.G.2 applies to hot shutdown components in the same fire compartment, not fire compartment boundaries. Per the NRC SER dated December 4, 1986, guidelines for fire compartment boundaries are set forth in Appendix A to BTP 9.5-1, Section D.1.(j). Therefore, the staff reviewed the fire door submittal as a deviation from conformance to Appendix A of BTP 9.5-1 and found the deviation acceptable.

BTP 9.5.1, Section C.5.a.(5), requires, in part, that, "Door openings in fire barriers should be protected with equivalently rated doors, frames, and hardware that have been tested and approved by a nationally recognized laboratory."

The deviation for the subject fire doors was approved and documented in the NRC SER dated December 4, 1986 (TAC 56566).

The following conditions were cited in the NRC SER as the bases for the exemption approval relative to the fire doors:

- The equivalent fire severity in each of the affected compartments is less than 120 minutes and generally less than 60 minutes.
- Except for the doors located in the intake structure, the corrective modifications provide an adequate margin of fire resistance compared to the combustible loading.
- For the doors in the intake structure, the corrective modifications are not possible due to functional restrictions (air pipes cannot be sealed internally). However, the door assemblies in conjunction with the resistance of the 3-hour fire rated masonry walls, provide an adequate margin of fire resistance between redundant trains of safe shutdown equipment. The solid wall between 1-IS-2 and 1-IS-3 would prevent a fire from spreading to 1-IS-3 or 1-IS-4. Auxiliary river water pumps located in the separate auxiliary intake structure are available as backup systems.

Evaluation:

The NRC SER dated December 4, 1986, states that, "We found the deviation of fire door design from our guidelines acceptable. Details may be found in the safety evaluation, Enclosure 2."

The SER also states:

1. *Fire doors for twenty-four fire areas.*

BVPS-1

Licensing Action #: 11.18

Licensing Action: Fire Doors - Lack of 3-Hour Fire Barriers (III.G.2 criteria)

Exemptions were requested from the technical requirements of Section III.G.2.a to the extent that the fire door assemblies in the 3-hour fire-rated barriers that separate these areas are not UL-listed for 3 hours.

Section III.G.2 of Appendix R to 10 CFR 50 contains requirements for the protection of hot shutdown components located within the same fire area. It does not apply to fire area boundaries. Acceptable guidelines for establishment of fire area boundaries are set forth in Section D.1.(j) of Appendix A to BTP APCSB 9.5-1. Therefore, the staff has reviewed the fire doors discussed in the Licensee's request for conformance with Appendix A guidelines.

Enclosure 2 states:

2.3 Evaluation

The guidelines of Section D.1.(j) of Appendix A to BTP APCSB 9.5-1 are not met because a fire door is not labeled (1 location) or because fire door frames are not labeled (10 locations), fire doors have been modified for security purposes (18 locations), or fire doors have been penetrated by pipe or conduit (8 locations). Several locations contain multiple deviations.

However, the equivalent fire severity in each of the affected fire areas is less than 120 minutes and generally less than 60 minutes.

The staff has reviewed the licensee's evaluation and concurs with the licensee's assessment that the existing fire door assemblies with the corrective modifications provide an adequate margin of fire resistance compared to the combustible loading in the affected fire areas, with one exception.

The exception to the fire resistance discussed above is the doors located in the intake structure. Due to the functional restrictions, the corrective modifications required to upgrade these doors are not possible. However, these door assemblies, in conjunction with the resistance of the 3-hour fire-rated masonry walls, provide an adequate margin of fire resistance between redundant trains of safe shutdown systems. The staff therefore concludes that the intake structure door assemblies should be acceptable.

2.4 Conclusion

Based on the above evaluation, the staff concludes that the aforementioned fire door assemblies, combined with the licensee's modifications, provide an acceptable level of protection in accordance with the guidelines of Section D.1(j) of Appendix A to BTP APCSB 9.5-1.

Validation/Conclusions:

Conformance with the Appendix R exemption bases reached with the NRC regarding Fire Doors (lack of 3-hour fire barriers [III.G.2 criteria]), as stated in the NRC SER dated December 4, 1986, was verified. The exemption for the subject fire doors is being transitioned to the new licensing basis under NFPA 805.

BVPS-1

Licensing Action #: 11.18

Licensing Action: Fire Doors - Lack of 3-Hour Fire Barriers (III.G.2 criteria)

Disposition:

Licensing Action acceptable for transition

References:

- 10080-DEC-3560, Revision 1, "Fire PRA Task 1 - Plant Boundary Definition and Partitioning."
- 85-01-14, "Appendix R - Additional Exemption Requests."
- 86-12-04, "BVPS-1 - Transmittal of Fire Protection Technical Exemption (TAC 56566)."
- 8700-01.062-0048, Revision A, "Beaver Valley Unit 1 NFPA 805 Safe Shutdown Analysis Interim Transition Report."
- 8700-B-084, Revision 12, "Fire Hazards Analysis."
- 8700-B-084, Revision 12, Addendum 1, "Fire Hazards Analysis."
- 8700-RA-0006A, Sheet 1, Revision 28, "Door Schedule - Sheet 1."
- CA 971034-03, Revision 0, "Corrective Action: Fire Protection Engineer Review of Exemption Requests."
- TER-12224, Revision 0, "Evaluate Change of Manufacturer for Fire Door Assembly S13-4."
- TER-12661, Revision 0, "Appendix R Report Update for CR971034."
- UFSAR, Revision 26, "BVPS-1 Updated Final Safety Analysis Report."

Associations:

Ch.4 - Compartment: 1-CR-2
Ch.4 - Compartment: 1-CR-4
Ch.4 - Compartment: 1-CS-1
Ch.4 - Compartment: 1-CV-1
Ch.4 - Compartment: 1-CV-2
Ch.4 - Compartment: 1-ES-1
Ch.4 - Compartment: 1-ES-2
Ch.4 - Compartment: 1-FB-1
Ch.4 - Compartment: 1-MG-1
Ch.4 - Compartment: 1-MS-1
Ch.4 - Compartment: 1-NS-1
Ch.4 - Compartment: 1-PA-1A
Ch.4 - Compartment: 1-PA-1C
Ch.4 - Compartment: 1-PA-1E
Ch.4 - Compartment: 1-PA-1G
Ch.4 - Compartment: 1-PA-1GA
Ch.4 - Compartment: 1-PA-1GB
Ch.4 - Compartment: 1-PA-1GC

BVPS-1

Licensing Action #: 11.18

Licensing Action: Fire Doors - Lack of 3-Hour Fire Barriers (III.G.2 criteria)

Ch.4 - Compartment: 1-TB-1
Ch.4 - Compartment: 3-CR-1
Ch.4 - Compartment: 3-IS-1
Ch.4 - Compartment: 3-IS-2
Ch.4 - Compartment: 3-IS-3
Ch.4 - Compartment: 3-IS-4
Fire Protection - Fire Compartment: 1-CR-2 / Form: Passive Protection
Fire Protection - Fire Compartment: 1-CR-4 / Form: Passive Protection
Fire Protection - Fire Compartment: 1-CS-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 1-CV-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 1-CV-2 / Form: Passive Protection
Fire Protection - Fire Compartment: 1-ES-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 1-ES-2 / Form: Passive Protection
Fire Protection - Fire Compartment: 1-FB-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 1-MG-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 1-MS-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 1-NS-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 1-PA-1A / Form: Passive Protection
Fire Protection - Fire Compartment: 1-PA-1C / Form: Passive Protection
Fire Protection - Fire Compartment: 1-PA-1E / Form: Passive Protection
Fire Protection - Fire Compartment: 1-PA-1G / Form: Passive Protection
Fire Protection - Fire Compartment: 1-PT-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 1-SGPD-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 1-TB-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 3-CR-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 3-IS-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 3-IS-4 / Form: Passive Protection
Fire Protection - Fire Compartment: 3-IS-6 / Form: Passive Protection

BVPS-1

Licensing Action #: 11.19

Licensing Action: Fire Dampers - Lack of 3-Hour Fire Barriers (III.G.2 criteria)

Basis Date: June 29, 1990

To Be Transitioned?: No

Basis:

The BVPS-1 letter dated January 14, 1985, requested an exemption from the requirement of Section III.G.2 for 3-hour rated barriers because various unlabeled, field-fabricated, fire dampers [SMACNA] (Sheet Metal and Air Conditioning Contractor's National Association specification dampers) are rated for 1.5 hours. The NRC SER dated December 4, 1986, (TAC 56566) stated that Appendix R paragraph III.G.2(a) does not apply to fire compartment boundaries and evaluated the fire dampers as a deviation to Section D.1.(j) of Appendix A to BTP APCSB 9.5-1. Initially, the NRC found the deviation unacceptable because of the lack of testing to demonstrate the effect of the design differences on damper performance.

BTP 9.5.1, Section C.5.a(4) requires, in part, that, "Penetration openings for ventilation systems should be protected by fire dampers having a rating equivalent to that required of the barrier."

By letter dated December 19, 1989, BVPS-1 committed to perform the following actions:

- For fire area with combustible loading exceeding one hour, the fire dampers would be replaced with rated dampers. A total of 17 fire dampers were identified. These were subsequently replaced with 3-hour rated dampers by DCP 1482, as described in Section 6.16 of the Appendix R Report. (BVPS-1 letter dated July 22, 1991, Unqualified Fire Dampers (TAC No. 66319), provided notification to the NRC of the completion of fire damper replacements).
- For fire areas with combustible loading less than one hour, an analysis was performed which demonstrated the acceptability of the existing sheet metal ductwork (taking no credit for the dampers). These evaluations were documented in the December 19, 1989, letter to NRC as EV-1 through EV-8, which summarized the results of design analyses 8700-DMC-2341 and 2345.

Based on the December 19, 1989, submittal and the commitments identified, the staff reviewed the fire dampers as deviations from conformance to Appendix A of BTP 9.5-1, and ultimately found the deviations acceptable (NRC letter dated June 29, 1990 (TAC 66319)).

The BVPS-1 letter dated July 22, 1991, (TAC No. 66319) provided notification to the NRC of the completion of the fire damper replacement effort identified previously in the BVPS-1 letter dated December 19, 1989.

The following conditions were cited as the bases for the deviation relative to the unqualified fire dampers:

- Fire loading in the areas with the unqualified dampers is less than one hour. Based on NFPA 90A, Section 3-3.1.1, no fire damper is required in ductwork passing through a 1-hour fire rated wall. Therefore, for fire areas with less than 1-hour fire load, no damper is required.

BVPS-1

Licensing Action #: 11.19

Licensing Action: Fire Dampers - Lack of 3-Hour Fire Barriers (III.G.2 criteria)

- Sheet metal ductwork .022 inch (24 gauge) has been successfully tested to withstand 1700F for a duration of one hour.
- Analysis shows that the estimated temperature on the opposite side of the ductwork due to the fire is less than the temperature that will cause collapse of the ductwork.

Evaluation:

The NRC letter dated June 29, 1990, states:

> *DLC letter dated December 19, 1989, reaffirmed the commitment to replace during the next BVPS-1 refueling outage, unqualified fire dampers in those areas with combustible loadings exceeding 1-hour, and to maintain compensatory fire watches until then. That letter also presented engineering evaluations for the remaining unqualified fire dampers. DLC judged the results of the engineering evaluations to be satisfactory and concluded that those remaining fire dampers need not be replaced and that the compensatory measures were no longer needed.*
>
> *A cursory examination of the DLC methodology shows it to be similar to that previously approved by the staff for the Susquehanna facility. Based on this similarity, the staff has no objection to DLC's corrective actions and schedule.*

Validation/Conclusions:

Engineering evaluations (FPPCE 12-024) have concluded that the fire barrier duct penetrations between fire compartments with a fire duration of less than 1-hour are acceptable and adequate for the hazard. The fire dampers are not required to maintain separation between the fire compartments; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- 2701.620-000-045, Revision A, "Fact-Finding Report on Air Duct Penetration through One Hour Fire Resistive Wall Assembly."
- 85-01-14, "Appendix R - Additional Exemption Requests."
- 86-12-04, "BVPS-1 - Transmittal of Fire Protection Technical Exemption (TAC 56566)."
- 8700-B-084, Revision 12, "Fire Hazards Analysis."
- 8700-DMC-2341, Revision 1, "Basis for Exemption of Non-Qualified Fire Damper VS-D-263 and VS-D-266."
- 8700-DMC-2345, Revision 0, "Determination of Area Temperature as a Result of a Fire in Auxiliary Building Elevation 768'-7"."
- 89-12-19, "BVPS-1 (TAC 56566) - Fire Damper Engineering Evaluations."

BVPS-1

Licensing Action #: 11.19

Licensing Action: Fire Dampers - Lack of 3-Hour Fire Barriers (III.G.2 criteria)

- 90-06-29, "BVPS-1 - Unqualified Fire Damper Engineering Evaluation (TAC 66319)."
- 91-07-22, "Beaver Valley Power Station Unit 1 Unqualified Fire Dampers."
- FPPCE 12-024, Revision 0, "G.L. 86-10 Evaluations for Unqualified Fire Dampers."
- NFPA 90A, Revision 1989, "Standard for the Installation of Air-Conditioning and Ventilating Systems."
- UFPARR, Revision 30, "Updated Fire Protection Appendix R Review."

Associations:

None

BVPS-1

Licensing Action #: 11.20

Licensing Action: Primary Auxiliary Building/Charging Pump Cubicles (1-PA-1G and 1-PA-1GA, 1-PA-1GB, and 1PA-1GC) - Lack of 20 foot Separation (III.G.2 criteria)

Basis Date: December 4, 1986

To Be Transitioned?: No

Basis:

The BVPS-1 letter dated January 14, 1985, submitted the exemption request that modifies previous submittals for the Primary Auxiliary Building (713'-6", 1-PA-1G) identified in Licensing Action Nos. 3, 6, and 7. This submittal redefined the 713'-6", 1-PA-1G as a single fire compartment due to interconnecting ventilation and identified separation issues with the charging pumps. Supplemental submittals, dated October 16, 1985, and October 28, 1986, were provided to support the justification for the subject configurations.

III.G.2.b requires separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire compartment.

Attachment 3 of the BVPS-1 submittal dated January 14, 1985, identified that the 713'-6", 1-PA-1G was redefined as a single fire compartment due to the ventilation system and open ventilation chase traversing through the building. Charging pump cubicles cannot be totally sealed off due to the need for ventilation openings. The 713'-6", 1-PA-1G compartment is not completely protected by fire detection or an automatic suppression system.

The potentially affected safe shutdown equipment from a fire in the Primary Auxiliary Building (713'-6", 1-PA-1G) is 1-PA-1GA, 1-PA-1GB, and 1-PA-1GC (High Head Safety Injection - Charging Pumps).

The exemption for the Primary Auxiliary Building was approved and documented in the NRC SER dated December 4, 1986 (TAC 56566).

The following conditions were cited in the NRC SER dated December 4, 1986, as the basis for approval of the exemption request relative to fire compartment (713'-6", 1-PA-1G):

- A fire of significant duration or magnitude is not expected to occur because combustible loading in the pump cubicles and surrounding portion of the (1-PA-1G) is moderate to light.
- Intervening combustibles between the redundant charging pumps are only in the corridor outside the charging pump cubicles and do not extend into the ventilation openings; therefore, they do not provide a complete fire propagation path.
- A fire in the charging pump cubicles would be detected and annunciate in the Control Room.
- A fire on the 722' elevation outside the charging pump cubicles would not affect pump B because it is separated from other portions of this level by 3-hour barriers on that elevation and lack of fire propagation path via intervening combustibles.

BVPS-1

Licensing Action #: 11.20

Licensing Action: Primary Auxiliary Building/Charging Pump Cubicles (1-PA-1G and 1-PA-1GA, 1-PA-1GB, and 1PA-1GC) - Lack of 20 foot Separation (III.G.2 criteria)

Evaluation:

The NRC SER dated December 4, 1986, states:

We have completed our review of your request. Enclosure 1 is the document granting all three exemptions you requested, as well as approving one deviation from our guidelines. Exemptions are granted for:

(1) charging pump cubicles separation and fire suppression,

The SER further states:

Based on the review of the licensee's analysis, the staff concludes that:

- *The separation of redundant trains of charging pumps by more than 20 feet of horizontal distance free of intervening combustibles in the adjacent corridor and the installation of automatic fire suppression systems would not significantly increase the level of fire protection in the charging pump cubicles. Therefore, the requested exemption can be granted.*

Enclosure 2 of the SER states:

4.0 Charging Pump Cubicle A (Fire Zone PA-1F). Charging Pump Cubicle B (Fire Zone PA-1G), and Charging Pump Cubicle C (Fire Zone PA-1H)

4.1 Exemption Requested

Exemptions were requested from Section III.G.2.b to the extent that it requires separation of cables and equipment and associated nonsafety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards, and to the extent that it requires an automatic fire suppression system to be installed throughout the fire area.

The SER also states:

4.3 Evaluation

The fire protection in the charging pump cubicles does not comply with the technical requirements of Section III.G.2.b of Appendix R because redundant trains of cables and equipment and associated nonsafety circuits are not separated by 20 feet of horizontal distance free of intervening combustibles, and an automatic fire suppression system has not been installed.

The primary concern was that even though redundant charging pumps are separated by a horizontal distance of more than 20 feet, the presence of intervening combustibles in the corridor and the absence of automatic fire suppression systems in or around the pump cubicles may result in a loss of safe shutdown capability.

A fire of significant duration or magnitude is not expected to occur on elevation 722 feet, 6 inches because the combustible loading in the pump cubicles and the surrounding portions of the PAB is moderate to light. In addition, the intervening

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Licensing Action #: 11.20

Licensing Action: Primary Auxiliary Building/Charging Pump Cubicles (1-PA-1G and 1-PA-1GA, 1-PA-1GB, and 1PA-1GC) - Lack of 20 foot Separation (III.G.2 criteria)

combustibles between redundant pumps are only in the corridor outside of the pump cubicles and do not extend into the ventilation openings. Therefore, they do not provide a complete fire propagation path between redundant pumps.

Should a fire occur in a pump cubicle, it is expected to be detected by the detectors which annunciate in the control room. The operators will dispatch the plant fire brigade to respond and extinguish the fire.

If the detectors do not operate, or if a fire should occur outside of a pump cubicle on the 722-foot, 6-inch level, it is expected that pump B would remain free of fire damage because it is separated from other portions of this level by barriers with at least a 3-hour fire resistance rating and because of the lack of a fire propagation path via intervening combustibles between pumps.

Should a fire occur on the 735-foot, 6-inch level, it is expected that at least one of the pumps would remain free of fire damage because pumps A and C are separated from this portion of the PAB by fire barriers with at least a 1-hour fire resistance rating. In addition, the fire is unlikely to propagate downward through the pump B cubicle personnel hatch. Pump B power cables are enclosed in 1-hour fire wrap.

Based on this evaluation, the staff concludes that with the installed fire protection features and the licensee-committed modifications, there is reasonable assurance that a fire originating in the PAB building will not prevent the plant from safely shutting down.

Validation/Conclusions:

The Fire Compartment was evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

Disposition:

Not being transmitted

References:

- 85-01-14, "Appendix R - Additional Exemption Requests."
- 86-12-04, "BVPS-1 - Transmittal of Fire Protection Technical Exemption (TAC 56566)."
- 8700-B-084, Revision 11, Addendum 1, "Fire Hazards Analysis."

Associations:

None

BVPS-1

Licensing Action #: 11.21

Licensing Action: Control Room (1-CR-1/1-CR-2) - Lack of 20 foot Separation (III.G.2 criteria)

Basis Date: December 4, 1986

To Be Transitioned?: No

Basis:

The BVPS-1 letter dated January 14, 1985, submitted the exemption request that modifies previous submittals for Control Room (1-CR-1) and Control Room HVAC Equipment Room (1-CR-2) described in Licensing Action Nos. 11.01 and 11.08. This submittal redefined 1-CR-1 and 1-CR-2 as a single fire compartment due to interconnecting ventilation system and identified redundant emergency diesel generator circuits within the fire compartment.

Supplemental submittals, dated October 16, 1985, and October 28, 1986, were provided to support the justification for the subject configuration.

III.G.2.b requires separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire compartment.

Attachment 4 of the BVPS-1 submittal dated January 14, 1985, identified that the Control Room (1-CR-1) and Control Room HVAC Equipment Room (1-CR-2) were redefined as a single fire compartment (1-CR-1/1-CR-2) due to the interconnecting ventilation system. In addition, the control room compartment is not completely protected by an automatic suppression system.

The potentially affected safe shutdown equipment from a fire in the Control Room (1-CR-1) and Control Room HVAC Equipment Room (1-CR-2) includes:

- Redundant safe shutdown circuits associated with the emergency diesel generators.
- HVAC equipment for the Control Room.

The exemption for fire compartment 1-CR-1/1-CR-2 was approved and documented in the NRC SER dated December 4, 1986 (TAC 56566).

The following conditions were cited in the NRC SER dated December 4, 1986, as the basis for approval of the exemption request relative to fire compartment 1-CR-1/1-CR-2:

- The combined vertical and horizontal distance between the redundant systems is more than 65 feet.
- The intervening combustibles in the control room are located above the level of train A control circuits, but not in the ducts or duct shaft.
- A fire would have to propagate up the duct shaft, across the ceiling of the control room, and down to the benchboard where the train A circuits are located.
- The combustible loading is light. There are no combustibles in the ventilation shaft.
- Both rooms are protected by fire detectors.
- The control room is constantly attended.

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Licensing Action #: 11.21

Licensing Action: Control Room (1-CR-1/1-CR-2) - Lack of 20 foot Separation (III.G.2 criteria)

Evaluation:

The NRC SER dated December 4, 1986, states:

We have completed our review of your request. Enclosure 1 is the document granting all three exemptions you requested, as well as approving one deviation from our guidelines. Exemptions are granted for:

(1) charging pump cubicles separation and fire suppression,

Enclosure 1 states:

Based on the review of the licensee's analysis, the staff concludes that:

- *The separation of redundant trains of charging pumps by more than 20 feet of horizontal distance free of intervening combustibles in the adjacent corridor and the installation of automatic fire suppression systems would not significantly increase the level of fire protection in the charging pump cubicles. Therefore, the requested exemption can be granted.*

Enclosure 2 states:

5.0 Control Room (Fire Zones CR-1 and CR-2)

5.1 Exemption Requested

An exemption was requested from Section III.G.2.b to the extent that it requires separation of cables and equipment and associated nonsafety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards, and to the extent that it requires an automatic fire suppression system to be installed throughout the fire area.

Enclosure 2 continues on to state:

5.3 Evaluation

The technical requirements of Section III.G.2.b of Appendix R are not met in these zones because redundant emergency diesel generator circuits are not separated by a horizontal distance of more than 20 feet free of intervening combustibles or fire hazards, and because an automatic fire suppression system is not installed throughout the fire zones.

The staff's principal concern was that the presence of intervening combustibles between train A emergency diesel generator control circuits and the train B emergency diesel generator power cables, and the lack of fire suppression systems throughout the control room complex may result in a loss of redundant safe shutdown capability.

However, the combined vertical and horizontal distance between the redundant systems is more than 65 feet. The intervening combustibles in the control room are located above the level of train A control circuits, but not in the ducts or duct shaft. Therefore, it is unlikely that a fire would spread between redundant circuits.

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Licensing Action #: 11.21

Licensing Action: Control Room (1-CR-1/1-CR-2) - Lack of 20 foot Separation (III.G.2 criteria)

To spread via the intervening combustibles from the train B power cables to the room below, a fire would have to propagate up the duct shaft, across the ceiling of the control room, and down to the bench board where the train A circuits are located. This mode of fire spread is unlikely because the combustible loading in these two rooms is light, both are protected by fire detectors throughout, there are no combustibles in the shaft, and the control room is constantly attended.

If a fire were to occur in one of these rooms, the staff has reasonable assurance that it would be detected by the fire detectors or the operators. Detector actuation would be annunciated in the control room and the operators would dispatch the plant fire brigade to extinguish the fire.

5.4 Conclusion

Based on the above evaluation, the staff concludes that the above-mentioned fire protection features provide a level of fire protection equivalent to the technical requirements of Section III.G.2.b of Appendix R. Therefore, the exemption request for the aforementioned diesel generator circuits and a fire suppression system in the control room complex should be granted.

Based on the above evaluation, the staff concludes that the above-mentioned fire protection features provide a level of fire protection equivalent to the technical requirements of Section III.G.2.b of Appendix R. Therefore, the exemption request for the aforementioned diesel generator circuits and a fire suppression system in the control room complex should be granted.

Validation/Conclusions:

The Fire Compartment was evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- 1/2-ADM-1900, Revision 24, "Fire Protection Program."
- 10080-DEC-3560, Revision 0, Addendum 1, "Fire PRA Task 1 - Plant Boundary Definition and Partitioning."
- 1OM-56C.4.B, Revision 31, "Shift Manager Procedure."
- 1OST-33.16, Revision 14, "Smoke Detector Instrumentation Test."
- 85-01-14, "Appendix R - Additional Exemption Requests."
- 85-10-31, "BVPS-1 Special Report."
- 86-12-04, "BVPS-1 - Transmittal of Fire Protection Technical Exemption (TAC 56566)."

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Licensing Action #: 11.21

Licensing Action: Control Room (1-CR-1/1-CR-2) - Lack of 20 foot Separation (III.G.2 criteria)

- 8700-RE-0027A, Revision 40, "Arrangement - Control and Computer Rooms."
- 8700-RE-0047A, Revision 49, Addendum 1, "Conduit Plan & Details Control Room."

Associations:

None

BVPS-1

Licensing Action #: 11.22

Licensing Action: Main Steam Valve Room (1-MS-1) - Lack of 3-Hour Fire Barriers (III.G.2 criteria)

Basis Date: December 4, 1986

To Be Transitioned?: No

Basis:

The BVPS-1 letter dated January 14, 1985, submitted the exemption request for the Main Steam Valve Room (1-MS-1). Supplemental submittals, dated October 16, 1985, and October 28, 1986, were provided to support the justification for the subject configuration.

The steam generator atmospheric dump valves (PCV-MS101A, B, and C), main steam isolation valves (TV-MS101A, B, and C), steam supply trip valves for the auxiliary feedwater (AFW) pump, MOV-MS105 and TV-MS105A and B, and the residual heat release valve (HCV-MS104) are all located in this fire compartment and are used for safe shutdown. The residual heat release valve is used for control of decay heat release in conjunction with the atmospheric steam dump valves.

III.G.2.b requires separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire compartment.

Attachment 5 of the BVPS-1 submittal dated January 14, 1985, identified that the Main Steam Valve Room (1-MS-1) required an exemption from III.G.2 criteria of Appendix R because redundant trains of safe shutdown equipment and circuits are located in this fire compartment (1-MS-1). In addition, the Main Steam Valve Room is not protected by fire detection or an automatic suppression system.

The potentially affected safe shutdown equipment from a fire in the Main Steam Valve Room (1-MS-1) is the redundant safe shutdown circuits associated with decay heat removal capability. Redundant equipment including atmospheric dump valves, steam supply trip valves for the terry turbine, and residual heat release valve are located in this fire compartment.

The exemption request for Main Steam Valve Room (1-MS-1) was approved and documented in the NRC SER dated December 4, 1986 (TAC 56566).

The following conditions were cited in the NRC SER dated December 4, 1986, as the basis for approval of the exemption request relative to fire compartment 1-MS-1:

- The combustible loading is less than 30 minutes.
- Redundant valves are separated by at least 5 feet.
- The main steam safety valves do not require power or compressed air to operate, and should not be affected due to their size and low combustible loading.
- MOV-MS105 and the steam supply trip valves should fail to the safe (open) position, and the motor driven AFW pumps are also available.

BVPS-1

Licensing Action #: 11.22

Licensing Action: Main Steam Valve Room (1-MS-1) - Lack of 3-Hour Fire Barriers (III.G.2 criteria)

- Fire damage to the main steam isolation valves can be overcome from outside the fire area by manually initiating a loss of air condition, which will cause the valves to close safe.

Evaluation:

The NRC SER dated December 4, 1986, states:

We have completed our review of your request. Enclosure 1 is the document granting all three exemptions you requested, as well as approving one deviation from our guidelines. Exemptions are granted for:

(3) main steam valve room equipment separation.

Enclosure 1 states:

Based on the review of the licensee's analysis, the staff concludes that:

- *The separation of redundant trains of charging pumps by more than 20 feet of horizontal distance free of intervening combustibles in the adjacent corridor and the installation of automatic fire suppression systems would not significantly increase the level of fire protection in the charging pump cubicles. Therefore, the requested exemption can be granted.*

Regarding the Main Steam Valve Room (Fire Area MS-1), enclosure 2 states:

6.1 Exemption Requested

An exemption was requested from Section III.G.2.a to the extent that it requires separation of cables and equipment and associated nonsafety circuits of redundant trains by a fire barrier having a 3-hour rating.

It continues on to state:

6.3 Evaluation

The technical requirements of Section III.G.2.a of Appendix R are not met in Fire Area MS-1 because redundant trains of equipment are not separated by a fire barrier having a 3-hour rating.

The staff was concerned that the lack of 3-hour fire rated barriers between redundant valves in this fire area may result in a loss of safe shutdown capability.

The valves in this room perform one of two safe shutdown functions:

- *Isolation of the main steam system (main steam isolation valves)*
- *Control of decay heat release (atmospheric dump valves, steam supply trip valves, RHR valves, and the code safety valves).*

The combustible loading in Fire Area MS-1 is low (less than 30 minutes). Redundant valves are separated by at least 5 feet. If a fire were to occur, it is not expected to result in a loss of safe shutdown capability for the following reasons:

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Licensing Action #: 11.22

Licensing Action: Main Steam Valve Room (1-MS-1) - Lack of 3-Hour Fire Barriers (III.G.2 criteria)

- *If the steam generator atmospheric dump valves and the RHR valve fail to open, the main steam safety valves would be available. These valves do not require power or compressed air to operate. Because of their size and construction and the combustible load in the room, they are not expected to be damaged by a fire.*
- *Should fire damage valve MOV-MS105 and the steam supply trip valves, these valves should fail to the safe open position and continue to supply steam to the turbine-driven AFW pump. In addition, two motor-driven AFW pumps are available.*
- *Fire damage to electrical controls for the main steam isolation valves can be overcome from outside of this fire area by manually initiating the 'loss of air' condition, which will cause these valves to close safe (the same as the electrical controls).*

Therefore, the staff has reasonable assurance that a fire originating in the Fire Area MS-1 will not prevent the plant from safely shutting down.

6.4 Conclusion

Based on the above evaluation, the staff concludes that the above-mentioned fire protection features provide a level of fire protection equivalent to the technical requirements of Section III.G.2.a of Appendix R. Therefore, the exemption request for Fire Area MS-1 should be granted.

Validation/Conclusions:

The Fire Compartment was evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- 85-01-14, "Appendix R - Additional Exemption Requests."
- 86-12-04, "BVPS-1 - Transmittal of Fire Protection Technical Exemption (TAC 56566)."
- 8700-B-084, Revision 11, Addendum 1, "Fire Hazards Analysis."

Associations:

None

BVPS-1

Licensing Action #: 11.23

Licensing Action: Control Room (1-CR-1) - 72-Hour Cold Shutdown Requirement (III.L criteria)

Basis Date: March 14, 1983

To Be Transitioned?: No

Basis:

Section III.L specifies, in part, that the plant can achieve cold shutdown conditions within 72 hours. 1-CR-1 does not comply with Section III.L because alternate shutdown procedure using the water solid steam generator cooldown method is capable of achieving cold shutdown in approximately 127 hours rather than 72 hours.

The original exemption request for the Control Room was contained in Chapter 11 of the Appendix R Review Report transmitted by the BVPS-1 letter dated June 30, 1982. The safe shutdown methodology in the original Appendix R review did not provide for the use of RHR to achieve cold shutdown. As identified in a letter dated October 28, 1982, it was BVPS's position that Section III.L requiring cold shutdown within 72 hours is not applicable to BVPS-1.

Additional clarifications were provided to justify the alternate safe shutdown methodology for using the water solid steam generator cooldown method, which is capable of achieving cold shutdown in approximately 127 hours rather than 72 hours.

In the letter of December 10, 1982, responses were provided to the NRC questions. In response to question 4, regarding the time required to achieve cold shutdown, WCAP-15962, "Beaver Valley Unit One Natural Circulation Cooldown Analysis for Appendix R Safe Shutdown" was attached, which included a calculation estimating that it would take approximately 127 hours to cool down to 200F. The NRC SER dated January 5, 1983 approved certain exemptions subject to approval of the 72-hour cold shutdown exemption, which was not addressed in that SER. The exemption was granted in the NRC SER dated March 14, 1983.

BVPS-1 submittals that provided the bases for the exemption request were as follows:

- DLC letter dated June 30, 1982, Fire Protection - Response to Appendix R Requirements and Generic Letter 81-12. [The original Fire Protection Appendix R Review was attached to this letter].
- DLC letter dated October 22, 1982, Supplemental Information to Fire Protection - Appendix R Review Report. [Clarification of the design of the Backup Indicating Panel].
- DLC letter dated October 28, 1982, Supplemental Information to Fire Protection Appendix R Review Report - Allowable Time to Achieve Cold Shutdown. [Contention that Section III.L not applicable to BVPS-1 and disagreement that the plant must demonstrate design capability for achieving cold shutdown within 72 hours. The safe shutdown method was further explained including the water solid steam generator].
- DLC letter dated December 10, 1982, Supplemental Information to Fire Protection - Appendix R Review Report. [Summarized November 30, 1982 meeting with NRC.

BVPS-1

Licensing Action #: 11.23

Licensing Action: Control Room (1-CR-1) - 72-Hour Cold Shutdown Requirement (III.L criteria)

Cold shutdown achieved in 127 Hours. Auxiliary feedwater supply would be sufficient. Commitment to install remote source range indication, thermocouples vs. hot leg temperature, local steam pressure indication, and steam generator pressure vs. cold leg temperature].

The following conditions were cited in the NRC SER dated March 14, 1983, as the bases for the exemption approval.

- The licensee has permanently installed and hardwired a backup instrumentation panel for one train of equipment. The new backup indicating panel is electrically isolated from the control room.
- The control room is equipped with area fire detectors.
- Plant technical specifications require continuous occupancy of the control room by the operators. Because the operators constitute a continuous fire watch, manual fire suppression in event of a fire would be prompt and effective.
- Cold shutdown capability can be achieved in 72 hours with use of the RHR, and can be achieved in 127 hours when offsite power and RHR are lost.
- A backup source of makeup water from the river is available for this function to continue indefinitely and the method is used only when offsite power and RHR are lost.

Evaluation:

The NRC SER dated January 5, 1983, states:

By submittals dated June 30, October 22 and October 28, 1982 the Licensee described the means by which safe shutdown can be achieved in the event of fire, and proposed modifications to the Beaver Valley Nuclear Power Station Unit 1 to meet the requirements of Appendix R to 10 CFR 50, Items III.G.3 and III.L. Additional information and clarification was obtained through a meeting held on November 30, 1982 and through telephone conference calls on December 6 and 9, 1982. The licensee subsequently documented his response in Letters dated December 10 and 21, 1982.

The licensee has provided safe shutdown analyses for the fire events and has demonstrated adequate redundancy in the proposed design of the Beaver Valley Nuclear Power Station Unit 1. The proposed modifications resolve previous SER open items on alternate shutdown.

The NRC concluded that:

The goals of reactivity control, inventory control, decay heat removal and pressure control are met except for the deviation from the 72-hour cold-shutdown criterion (127 hours with only onsite power). The staff finds this extended time acceptable. The goals of process monitoring and adequate support systems have been met. Therefore, based on our review we conclude that the proposed Beaver Valley

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Licensing Action #: 11.23

Licensing Action: Control Room (1-CR-1) - 72-Hour Cold Shutdown Requirement (III.L criteria)

> *Nuclear Power Station Unit 1 design meets the requirements of Appendix R to 10 CFR Part 50 Items III.G.3 and III.L with respect to safe shutdown in the event of a fire, in the areas identified in the licensee's proposed modifications. This conclusion is contingent upon the granting of exemption to the 72-hour cold-shutdown requirement. We further conclude that the alternate shutdown open items in our SER dated May 3, 1979 are considered to be resolved.*

In the section titled "Cold Shutdown Capability," the NRC SER dated March 14, 1983, states:

> *The licensee has requested an exemption from the 72-hour requirement to achieve cold shutdown, per Section III.L of Appendix R. The licensee proposed to use the method of solid steam generator to achieve cold shutdown only when the RHR system is not available. It will need 127 hours to achieve cold shutdown. Since this method is used only when offsite power and RHR are lost, we consider the extended cold shutdown time, from 72 hours to 127 hours, acceptable.*
>
> *This exemption should be granted.*

Validation/Conclusions:

Per NFPA 805, Section 1.3.1, the nuclear safety goal is to provide reasonable assurance that a fire during any operational mode and plant configuration will not prevent the plant from achieving and maintaining the fuel in a safe and stable condition. For BVPS-1 it will not be necessary to perform a transition to cold shutdown, as currently required under 10 CFR 50, Appendix R, to be in a safe and stable condition. Therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- 82-06-30, "Fire Protection - Response to Appendix R Requirements and Generic Letter 81-12."
- 82-10-22, "Supplemental Information to Fire Protection - Appendix R Review Report."
- 82-10-28, "Supplemental Information to Fire Protection - Appendix R Review Report: Allowable Time to Achieve Cold Shutdown."
- 82-12-10, "Supplemental Information to Fire Protection - Appendix R Review Report."
- 82-12-21, "Appendix R~ to 10 CFR 50 - Exemptions."
- 83-01-05, "SER for Appendix R to 10 CFR Part 50, Items III.G and III.L - BVPS-1."
- 83-03-14, "BVPS-1 - Request for Exemption from Some Requirements of Appendix R to 10 CFR Part 50."

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Licensing Action #: 11.23

Licensing Action: Control Room (1-CR-1) - 72-Hour Cold Shutdown Requirement (III.L criteria)

Associations:

None

BVPS-1

Licensing Action #: 11.24

Licensing Action: Process Instrumentation - Alternative Shutdown Capability (III.G.3 criteria and III.L criteria)

Basis Date: January 5, 1983

To Be Transitioned?: Yes

Basis:

The BVPS-1 submittal of December 10, 1982, documented an agreement to install portable source range monitoring indication external to the Backup Indicating Panel (BIP) with the ability to hook up within one hour after the time at which source range indication would be available after a reactor trip. The BVPS-1 submittal of December 10, 1982, also documented an agreement to provide local steam pressure indication as an alternative to RCS cold leg temperature. These two deviations were accepted via the NRC SER dated January 5, 1983.

The BVPS-1 letter dated December 10, 1982, Supplemental Information to Fire Protection - Appendix R Review Report, summarized a meeting with the NRC on November 30, 1982, relative to the following topics: cold shutdown achieved in 127 hours; auxiliary feedwater supply; commitment to install remote source range indication; and thermocouples vs. hot leg temperature; local steam pressure indication; and steam generator pressure vs. cold leg temperature.

The BVPS-1 letter dated January 14, 1985, provided clarifications of design changes and documented deviations for process instrumentation. Enclosure IV of the January 14, 1985, submittal documents the deviations from the NRC staff position on the instrumentation necessary to achieve safe shutdown, and it states that the following instrumentation is required per interpretation of Section III.L:

- Pressurizer pressure.
- Pressurizer level.
- Reactor Coolant Hot Leg Temperature or Core Exit Thermocouple.
- Reactor Coolant Cold Leg Temperature.
- Steam generator pressure.
- Wide range SG level.
- Source range flux.
- Level indication for all tanks used.
- Diagnostic Instrumentation for Shutdown Systems.

The instrumentation on the Backup Indicating Panel (BIP) is in accordance with NRC staff guidance on instrumentation necessary to achieve safe shutdown, such as IE Information Notice 84-09, with the following deviations:

- Reactor coolant system pressure vs. pressurizer pressure.
- Steam generator level - narrow range versus wide range.

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Licensing Action #: 11.24

Licensing Action: Process Instrumentation - Alternative Shutdown Capability (III.G.3 criteria and III.L criteria)

- No direct level indication for RWST.
- Ganged instruments (i.e., one indicator for several sensors).
- Local main steam line pressure vs. steam generator pressure.
- Source range monitor is not permanently installed. Portable drawer can be hooked up within one hour after the time at which source range indication would be available after a reactor trip.

Evaluation:

The NRC SER dated January 5, 1983 states:

The alternate shutdown method will be accomplished by procedural means, with actions performed at local shutdown stations or locally at the equipment. The licensee has provided a summary of the functions for which alternate shutdown methods may be needed, and the manual actions required to accomplish each of the identified functions which have been described. Alternate process monitoring capability will be achieved through the installation of a backup indication panel in the east cable vault. The required instrumentation for process variables are available at the backup indication panel. The licensee will install a local steam pressure indicator in the atmospheric dump valve area for manual control of the steam pressure during post-fire shutdown.

The SER also states:

A. Performance Goals:

The performance goals for post-fire safe shutdown for reactivity control, reactor coolant makeup, reactor coolant pressure control and decay heat removal can be met using the existing systems and equipment listed in Section A above, including the new auxiliary feedwater pump.

The control of these functions can be accomplished using the alternate shutdown methods, or the control room, depending on the location of the fire. The licensee's alternate shutdown method relies on procedures and actions at local shutdown stations or equipment.

The process-monitoring capability will be provided on the backup indication panel for reactor hot and cold leg temperatures, pressurizer pressure and level, steam generator level and source range flux monitor. Steam pressure will be monitored locally. Requirements to read other local indications for tank levels and diagnostic pressure, temperature or flow indications of support systems will be included in the shutdown procedures. The installed source range instrument drawer at the backup indication panel (BIP) will have the ability to be hooked up to the source range monitor within one hour.

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Licensing Action #: 11.24

Licensing Action: Process Instrumentation - Alternative Shutdown Capability (III.G.3 criteria and III.L criteria)

The available support systems for post-fire safe shutdown are the redundant diesel generators, vital buses, reactor plant river water system, portable gasoline-powered fans for three areas and power supply for the backup indication panel.

The conclusion states:

The goals of reactivity control, inventory control, decay heat removal and pressure control are met except for the deviation from the 72-hour cold-shutdown criterion (127 hours with only onsite power). The staff finds this extended time acceptable. The goals of process monitoring and adequate support systems have been met. Therefore, based on our review we conclude that the proposed Beaver Valley Nuclear Power Station Unit 1 design meets the requirements of Appendix R to 10 CFR Part 50 Items III.G.3 and III.L with respect to safe shutdown in the event of a fire, in the areas identified in the licensee's proposed modifications. This conclusion is contingent upon the granting of exemption to the 72-hour cold-shutdown requirement. We further conclude that the alternate shutdown open items in our SER dated May 3, 1979 are considered to be resolved.

Validation/Conclusions:

Conformance with the Appendix R exemption bases reached with the NRC regarding process instrumentation - alternative shutdown capability [III.G.3 and III.L criteria], as stated in the NRC SER dated January 5, 1983, was verified. Any required control room instrumentation that is potentially unavailable after a fire has been addressed through variances from deterministic requirements and evaluated in the fire risk evaluations. Cable analysis indicates that the necessary instruments will be available at the backup indicating panel (BIP) when the control room indicators are compromised. Only the exemption related to the source range instrument drawer installation time at the BIP is being transitioned to the new licensing basis per NFPA 805.

Disposition:

Licensing Action acceptable for transition

References:

- 1OM-56C.4.D, Revision 32, "Nuclear Operator #1 Procedure."
- 1OM-56C.4.F-1, Revision 22, "Backup Indicator Panel Activation."
- 82-12-10, "Supplemental Information to Fire Protection - Appendix R Review Report."
- 83-01-05, "SER for Appendix R to 10 CFR Part 50, Items III.G and III.L - BVPS-1."
- 85-01-14, "Appendix R - Additional Exemption Requests."
- 8700-RE-0025DB, Revision 1, "Outline Backup Indicating Panel."
- TER-13882, Revision 0, "Clarification of Setup Time for Backup Indicating Panel Source Range Drawer."

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Licensing Action #: 11.24

Licensing Action: Process Instrumentation - Alternative Shutdown Capability (III.G.3 criteria and III.L criteria)

- UFPARR, Revision 30, "Updated Fire Protection Appendix R Review."
- UFSAR, Revision 26, "BVPS-1 Updated Final Safety Analysis Report."

Associations:

Ch.2 - NEI Section: 3.1.2.5
Ch.4 - Compartment: 1-CR-4
Ch.4 - Compartment: 1-CS-1
Ch.4 - Compartment: 1-MS-1
Ch.4 - Compartment: 3-CR-1

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Licensing Action #: 11.25

Licensing Action: Emergency Lighting - Lack of 8-Hour Battery Powered Emergency Lighting Units (III.J criteria)

Basis Date: July 27, 1987

To Be Transitioned?: No

Basis:

Section III.J of Appendix R to 10 CFR 50 requires 8-hour battery-powered emergency lighting units in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto.

Per the BVPS-1 letter of January 21, 1986, an exemption was requested from the technical requirements of Section III.J of Appendix R to 10 CFR 50 based on the results of an NRC inspection conducted the week of November 18, 1985. The inspection identified an apparent violation for use of security perimeter lighting for outside areas, 2-hour battery pack light for the brigade room, and lack of emergency lighting in the clean shop. An emergency light was installed in the clean shop and additional lights were installed on the turbine deck.

Per the BVPS-1 letter dated October 21, 1986, an additional exemption was requested from the technical requirements of Section III.J of Appendix R to 10 CFR 50, concerning the need for 8-hour battery-powered lighting units in areas having safe shutdown equipment and along access/egress routes.

The reason for requiring 8-hour battery-powered emergency lighting is to ensure that at least minimum lighting is available for the performance of manual actions necessary for safe shutdown after a fire. The licensee requested the exemption to allow the use of the following:

- Security perimeter lighting backed up by the security diesel generator is used for outdoor access/egress paths.
- Portable flashlights are required to enhance the permanent 8-hour battery-powered lighting for certain areas, including intake structure, turbine deck, PAB, service building roof, normal switchgear, emergency switchgear, and process rack area.
- The fire brigade room has 2-hour battery-powered emergency lighting.
- The NRC letter dated July 27, 1987, Transmittal of Appendix R Technical Exemption Regarding Emergency Lighting (TAC 60625), provided the approval of the exemption requests noted above. The following conditions were cited in the NRC SER dated July 27, 1987 as the basis for approval of the exemptions relative to emergency lighting:
- The security emergency diesel generator has a fuel supply for at least 24 hours.
- The security perimeter lighting circuits are not routed through fire areas where safe shutdown equipment or cables are located.
- A control room evacuation would not be required for a fire in Turbine Building (1-TB-1) or Normal Switchgear Room (1-NS-1). The security diesel and transfer circuits are independent of all other fire areas of Appendix R concern.

BVPS-1

Licensing Action #: 11.25

Licensing Action: Emergency Lighting - Lack of 8-Hour Battery Powered Emergency Lighting Units (III.J criteria)

- IES Handbook (Referenced in GL 85-01) accepts the use of portable lighting to supplement fixed d-c units.
- Operator actions requiring flashlights are hands-free activities or require one hand.
- The expected time duration for use of the fire brigade room as a staging area would be less than 30 minutes; therefore, 2-hour lighting is acceptable.
- The turbine deck has 8-hour battery-powered lighting units for access/egress around the brigade room.
- The fire brigade room was relocated from the Turbine Deck to the Security Building. The conditions of the exemption are still met because the brigade room has two hour battery-powered emergency lighting in its present location and access to the Brigade Room is lit by security perimeter lighting.

Evaluation:

The NRC SER dated July 27, 1987, states:

Accordingly, the Commission has determined that pursuant to 10 CFR 50.12(a), the exemption as described in Section III is authorized by law and will not present an undue risk to the public health and safety and are consistent with common defense and security, and special circumstances are present for the exemptions in that application of the regulation in these particular circumstances is not necessary to achieve the underlying purposes of Appendix R to 10 CFR Part 50. Therefore, the Commission hereby grants the following exemption for the items mentioned in Section III above from the requirements of Section III.J of Appendix R to 10 CFR Part 50 concerning the need for 8-hour battery-powered lighting units in areas having safe shutdown equipment and along access/egress routes as follows:

1. Security perimeter lighting for outside yard area access/egress routes may be used,

2. Portable, hand-held lighting units may be used for plant areas as specified in the licensee's submittal provided the licensee provide the hand-held lights as part of the dedicated supplies required for alternate safe shutdown, and

3. Two-hour battery-powered emergency lighting in the fire brigade room may be used.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of the exemption will have no significant impact on the environment (52 FR 27892).

Validation/Conclusions:

An 8-hour Battery Powered Emergency Lighting is no longer required by NFPA 805; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

BVPS-1

Licensing Action #: 11.25

Licensing Action: Emergency Lighting - Lack of 8-Hour Battery Powered Emergency Lighting Units (III.J criteria)

References:

- 86-01-21, "BVPS-1 Appendix R - Exemption Request: Emergency Lighting."
- 87-07-27, "BVPS-1 - Transmittal of Appendix R Technical Exemption Regarding Emergency Lighting (TAC 60625)."

Associations:

None

BVPS-2

Licensing Action #: 01

Licensing Action: Fire Brigade - Annual Physical Examinations - BTP C.3.b

Basis Date: October 1985 (NUREG-1057)

To Be Transitioned?: No

Basis:

The BVPS-2 "Updated Final Safety Analysis Report," (BVPS-2 UFSAR), Section 9.5A.2, Item C.3.b, states:

> *The Standard Review Plan states that the qualification of fire brigade members should include an annual physical examination to determine their ability to perform strenuous fire- fighting activities.*
>
> *Differences from the SRP:*
>
> *As a minimum, physical examinations will be conducted for the fire brigade every 3 years, and each member's records will be reviewed annually by the Medical Department.*
>
> *Justification:*
>
> *This procedure was established and approved for BVPS-1 and has been in effect since 1976 without any problems. The physical examination (nuclear physical) given to the fire brigade members is the same examination given to all workers involved in radiological work at the site. This examination is far more extensive than the examination required for non radiological workers. Fire brigade members who become physically unfit to perform their function on the fire brigade are reviewed at the time their physical inability occurs, in accordance with company policy, and corrective action is taken. The annual review is merely a confirmation that no physical problems relating to a fire brigade member have been overlooked. If the latter occurs, immediate corrective action is taken.*

The following conditions were cited in the NRC SER (NUREG-1057) as the bases for the deviation approval relative to the fire brigade:

- Physical examinations of the fire brigade members will be provided every three years instead of annually as specified in the staff guidelines.
- Each fire brigade member's medical records will be reviewed annually to determine fitness for strenuous firefighting activity.

Evaluation:

Section 9.5.1.3 of the SER, NUREG-1057 states:

> *The applicant proposes to give physical examinations to the fire brigade members every 3 years instead of annually as specified in the staff guidelines. Each fire brigade member's medical records will be reviewed annually to determine fitness for strenuous firefighting activity.*
>
> *This procedure was approved for the Unit 1 fire brigade in 1976 and has operated successfully since then.*

BVPS-2

Licensing Action #: 01

Licensing Action: Fire Brigade - Annual Physical Examinations - BTP C.3.b

On the basis of its evaluation and previous approval, the staff concludes that this is an acceptable deviation from the guidelines in Section C.3 of BTP CMEB 9.5-1.

Procedure 1-2-ADM-1902, "Fire Brigade," details the interval between physical exams and requires fire brigade physicals every year.

Validation/Conclusions:

Compliance with criteria was established to provide annual physical examinations of the fire brigade members; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned.

References:

- NUREG-1057, "NRC SER - NUREG-1057 dated October 1985."

Associations:

None

BVPS-2

Licensing Action #: 02

Licensing Action: Structural Steel - Lack of Structural Steel Fireproofing - BTP C.5.a(1)

Basis Date: August 1987 (NUREG-1057, Supplement 6)

To Be Transitioned?: No

Basis:

The BVPS-2 "Updated Final Safety Analysis Report," (BVPS-2 UFSAR), Section 9.5A.2, Item C.5.a(1), reports:

> *The Standard Review Plan states that fire barriers with a minimum fire resistance rating of 3 hours should be provided to:*
>
> *(a) Separate safety-related systems from any potential fires in nonsafety-related areas that could affect their ability to perform their safety function;*
>
> *(b) Separate redundant divisions or trains of safety-related systems from each other so that both are not subject to damage from a single fire;*
>
> *(c) Separate individual units on a multiple-unit site unless the requirements of General Design Criterion 5 are met with respect to fires.*
>
> *Difference from the SRP:*
>
> *The structural steel supporting the 3-hour fire-rated concrete block walls which separate the 780 ft-6 in. el of the service building (SB-5) from the turbine building (TB-1) and the 773 ft-6 in. el of the auxiliary building (PA-5) and which separate PA-5 from the radiation protection area (WH-2) and TB-1 has not been fireproofed.*
>
> *Justification:*
>
> *The combustible loading in SB-5 is < 1/2 hour. The largest portion of that loading is the charcoal filters, which are all provided with manually actuated deluge spray systems and heat detection systems. There are no local concentrations of combustibles (stacks of cable trays) adjacent to the columns. Therefore, a fire in either of these areas will not be large enough to cause structural damage, and no safety-related equipment in these areas is required for safe-shutdown. Postulating failure of the steel, safe shutdown can still be achieved.*

Clarification was provided by the licensee in letter dated February 11, 1987 based on a question from the NRC Fire Protection reviewer.

> *The NRC Fire Protection Reviewer requested additional information to ensure that failure of unprotected structural steel in the upper elevations of the Service and Auxiliary Buildings (Fire Areas SB-5 and PA-5) will have no adverse impact on the safe shutdown capability.*
>
> *Response:*
>
> *FSAR Appendix 9.5A provides results of the fire protection safe shutdown analysis for these areas and concludes that safe shutdown can be achieved assuming loss of all safe shutdown cables and equipment located in these areas.*
>
> *FSAR Table 3.2-2 provides a summary of Seismic and QA Category I structures. As indicated in the referenced table, the Seismic Category I seismic*

BVPS-2

Licensing Action #: 02

Licensing Action: Structural Steel - Lack of Structural Steel Fireproofing - BTP C.5.a(1)

and tornado missile barriers located at the 780' elevation for the Service Building and at 773'-6" for the Auxiliary Building. These are the floor slabs in Fire Areas SB-5 and PA-5." "Failure of the structural steel above the tornado missile barriers will not cause damage to components below as the missile boundary is capable of withstanding collapse. In addition, FSAR Section 3.6B.1.3.4.3 states in part for the Service Building that '... if non-seismic Category I portions of the structure fail, no adverse effects on adjacent Seismic Category I structures or components will occur.'

In conclusion, the above information provides adequate justification for the SRP deviation on unprotected structural steel.

Evaluation:

NUREG-1057, BVPS-2 SSER, Supplement 5 states:

9.5.1.4 General Plant Guidelines

Branch Technical Position (BTP) CMEB 9.5-1, Section C.5.a(1) states that fire barriers with a minimum fire resistance rating of 3 hours should be provided to 'separate safety-related systems from any potential fire in non-safety-related areas that could affect their ability to perform their safety function' and to 'separate redundant divisions or trains of safety-related systems from each other so that both are not subject to damage from a single fire.'

In Amendment 14, the applicant stated that the structural steel supporting the 3-hour fire-rated walls that separate the 780-foot, 6-inch elevation of the service building (Fire Area SB-5) from the turbine building and the 773-foot, 6-inch elevation of the auxiliary building (Fire Area PA-5) from the turbine building and the health physics area have not been fireproofed. The staff was concerned that a fire in the turbine building or in the upper elevations of the service or auxiliary building could cause the steel to collapse, jeopardizing safe shutdown equipment in the surrounding areas. However, Appendix 9.5A to the FSAR demonstrates that the loss of safety-related equipment in areas adjacent to the unprotected steel would not affect the plant's ability to achieve a safe shutdown. In addition, Table 3.2.2 of the applicant's FSAR states that the floor slabs at the 773-foot, 6-inch and the 780-foot, 6-inch elevations, which are the fire boundaries directly below the unprotected steel in the service and auxiliary buildings, are rated as seismic Category I. Section 3.6.B1.3.4.3 of the FSAR states that if non-seismic Category I portions of the structure fail, no adverse effects on adjacent seismic Category I structures or components will occur. Therefore, if a fire caused the unprotected structural steel to collapse, the plant would still be able to achieve a safe shutdown. Considering this evaluation, the staff concludes that the lack of structural steel fireproofing in Fire Areas SB-5 and PA-5 does not adversely affect plant safety and is an acceptable deviation from Section C.5.a(1) of BTP CMEB 9.5-1.

Validation/Conclusions:

Each of the walls consists of a block wall, with structural steel on the building interiors for support of the building roofs. The wall in the Turbine building extends on above the block

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Licensing Action: Structural Steel - Lack of Structural Steel Fireproofing - BTP C.5.a(1)

wall, with a metal siding wall to the exterior. If the steel were to deform due to fire, the exterior metal wall and roof would be impacted, but the block wall would remain intact. The compartment barriers meet the 3-hour-rated barrier requirement, and the project has done a review of structural steel to ensure that the risk of any steel failures has been addressed within the PRA model; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- NUREG-1057, *Supplement 6*, "NRC SSER - NUREG-1057, *Supplement 6* dated August 1987."

Associations:

None

BVPS-2

Licensing Action #: 03

Licensing Action: Conduits/Penetration Seals & Penetration Seal Design - BTP C.5.a(3)

Basis Date: May 1987 (NUREG-1057, Supplement 5)

To Be Transitioned?: Yes

Basis:

The BVPS-2 "Updated Final Safety Analysis Report," (BVPS-2 UFSAR), Conduits/Penetration Seals states:

> *The Standard Review Plan states that openings inside conduit larger than 4 inches in diameter should be sealed at the fire barrier, and that openings inside conduit 4 inches or less in diameter should be sealed at the fire barrier unless the conduit extends at least 5 feet on each side of the fire barrier and is sealed either at both ends or at the fire barrier with noncombustible material to prevent the passage of smoke and hot gases.*
>
> *Differences from the SRP:*
>
> *a. Openings inside conduit greater than 4 inches in diameter may be sealed at the first access point on one side of the fire barrier with a fire seal material combined with a fire-wrap material encasing the conduit from the fire seal to the barrier.*
>
> *b. The following criteria may be applied for internal conduit seals in conduit 4 inches or less in diameter to prevent the propagation of combustible products (smoke and hot gases).*
>
> *Barriers will be evaluated to determine the need for sealing. The occupancy, safe shutdown equipment and existing fire protection features on each side of the barrier will be evaluated to determine the need for sealing to prevent smoke passage. The following conditions on each side will be used to determine the need for prevention of smoke passage.*
>
> *1. If there is automatic suppression provided on both sides of the barrier, a fire of sufficient heat to cause combustion of cables inside the conduits or generation of excessive smoke outside the conduits would not be expected to develop. Therefore, sealing inside conduits would not be required.*
>
> *2. If all equipment in the areas on both sides of the barrier is of the same division for safe shutdown or not required for safe shutdown, there is no need to seal. The area on a side of a barrier will be considered to have one division of safe shutdown in cases where the conduit of the redundant division is protected by a one hour rated wrap throughout the area.*
>
> *3. For barriers where a potential for exposure of redundant safe shutdown trains exist, the following analysis will be made and sealing provided inside the conduit which could affect equipment of the redundant division by passage of smoke:*
>
> *a) All conduits 3 inches to 4 inches in diameter will be sealed at the barrier or first opening on both sides of the barrier. This will prevent passage of smoke from either side into the adjacent area.*

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Licensing Action #: 03

Licensing Action: Conduits/Penetration Seals & Penetration Seal Design - BTP C.5.a(3)

b) Conduits less than 3 inches in diameter will be sealed on any side of the barrier where the following conditions exist:

i) The conduit terminates in a panel or enclosure containing equipment within a 10 foot lineal run from the point it enters the area. If the conduit length is more than 10 feet in the area, the products of combustion would condense out inside the conduit and would not be expected to reach equipment.

ii) The panel or equipment in which the conduit terminates is required for safe shutdown or contains safe shutdown equipment. The effects of smoke and gases would be limited to the immediate enclosed area of conduit termination. Therefore, only those conduits connected to panels with safe shutdown equipment would have a potential for damage and affect safe shutdown.

If both of the above conditions exist on a side of the barrier, the conduit will be sealed on that side of the barrier to prevent the passage of smoke generated in the conduit on the other side (fire side) of the barrier. Each side of the barrier will be evaluated to the above two conditions to determine which conduits less than 3 inches in diameter must be sealed.

Fire protection engineering evaluations shall apply the revised internal conduit sealing criteria for specific conduit configurations based on plant specific fire severities, locations of safe shutdown equipment, and the availability of fire detection and suppression systems for barriers described in the Fire Protection Safe Shutdown Report for BVPS Unit 2 as providing separation of redundant trains of safe shutdown equipment.

Justification:

a. Openings inside conduit greater than 4 inches in diameter will be sealed at the barrier where possible. Due to clearance problems, there are specific cases where this cannot occur. For these cases, the installation of a fire seal at the first opening on one side of the barrier, combined with fire wrap from the seal to the barrier, effectively extends the fire barrier. This method provides the same degree of protection as would sealing at the barrier.

b. These sealing criteria are consistent with those documented in a letter from Cleveland Electric Illuminating (CEI, 1985) Perry Nuclear Power Plant to the NRC. The NRC (USNRC, 1985) stated that CEI'S conduit sealing criteria are an acceptable deviation from Section C.5.a(3) of BTP CMEB 9.5-1.

In addition, specific conduit configurations will be evaluated for sealing requirements based on plant specific fire severities, locations of safe shutdown equipment, availability of fire detection and suppression systems, and will be documented in fire protection engineering evaluations in accordance with guidance provided in Generic Letter 86-10. This provides a level of protection equivalent to BTP CMEB 9.5-1.

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Licensing Action #: 03

Licensing Action: Conduits/Penetration Seals & Penetration Seal Design - BTP C.5.a(3)

The BVPS-2 UFSAR, Penetration Seal Design states:

The Standard Review Plan states that penetration designs should utilize only noncombustible materials and should be qualified by tests. The penetration qualification tests should use the time-temperature exposure curve specified by ASTM E-119, 'Fire Test of Building Construction and Materials.'

Differences from the SRP:

Penetrations in fire barriers for ventilation ductwork are sealed with non-tested fire seals.

Justification:

a. Due to plant construction, a rated seal could not be installed in the ductwork passing between the Auxiliary Building 773'6" (Fire Area PA-5) and the Radiation Protection Building 786'6" (Fire Area WH-2). The penetration is in a 12" block wall which has two pieces of ductwork passing through it. Each duct has two 1 1/2 hour fire dampers located in it. Due to the spacing of the dampers and the thickness of the wall, one damper is located outside the wall. The ductwork will be fire wrapped with 1 hour. wrap from just beyond the fire damper to the opening and then flared to cover the face of the opening. To allow the damper in the wall to expand, the opening around the ductwork is filled with Kaowool. Both fire areas have a fire severity of less than 1/2 hour. Fire area WH-2 has an Automatic Sprinkler suppression system and Fire Area PA-5 is provided with an Automatic General Area fire detection system. Both systems provide alarms in the control room.

b. Due to plant construction, the penetration for the ductwork passing between the pipe tunnel el. 718'6" (Fire Area PT-1) and Cable Vault el. 735'6" (Fire Area CV-1) is not sealed in accordance with the fire damper manufacturer's requirements. The block out is in the 2 ft. thick concrete floor separating the two fire areas. There are two pieces of ductwork passing through this hole. The fire damper listing requires the retaining angle to extend over the opening and onto the floor. Since the two ducts are run side-by-side, this requirement cannot be met between the two ducts. A barrier is provided between the two ducts by filling the area with Kaowool, and the area above the retaining angles is covered with two layers (1 hr rating) of E54A fire wrap material. The combustible loading in the pipe tunnel is less than 1/2 hour and the area has a general area smoke detection system which alarms locally and in the Control Room. The Cable Vault el. 735'6" has a combustible loading of less than 2 hrs. and has an automatic CO2 suppression system.

c. The penetration for the ductwork passing between the Cable Vault el. 735'6" (Fire Area CV-1) and Cable Vault el. 755'6" (Fire Area CV-3) is not sealed in accordance with the fire damper manufacturers requirements because of plant configuration. The block out is in the 2 ft. thick concrete floor separating the two fire areas. Two pieces of ductwork pass through this hole. The fire damper listing requires the retaining angle to extend over the opening onto the floor. Since no floor exists in the area between the two ducts, this area was filled with Kaowool. The retaining angles

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Licensing Action #: 03

Licensing Action: Conduits/Penetration Seals & Penetration Seal Design - BTP C.5.a(3)

on top were covered with two layers (1 hr. rating) of E54A fire wrap material. Both areas are provided with automatic CO2 suppression systems.

Evaluation:

The NRC SSER - NUREG-1057, Supplement 5, Section 9.5.1.4, "General Plant Guidelines," states:

> *In the SER, the staff stated that the applicant would provide qualified penetration seals for all penetrations of fire-rated walls or floor/ceiling assemblies. In Amendment 14 of the FSAR, the applicant stated that because of installation problems, certain fire barrier penetrations could not be sealed per Section C.5.a(3) of BTP CMEB 9.5-1. The applicant identified approximately 18 penetrations, of 4-inch diameter or greater, which cannot be sealed at the barrier. The applicant proposed to seal these penetrations with fire-seal material at the first opening and wrap the conduit from the seal to the barrier with 1-hour fire-wrap material. Seventeen of the penetrations have detection and automatic suppression on both sides of the barrier. The remaining penetration has detection on both sides with automatic suppression on one side. The applicant also stated that certain penetrations throughout the plant which are less than 4 inches in diameter and extend less than 5 feet on either side of the barrier cannot be sealed at the barrier. For these cases, the applicant proposed to seal the penetration at the first opening on both sides of the barrier with a fire-seal material. During the site audit on January 27-30, 1987, seals of both configurations were reviewed in the field and were found to provide an adequate measure of sealing for penetrations in fire barriers when the Standard Review Plan (SRP) (NUREG-0800) cannot be met because of installation difficulties. Therefore, the method for sealing penetrations as identified in Amendment 14 to the FSAR is an acceptable deviation from Section C.5.a(3) of BTPCMEB 9.5-1 when installation difficulties do not allow sealing at the barrier.*

Validation/Conclusions:

The bases for previous acceptance remain valid as described in the applicable sections above. The deviation for conduit/penetration seals and penetration seal design is being transitioned to the new licensing basis per NFPA 805.

Disposition:

Licensing Action acceptable for transition

References:

- 1/2-PIP-M16, Revision 8, "Penetration Seals."
- 10080-B-085, Revision 14, "Fire Hazard Analysis."
- 10080-RB-0016H, Sheet 8, Revision 12, "Ventilation & Air Conditioning Reactor Containment Contiguous Areas."
- 10080-RB-0016J, Sheet 9, Revision 8, "Ventilation & Air Conditioning Reactor Containment Contiguous Areas."

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Licensing Action #: 03

Licensing Action: Conduits/Penetration Seals & Penetration Seal Design - BTP C.5.a(3)

- 10080-RB-0045G, Sheet 7, Revision 12, "Ventilation & Air Conditioning Auxiliary Building."
- 10080-RB-0077B, Sheet 2, Revision 12, "Building Services Waste Handling Building."
- 10080-RB-0077C, Sheet 3, Revision 15, "Building Services Waste Handling Building."
- 10080-RB-0077K, Sheet 10, Revision 4, "Ventilation & A/C Health Physics Area."
- 10080-RC-0037E, Sheet 5, Revision 8, "Wall Sections & Details Auxiliary Building."
- 10080-RE-0064AX, Revision 3, "Cable Block Diagram Fire Detection 2DGP-3 2DGP-4."
- 10080-RE-0064AZ, Revision 5, "Cable Block Diagram - Fire Detection 2DGP-7."
- 10080-RM-0433-002A, Revision 17, "Valve Operation Number Diagram - CO2 Fire Protection System."
- 10080-RM-0433-001F, Revision 10, "Valve Operation Number Diagram Fire Protection Water Conditioning Polishing Building/Waste Handling Building/Yard."
- 10080-TLD-033C-081-03, Revision 2, "Test Loop Diagram Fire Protection-Water PT Interface/Turbine Building & Waste Handling Building."
- 10080-TLD-033D-040-03, Revision 4, "Test Loop Diagram Station Fire Detection System Zone 40 CV Smoke Detection."
- 10080-TLD-033D-057-03, Revision 5, "Test Loop Diagram Station Fire Detection System Zone 57 Auxiliary Building Smoke Detection."
- 2601.337-844-083, Revision B, "Internal Conduit Fire Seals EC-1 thru 6."
- 2OST-33.35, Revision 2, "Fire Rated Assemblies Visual Inspection."
- NUREG-1057, Supplement 5, "NRC SSER - NUREG-1057, Supplement 5 dated May 1987."
- UFSAR, Revision 19, "BVPS-2 Updated Final Safety Analysis Report."

Associations:

Ch.3 - Section: 3.11 / Subsection: 3.11.1
Ch.3 - Section: 3.11 / Subsection: 3.11.4
Ch.4 - Compartment: 2-CV-1
Ch.4 - Compartment: 2-CV-3
Ch.4 - Compartment: 2-PA-5
Ch.4 - Compartment: 2-PT-1
Ch.4 - Compartment: 2-WH-1
Fire Protection - Fire Compartment: 2-SB-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-3 / Form: Passive Protection

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Licensing Action #: 03

Licensing Action: Conduits/Penetration Seals & Penetration Seal Design - BTP C.5.a(3)

Fire Protection - Fire Compartment: 2-SB-4 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-5 / Form: Passive Protection

BVPS-2

Licensing Action #: 04

Licensing Action: Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)

Basis Date: November 1986 (NUREG-1057, Supplement 3)

To Be Transitioned?: Yes

Basis:

The BVPS-2 "Updated Final Safety Analysis Report" (BVPS-2 UFSAR), Section 9.5A.2, Item C.5.a (4), states:

The Standard Review Plan states that penetration openings for ventilation systems should be protected by fire dampers having a rating equivalent to that required of the barrier (see NFPA-90A, 'Air Conditioning and Ventilating Systems').

Difference from the SRP:

Fire dampers installed in barrier openings consist of two 1 1/2-hour fire-rated dampers in series instead of one 3-hour fire-rated damper. This is not a tested configuration.

Justification:

The two 1 1/2-hour fire dampers in series is equivalent to a 3-hour rated damper and adequately assures that the fire barriers will be maintained for the specific fire areas. These dampers were all purchased as U.L.-rated dampers and placed in series in common sleeves to provide the equivalent 3-hour rated damper. In most cases, the U.L. label was removed due to the two dampers being in series, a configuration in which the dampers were not U.L. tested. When additional dampers were required, they were purchased under the same specifications and purchase order as the original dampers.

In the remaining few cases, the U.L. label was removed because of the addition of the CO2 release device. This is because the dampers were not tested with the release device installed. However, the CO2 release device is a plunger operated pin in addition to the fusible link pin in the damper. The CO2 release device is listed for this application with U.L. and therefore does not reduce the effectiveness of the damper.

Combustible loadings were calculated for all fire areas within the plant. There are two fire areas that have fire loadings in excess of 1 1/2-hours that have ventilation penetrations. These areas are listed below and have fire loadings of less than 3 hours and all areas have an automatic fire suppression system.

1. *Cable Tunnel (CT-1)*
2. *Cable Vault and Rod Control Areas (CV-1)*

The fire loadings in these areas are due in a large part to cables. All cables, except certain cables located in conduit, are IEEE-383-1974 for safety related applications or similarly rated for non-safety applications (Refer to Section 8.3.3 for further details), and thus will not support combustion even though they are included in the fire loadings calculations.

BVPS-2

Licensing Action #: 04

Licensing Action: Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)

Approval of clarifications relative to this exemption is being requested as part of this LAR submittal and transition to NFPA 805 (See Attachment T "Clarification of Prior NRC Approvals").

Evaluation:

NRC SSER - NUREG-1057, Supplement 3, Section 9.5.1.4, "General Plant Guidelines," states:

> *In the SER, the staff stated that 3-hour fire-rated damper assemblies are provided in all ventilation ducts that penetrate 3-hour fire-rated barriers and that the damper assemblies are Underwriters Laboratories, Inc. (UL) labeled. By letter dated March 27, 1985, the applicant informed the staff that the 1 1/2-hour-rated fire damper assemblies are installed in series in each duct penetrating a 3-hour fire-rated barrier. Moreover, because the applicant redefined the fire area boundaries, some damper assemblies had to be installed within completed heating, ventilation, and air conditioning (HAVC) systems. These damper assemblies are located close to, but not within, the fire barrier penetration. To compensate for the damper location, the applicant enclosed the ductwork from the fire barrier to the damper assembly with 3-hour fire-rated barrier material.*
>
> *In the March 27, 1985, letter, the applicant also informed the staff that although all of the fire damper assemblies were purchased as UL-labeled units, the manufacturer had removed the UL label from the assemblies because they were not tested in the series configuration, and because they were not tested with carbon dioxide fire-suppression-system-actuated release devices.*
>
> *For a fire to spread between fire areas through an HVAC system duct, it would have to burn through the duct in one fire area, through two 1 1/2-hour fire-rated dampers, and finally, through the duct in the adjoining area. In the staff's opinion, the two 1 1/2-hour fire-rated dampers will provide the equivalent fire resistance of one 3-hour fire-rated damper. The 3-hour fire-rated wrap around the ducts constitutes continuous fire-rated construction which will prevent fire spread through the ductwork between the fire barrier and the fire dampers. The release device is a plunger-operated pin that is in addition to the fusible link for damper actuation. The device is UL-listed for this service and, in the staff's opinion, will not reduce the effectiveness of the dampers actuated by the devices. The staff concludes that the fire dampers, as installed, will prevent fire spread from one fire area to another. The damper installation is, therefore, an acceptable deviation from Section C.5.a(4) of BTP CMEB 9.5-1.*

Validation/Conclusions:

The bases for previous acceptance remain valid as described in the applicable sections above. The deviation for ventilation system fire damper installations is being transitioned to the new licensing basis per NFPA 805.

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Licensing Action #: 04

Licensing Action: Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)

Disposition:

Licensing Action acceptable for transition

References:

- 10080-B-085, Revision 14, "Fire Hazard Analysis."
- 10080-DEC-3560, Revision 1, "Fire PRA Task 1 - Plant Boundary Definition and Partitioning."
- 10080-RB-0003A, Revision 12, "Fire Protection Arrangement."
- 10080-RB-0003B, Revision 10, "Fire Protection Arrangement 718' to 735'."
- BVPS-2 UFSAR, Revision 19, "BVPS-2 Updated Final Safety Analysis Report."
- NUREG-1057, Supplement 3, "NRC SSER - NUREG-1057, Supplement 3 dated November 1986."
- TER-13568, Revision 0, "IEEE-383-74 Cable Flame Test Comparative Analysis."

Associations:

Ch.4 - Compartment: 2-ASP
Ch.4 - Compartment: 2-CB-1
Ch.4 - Compartment: 2-CB-4
Ch.4 - Compartment: 2-CB-5
Ch.4 - Compartment: 2-CB-6
Ch.4 - Compartment: 2-CP-1
Ch.4 - Compartment: 2-CV-1
Ch.4 - Compartment: 2-CV-2
Ch.4 - Compartment: 2-CV-3
Ch.4 - Compartment: 2-CV-4
Ch.4 - Compartment: 2-CV-5
Ch.4 - Compartment: 2-CV-6
Ch.4 - Compartment: 2-DG-2
Ch.4 - Compartment: 2-FB-1
Ch.4 - Compartment: 2-PA-3
Ch.4 - Compartment: 2-PA-4
Ch.4 - Compartment: 2-PA-5
Ch.4 - Compartment: 2-PT-1
Ch.4 - Compartment: 2-SB-1
Ch.4 - Compartment: 2-SB-10
Ch.4 - Compartment: 2-SB-2
Ch.4 - Compartment: 2-SB-3
Ch.4 - Compartment: 2-SB-4
Ch.4 - Compartment: 2-SB-5
Ch.4 - Compartment: 2-SB-6
Ch.4 - Compartment: 2-SB-7

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Licensing Action #: 04

Licensing Action: Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)

Ch.4 - Compartment: 2-SB-8
Ch.4 - Compartment: 2-SB-9
Ch.4 - Compartment: 2-SG-1N
Ch.4 - Compartment: 2-SG-1S
Ch.4 - Compartment: 2-WH-1
Ch.4 - Compartment: 3-CR-1
Fire Protection - Fire Compartment: 2-CB-1 / Form: Gaseous Suppression
Fire Protection - Fire Compartment: 2-CB-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CB-4 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CB-5 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CB-6 / Form: Gaseous Suppression
Fire Protection - Fire Compartment: 2-CB-6 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CP-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CV-1 / Form: Gaseous Suppression
Fire Protection - Fire Compartment: 2-CV-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CV-2 / Form: Gaseous Suppression
Fire Protection - Fire Compartment: 2-CV-2 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CV-3 / Form: Gaseous Suppression
Fire Protection - Fire Compartment: 2-CV-3 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CV-4 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CV-5 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CV-6 / Form: Gaseous Suppression
Fire Protection - Fire Compartment: 2-CV-6 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-FB-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-MS-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-PA-3 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-PA-4 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-PA-5 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-PT-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-10 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-2 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-3 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-4 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-5 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-6 / Form: Detection
Fire Protection - Fire Compartment: 2-SB-6 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-7 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-8 / Form: Detection
Fire Protection - Fire Compartment: 2-SB-8 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-9 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SG-1N / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SG-1S / Form: Passive Protection
Fire Protection - Fire Compartment: 2-WH-1 / Form: Passive Protection

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Licensing Action #: 04

Licensing Action: Ventilation Penetration Openings (Fire Dampers) - Lack of Appropriate Fire Dampers - BTP C.5.a(4)

Fire Protection - Fire Compartment: 3-CR-1 / Form: Passive Protection

BVPS-2

Licensing Action #: 05

Licensing Action: Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork 1-Hour Fire Wrap - BTP C.5.a(4)

Basis Date: May 1987 (NUREG-1057, Supplement 5)

To Be Transitioned?: Yes

Basis:

The BVPS-2 "Updated Final Safety Analysis Report," (BVPS-2 UFSAR), states:

The Standard Review Plan states that penetration openings for ventilation systems should be protected by fire dampers having a rating equivalent to that required of the barrier (see NFPA-90A, 'Air Conditioning and Ventilating Systems'). Flexible air duct coupling in ventilation and filter systems should be noncombustible.

Differences from the SRP:

a. Certain fire dampers were located outside of fire barriers and the ductwork portions from the dampers to the barriers are protected with a 1-hour fire-rated material.

b. In the HVAC duct penetrating the fire barrier between Fire Areas SB-3 and SB-4 (ceiling of SB-3/floor of SB-4), the upper damper of a 3-hr equivalent pair extends 2 inches above the fire barrier. In this particular instance, the 2 inch portion of ductwork will not be wrapped with a fire wrap material.

The portion of the ductwork penetrations located between PA-3 and PA-4 (Degassifier and Gas Waste Charcoal Bed Cubicles) will not be wrapped with a fire wrap material.

c. Ventilation ductwork passing through fire barriers is protected on both sides of the barrier with a 1-hour fire-rated material and automatic detection instead of fire dampers installed at the barrier.

d. Ventilation ductwork passing through fire barriers is protected on the outsides of the barrier with a 1-hour fire-rated material and automatic detection and suppression instead of fire dampers.

e. Gland steam exhaust ventilation ductwork between SB-5 and PA-5 has non-rated dampers.

Justification:

a. Due to changes in boundaries of a portion of the plant's fire areas it became necessary to install fire dampers in completed ventilation systems. Extensive redesign and field modifications would have been required to locate the fire dampers inside the barrier.

The fire dampers are located as close to the fire barriers as possible and the ductwork from the fire dampers to the barrier is wrapped with a 1-hour fire-rated material. Fire wrap is also installed on the ductwork beyond the fire damper to the first support if required to ensure the ductwork's integrity.

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Licensing Action #: 05

Licensing Action: Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork 1-Hour Fire Wrap - BTP C.5.a(4)

The fire severity in these areas is less than 1 hour on both sides of the barrier or automatic suppression and detection has been provided.

The fire dampers are used as fire barriers between:

Opposite Side Located in

1) PA-3 (less than 1 hr) and PA-5 (less than 1 hr)

2) PA-4 (less than 1 hr) and PA-3 (less than 1 hr)

3) SB-3 (less than 2 hr with suppression and SB-4 (less than 1 hr)

4) SB-4 (less than 1 hr) and SB-5 (less than 1 hr)

5) PT-1 (less than 1 hr) and SG-1S (less than 1 hr)

6) PA-5 (less than 1 hr) and WH-2 (less than 1 hr)

b. Due to field interferences, fire wrap material cannot be placed on all sides of this 2-inch portion of the ductwork. Combustible loadings (within SB-3 and SB-4 < 1 hour) are less than the rating of the lower damper which is located in the barrier. Additionally, these areas are provided with automatic detection with local and control room alarms.*

For fire areas PA-3 and PA-4 Degassifier and Gas Waste Charcoal Bed Cubicles), an evaluation (10080-DMC-0699) has been performed in accordance with Generic Letter 86-10 to justify the acceptability of the ductwork.

**Allowable combustible loadings in SB-3 are increased as result of Design Analysis 10080-DEC-196*

c. Due to plant layout the ventilation ductwork for the battery room exhaust system was required to pass through other fire areas (SB-1, SB-2, SB-4) not serviced by this system. In order to ensure the system availability in the event of a fire in an area not using this system, the ductwork was protected with a 1-hour fire-rated material and fire dampers were not installed in the fire barriers. The fire severity in these areas (SB-1, SB-2, SB-4) is less than 1 hour and automatic general area fire detection with local and control room alarms has been provided.

d. Due to plant layout the ventilation ductwork for the emergency switchgear ventilation and the battery room exhaust system were required to be installed in other fire areas (CV-1, CV-3, SB-3) not serviced by this equipment. In order to ensure the system availability in the event of a fire in an area not using these systems, the ductwork was protected with a 1-hour fire-rated material and fire dampers were not installed in the fire barriers. These fire areas (CV-1, CV-2, and CV-3) are provided with automatic suppression and detection with local and control room alarms.

e. A Generic Letter 86-10 evaluation determined that the Gland Steam System ductwork will prevent the spread of fire between PA-5 and SB-5 without crediting 2GSS-DMPF23A and B as fire dampers.

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Licensing Action #: 05

Licensing Action: Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork 1-Hour Fire Wrap - BTP C.5.a(4)

Approval of clarifications relative to this exemption is being requested as part of this LAR submittal and transition to NFPA 805 (See Attachment T "Clarification of Prior NRC Approvals").

Evaluation:

NRC SSER - NUREG-1057, Supplement 5, Section 9.5.1.4, "General Plant Guidelines," states:

In SSER 3, the staff stated that some fire damper assemblies were located outside of the fire barrier because of a redefining of certain fire areas and that where this took place, the ductwork from the barrier to the fire damper assembly would be wrapped with 3-hour fire-rated material. Section C.5.a(4) of BTP CMEB 9.5-1 states that, 'penetration openings for ventilation systems should be protected by fire dampers having a rating equivalent to that required of the barrier.' In a meeting on November 5, 1986, the applicant stated that 3-hour wrap material could not be used because of weight limitations of the structural supports and stated that the ductwork would be wrapped with 1-hour rated material. This deviation was included in Amendment 14 to the FSAR following the meeting. Fire dampers requiring 1-hour wrap are used as fire barriers between Fire Areas PA-3 and PA-5, PA-4 and PA-5, SB-3 and SB-4, SB-4 and SB-5, and PT-1 and SG-1S. The fire loading is less than ½ hour on either side of the subject dampers. Smoke detection is provided in all areas where the 1-hour wrap will be installed and hose racks are provided for fire brigade use. It is expected that a fire would be detected in its incipient stage and the plant fire brigade would extinguish it using the installed hose racks. Providing additional structural support to the ductwork to accommodate 3-hour wrap would not significantly increase the level of fire safety. Therefore, wrapping ductwork from the barrier to the damper with 1-hour material is an acceptable deviation to Section C.5.a(4) of BTP CMEB 9.5-1.

The applicant also identified one damper in Fire Area SB-4 in which a 2-inch portion of the ductwork could not be wrapped because of interferences and therefore constituted an additional deviation from Section C.5.a(4) of BTP CMEB 9.5-1. The fire loading in this area is less than 1/2 hour and detection is provided. The 2-inch portion of the ductwork is above one of the 1-1/2 hour dampers that are in series. Lack of wrap on this 2-inch ductwork section does not adversely affect plant fire safety and therefore, is an acceptable deviation from Section C.5.a(4) of BTP CMEB 9.5-1.

The applicant stated in Amendment 14 to the FSAR that ventilation ductwork for the battery room exhaust system and the emergency switchgear ventilation system pass through areas not serviced by the two systems. To ensure the operability of these systems in the event of a fire in an area not using these systems, the ductwork was wrapped with 1-hour material in areas not serviced by the ventilation systems. Battery room exhaust ducts run through Fire Areas SB-1, SB-2, and SB-4. Each of these areas has a fire loading of less than 1 hour and detection is provided. In the event of a fire in these areas, it is expected that the fire would be detected in its

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Licensing Action #: 05

Licensing Action: Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork 1-Hour Fire Wrap - BTP C.5.a(4)

incipient stage and that the plant fire brigade would respond and extinguish the fire. Both the battery room exhaust ductwork and the emergency switchgear ventilation ductwork run through Fire Areas CV-1, CV-3, and SB-3. These fire areas have a combustible loading of less than 2 hours and are provided with detection and automatic suppression. It would be expected that a fire in these areas would be detected in its incipient stage and that the plant fire brigade would respond and control it. The automatic suppression provides added assurance that a fire would not jeopardize the integrity of the 1-hour wrapped ventilation ducts. On the basis of this evaluation, this method of ensuring continuous ventilation to the battery room and emergency switchgear is acceptable.

Validation/Conclusions:

In conclusion, the bases for previous acceptance are still valid as described in the applicable sections above. The deviation for fire damper assemblies, fire wrap protection of ventilation ductwork, and the method of ensuring continuous ventilation to the battery room and emergency switchgear is being transitioned to the new licensing basis under NFPA 805.

The specific technical justifications for ventilation duct deviations have not previously been well documented. It has been determined to conservatively associate and apply the technical justification of this licensing action to all ventilation ductwork within BVPS-2 which is either fire-wrapped or which contains two 1.5-hour rated fire dampers in series; therefore, this licensing action is clarified in Attachment T. If the combustible loading within the compartment is greater than one hour, the smoke detection and fire suppression systems within the compartment are generally credited as additional measures to minimize the likelihood of fire propagation through the ductwork, consistent with the SER for the existing licensing action. If the combustible loading within the compartment is less than one hour, smoke detection is not required, based on the robustness of steel ductwork, as noted in the clarification.

Disposition:

Licensing Action acceptable for transition

References:

- 10080-B-085, Revision 14, "Fire Hazard Analysis."
- 10080-DEC-0196, Revision 1, "Non Rated Fire Assembly-Ductwork Unit 2 SB-3 2HVZ-DMPF-205A/B & 206A/B."
- 10080-DMC-0699, Revision 0, "Non-Rated Fire Assembly Ductwork, Unit 2 Degass & Waste Gas Charcoal Bed."
- 10080-RB-0016B, Sheet 2, Revision 11, "Ventilation & Air Conditioning Reactor Containment Contiguous Areas."
- 10080-RB-0016C, Sheet 3, Revision 10, "Ventilation & Air Conditioning Reactor Containment Contiguous Areas."

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Licensing Action: Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork 1-Hour Fire Wrap - BTP C.5.a(4)

- 10080-RB-0016K, Sheet 10, Revision 14, "Ventilation & Air Conditioning Reactor Containment Contiguous Area."
- 10080-RB-0035A, Sheet 1, Revision 10, "Ventilation Service Building."
- 10080-RB-0035B, Sheet 2, Revision 11, "Ventilation Service Building."
- 10080-RB-0035C, Sheet 3, Revision 10, "Ventilation Service Building."
- 10080-TLD-033A-014-03, Revision 5, "Test Loop Diagram CO2 System 2 Zone 2 Detection."
- 10080-TLD-033A-020-03, Revision 5, "Test Loop Diagram CO2 System 2 Zone 3 Detection."
- 10080-TLD-033A-023-03, Revision 5, "Test Loop Diagram CO2 System 2 Zone 4 Detection."
- 10080-TLD-033D-001-03, Revision 6, "Fire Detection Zone 1 Service Building Smoke Detection."
- 10080-TLD-033D-002-02, Revision 4, "Fire Detection Zone 2 Service Building Smoke Detection."
- 10080-TLD-033D-004-03, Revision 5, "Fire Detection Zone 4 Service Building Smoke Detection."
- 10080-TLD-033D-005-03, Revision 6, "Fire Detection Zone 5 Service Building Smoke Detection."
- 10080-TLD-033D-030-05, Revision 6, "Fire Detection Zone 30 Cable Vault Smoke Detection."
- 10080-TLD-033D-032-02, Revision 4, "Fire Detection Zone 32 Cable Vault Smoke Detection."
- 2OST-33.35, Revision 2, "Fire Rated Assemblies Visual Inspection."
- BVPS-2 UFSAR, Revision 19, "BVPS-2 Updated Final Safety Analysis Report."
- NUREG-1057, Supplement 5, "NRC SSER - NUREG-1057, Supplement 5 dated May 1987."
- FPPCE 06-043, Revision 1, "Evaluation of Maintaining Fire Rating of Fire Dampers 2GSS-DMPF23A & B."

Associations:

Ch.4 - Compartment: 2-ASP
Ch.4 - Compartment: 2-CB-1
Ch.4 - Compartment: 2-CB-5
Ch.4 - Compartment: 2-CB-6
Ch.4 - Compartment: 2-CP-1

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Licensing Action: Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork 1-Hour Fire Wrap - BTP C.5.a(4)

Ch.4 - Compartment: 2-CV-1
Ch.4 - Compartment: 2-CV-2
Ch.4 - Compartment: 2-CV-3
Ch.4 - Compartment: 2-CV-4
Ch.4 - Compartment: 2-CV-5
Ch.4 - Compartment: 2-CV-6
Ch.4 - Compartment: 2-FB-1
Ch.4 - Compartment: 2-PA-3
Ch.4 - Compartment: 2-PA-4
Ch.4 - Compartment: 2-PA-5
Ch.4 - Compartment: 2-PT-1
Ch.4 - Compartment: 2-SB-1
Ch.4 - Compartment: 2-SB-2
Ch.4 - Compartment: 2-SB-3
Ch.4 - Compartment: 2-SB-4
Ch.4 - Compartment: 2-SB-5
Ch.4 - Compartment: 2-SB-6
Ch.4 - Compartment: 2-SB-7
Ch.4 - Compartment: 2-SB-8
Ch.4 - Compartment: 2-SB-9
Ch.4 - Compartment: 2-SG-1N
Ch.4 - Compartment: 2-WH-1
Fire Protection - Fire Compartment: 2-ASP / Form: Detection
Fire Protection - Fire Compartment: 2-ASP / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CB-1 / Form: Detection
Fire Protection - Fire Compartment: 2-CB-1 / Form: Gaseous Suppression
Fire Protection - Fire Compartment: 2-CB-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CB-5 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CB-6 / Form: Detection
Fire Protection - Fire Compartment: 2-CB-6 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CP-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CV-1 / Form: Detection
Fire Protection - Fire Compartment: 2-CV-1 / Form: Gaseous Suppression
Fire Protection - Fire Compartment: 2-CV-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CV-2 / Form: Detection
Fire Protection - Fire Compartment: 2-CV-2 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CV-3 / Form: Detection
Fire Protection - Fire Compartment: 2-CV-3 / Form: Gaseous Suppression
Fire Protection - Fire Compartment: 2-CV-3 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CV-4 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CV-5 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CV-6 / Form: Detection
Fire Protection - Fire Compartment: 2-CV-6 / Form: Gaseous Suppression
Fire Protection - Fire Compartment: 2-CV-6 / Form: Passive Protection

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Licensing Action: Fire Dampers and Ventilation Ductwork - Assembly Location and Deviation in Ductwork 1-Hour Fire Wrap - BTP C.5.a(4)

Fire Protection - Fire Compartment: 2-FB-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-PA-3 / Form: Detection
Fire Protection - Fire Compartment: 2-PA-3 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-PA-4 / Form: Detection
Fire Protection - Fire Compartment: 2-PA-4 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-PA-5 / Form: Detection
Fire Protection - Fire Compartment: 2-PA-5 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-PT-1 / Form: Detection
Fire Protection - Fire Compartment: 2-PT-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-1 / Form: Detection
Fire Protection - Fire Compartment: 2-SB-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-2 / Form: Detection
Fire Protection - Fire Compartment: 2-SB-2 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-3 / Form: Detection
Fire Protection - Fire Compartment: 2-SB-3 / Form: Gaseous Suppression
Fire Protection - Fire Compartment: 2-SB-3 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-4 / Form: Detection
Fire Protection - Fire Compartment: 2-SB-4 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-5 / Form: Detection
Fire Protection - Fire Compartment: 2-SB-5 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-6 / Form: Detection
Fire Protection - Fire Compartment: 2-SB-6 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-7 / Form: Detection
Fire Protection - Fire Compartment: 2-SB-7 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-8 / Form: Detection
Fire Protection - Fire Compartment: 2-SB-8 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-9 / Form: Detection
Fire Protection - Fire Compartment: 2-SB-9 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SG-1N / Form: Detection
Fire Protection - Fire Compartment: 2-SG-1N / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SG-1S / Form: Detection
Fire Protection - Fire Compartment: 2-SG-1S / Form: Passive Protection
Fire Protection - Fire Compartment: 2-WH-1 / Form: Passive Protection

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Licensing Action #: 06

Licensing Action: Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Basis Date: May 1987 (NUREG-1057, Supplement 5)

To Be Transitioned?: Yes

Basis:

According to BVPS-2 "Updated Final Safety Analysis Report," (BVPS-2 UFSAR), Section 9.5A.2, Item C.5.a(5):

The Standard Review Plan states that door openings in fire barriers should be protected with equivalently rated doors, frames, and hardware that have been tested and approved by a nationally recognized laboratory. Such doors should be self-closing or provided with closing mechanisms and should be inspected semiannually to verify that automatic hold-open, release, and closing mechanisms and latches are operable. (See NFPA 80, 'Fire Doors and Windows.')

Areas protected by automatic total flooding gas suppression systems should have electrically supervised self-closing fire doors or fire doors should be kept closed and electrically supervised at a continuously manned location.

Differences from the SRP:

a. Fire door assemblies have been modified from their tested configuration by the addition of security hardware and alarm equipment as required by NRC regulation.

b. Rolling steel fire doors in the safeguards building have had the lower jam modified from the tested configuration to allow for the installation and removal of equipment.

c. Special purpose-type door assemblies (containment access doors/hatches) are not UL rated.

d. Hollow metal swing type fire door assemblies differ from their original UL tested configuration by having door clearances larger than those identified in ASTM E-152 and NFPA-80.

e. For areas protected by automatic total flooding gas suppression systems, certain doors are not equipped with electrical supervision but are locked closed or self-closing and maintained closed.

Justifications:

a. These modifications were made following the guidelines suggested by Underwriters Laboratories. They are similar to those made on BVPS-1 which were reviewed and found acceptable by the NRC. The door areas have either automatic detection and suppression or manual fire fighting equipment available in the areas. The security alarmed doors also have remote monitoring capability via the security system video monitors and the alarm function in the event the door is left open, which would alert personnel of an abnormal condition in these areas.

The adequacy of fire door assemblies in fire barriers separating safety-related areas will be justified by one of the following:

1. The door assembly will bear a UL label denoting the required fire rating,

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Licensing Action #: 06

Licensing Action: Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

2. The door assembly will have certification from the Vendor identifying the fire rating, or

3. The door assembly will be justified by an engineering analysis.

Table 9.5A-2 provides the list of fire doors with security modifications including the fire severities and methods of fire suppression for the areas separated by these doors.

b. The rolling steel doors in the north and south safeguards areas are not used to separate adjacent fire areas but are used to separate the stairwell within a fire area from the remainder of the area. Since the safeguards areas are normally unoccupied and the fire severity is less than 1/2 hour, this arrangement is acceptable.

c. These containment area special purpose-type door assemblies are capable of providing adequate fire protection for the area. The doors provide a pressure boundary and no UL fire-rated doors for these purposes are available.

d. The fire door assemblies will be justified by engineering analysis (Calc. No. 10080-DMC-3443).

e. Areas protected by automatic total flooding gas suppression systems are located in buildings that are provided with restricted access by electrically supervised security access locks which place the areas of concern out of normal travel routes. These doors are maintained closed, self-closing, administratively controlled by procedure, and checked on a daily basis. This ensures the operability of the doors and verifies that they are in the closed position. All fire doors to areas protected by automatic total flooding gas suppression systems are in accordance with the guidelines of the applicable NFPA codes for gaseous suppression systems (NFPA 12 or 12A). Doors subject to this exception are listed below:

FIRE DOOR	AREA ACCESSED	STATUS
CS-25-1	Cable Spreading to North Stair (Control Building 725')	Locked closed
CS-25-2	Cable Spreading to South Stair (Control Building 725')	Locked closed
CS-25-3	Cable Spreading to Equipment Shaft (Control Building 725')	Locked closed
DG-59-1	EDG 2-1 Room to Silencer Room (DG Building 759')	Locked closed
DG-59-2	EDG 2-1 Room to Plenum (DG Building 759')	Locked closed
DG-59-3	EDG 2-2 Room to Silencer Room (DG Building 759')	Locked closed
DG-59-4	EDG 2-2 Room to Plenum (DG Building 759')	Locked closed
DG-59-5	EDG 2-1 Room to EDG2-2 Room (DG Building 759')	*Note 1
IR-07-1	Process Equip Area to South Stair (Control Building 707')	*Note 1
IR-07-2	Process Equip Area to Equip Shaft (Control Building 707')	Locked closed
IR-12-1	Cable Tunnel to South Stair (Control Building 712')	*Note 1

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Licensing Action #: 06

Licensing Action: Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

FIRE DOOR	AREA ACCESSED	STATUS
CR-07-1	Cable Tunnel to North Stair (Control Building 707')	*Note 1
CR-07-3	East Communication Room to West Communication Room (Control Building 707')	*Note 1
CR-07-4	Process Equip Area to West Communication Room (Control Building 707')	*Note 1
CV-35-4	West Cable Vault to Wests Stair (CV Building 735')	*Note 1
CV-55-1	Rod Control Area to West Cable Vault (CV Building 755')	*Note 1
M-35-1	East Cable Vault to West Cable Vault (CV Building 735')	*Note 1
M-35-2	East Cable Vault to West Stair (CV Building 735')	*Note 1
M-35-4	East Cable Vault to Main Steam Pipe Chase (CV Building 735')	*Note 1
M-55-1	Rod Control Area to East Stair (CV Building 755')	*Note 1
M-55-2	Rod Control Area to Main Steam Pipe Chase (CV Building 755')	*Note 1
A-55-4	Rod Control Area to Relay Room (PAB Building 755')	Locked closed
A-55-5	Rod Control Area to Relay Room (PAB Building 755')	Locked closed
A-55-6	Rod Control Area to Relay Room (PAB Building 755')	Locked closed
A-55-9	Rod Control Area to Alt. Shutdown Panel Room (CV Building 755')	*Note 1
A-73-4	Primary Auxiliary Building to Control Building Ventilation Room (PAB 733')	Locked closed
S-35-70	Control Room to Computer Room (Control Building 735')	*Note 1

[*Note 1 - Self-closing & maintained closed]

The areas serviced by the automatic fire suppression systems are also protected by an early-warning smoke detection system which alarms in the control room. This system would provide early indication to the operations staff of a fire event in these areas. The gas suppression total-flooding systems servicing these areas are also designed to provide a "double-shot" full discharge capability, such that the initial discharge would be automatic and the follow-up discharge would be manually activated, if necessary. Manual hose stations for backup water suppression capability is also available for the subject areas providing additional defense-in-depth fire protection capability.

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Licensing Action: Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Evaluation:

NRC SSER - NUREG-1057, Supplement 5, Section 9.5.1.4, "General Plant Guidelines," states:

> *In the SER, the staff stated that with the exception of two rolling fire doors, door openings are in compliance with Section C.5.a(5) of BTP CMEB 9.5-1, which states that 'door openings in fire barriers should be protected with equivalently rated doors, frames, and hardware that have been tested and approved by a nationally recognized laboratory.' The applicant stated in Amendment 14 to the FSAR that certain doors have been modified by the installation of security hardware and are no longer approved fire doors. The applicant also stated that there are 'special purpose' doors that are not approved by Underwriters Laboratories (UL). During the site audit of January 27-30, 1987, the applicant identified 40 doors that were modified for security purposes. The applicant demonstrated that all modifications were made in accordance with recommendations supplied by UL. Although the applicant stated that all doors were originally purchased as UL-approved, it was noticed during the site visit that some UL labels were missing from doors. The applicant committed to have the doors relabeled by the manufacturer or to maintain on file documentation that individual doors are UL approved. This commitment will be implemented by fuel load. It was also observed that the security modifications consisted primarily of the addition of electric contact switches with a single conduit penetrating the frame. Installations appeared to be in accordance with design drawings, which were based on UL recommendations. Therefore, with the exception of the doors missing labels, the security-modified fire doors are an acceptable deviation from Section C.5.a(5) of BTP CMEB 9.5-1.*

Validation/Conclusions:

The bases for previous acceptance remain valid as described in the applicable sections above. The deviation for modified fire doors, special purpose doors, and certain doors that are not equipped with electrical supervision for areas protected by automatic total flooding gas suppression systems, is being transitioned to the new licensing basis per NFPA 805.

Disposition:

Licensing Action acceptable for transition

References:

- 1/2-ADM-1900, Revision 27, "Fire Protection Program."
- 1/2-ADM-1905, Revision 2, "Fire Protection/Fire Barrier Impairments."
- 1/2-PMP-33FP-FIRE DOORS-1M, Revision 8, "Periodic Inspection of Fire Doors."
- 10080-B-085, Revision 14, "Fire Hazard Analysis."
- 10080-DMC-3443, Revision 0, Addendum 1, "86-10 Evaluation of Excess Clearances b/w FR Doors & Frames."
- 10080-RA-0001C, Sheet 1, Revision 10, "Floor Plan - Service Building."

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Licensing Action: Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

- 10080-RA-0001D, Sheet 2, Revision 12, "Floor Plan - Service Building."
- 10080-RA-0001E, Sheet 3, Revision 9, "Floor Plan - Service Building."
- 10080-RA-0001F, Sheet 4, Revision 12, "Floor Plan - Service Building."
- 10080-RA-0006A, Sheet 1, Revision 30, "Door Schedule."
- 10080-RA-0006B, Sheet 2, Revision 20, "Door Schedule & Details."
- 10080-RA-0006D, Sheet 4, Revision 16, "Door Schedule."
- 10080-RA-0010G, Revision 5, "Stairs-Waste Handling Building."
- 10080-RA-0010K, Revision 6, "Safe Guards Building & Gaseous Waste Storage Vault Stairs & Detectors."
- 10080-RA-0020A, Revision 8, "General Roof Plan All Buildings."
- 10080-RA-0036A, Sheet 1, Revision 16, "Plans Auxiliary Building."
- 10080-RA-0036B, Sheet 2, Revision 15, "Plans Auxiliary Building."
- 10080-RA-0036F, Revision 10, "Plan Floor 718' & 710' Auxiliary Building."
- 10080-RB-0003A, Revision 12, "Fire Protection Arrangement."
- 10080-RB-0003B, Revision 10, "Fire Protection Arrangement 718' to 735'."
- 10080-RB-0003C, Revision 6, "Fire Protection Arrangement 735' to 760'."
- 10080-RB-0003D, Revision 7, "Fire Protection Arrangement 760' to 794'."
- 10080-RB-0003E, Revision 5, "Fire Protection Arrangement 735' to 752'."
- 10080-RC-0029A, Revision 7, "Plan-El 732-6 Outline Diesel Generator Building."
- 10080-RC-0031C, Revision 10, "MN STM and CV Building 735'-6"."
- 10080-RC-0031G, Revision 11, "MS & CV Slab Plan 773'-6"."
- 10080-RC-0038A, Revision 10, "Fuel and Decontamination Building Found Plan."
- 10080-RC-0038B, Revision 10, "Fuel & Decontamination Building Plan 768'-4" & Below."
- 10080-RC-0054C, Revision 5, "Plan 735'-6" Conditioning Polishing Building."
- 10080-RC-0054G, Revision 4, "Plan 774'-6" Conditioning Polishing Building."
- 10080-RC-0733A, Revision 8, "Embedments-Penetrations-Openings 722 & 735 Waste Handling."
- 10080-RS-0011B, Sheet 2, Revision 1, "Miscellaneous Steel Framing Service Building."
- 8700-RA-0020D, Revision 4, "Stair Details Main Entrance & Control Room."

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Licensing Action: Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

- BVPS-2 UFSAR, Revision 19, "BVPS-2 Updated Final Safety Analysis Report."
- NUREG-1057, Supplement 5, "NRC SSER - NUREG-1057, Supplement 5 dated May 1987."
- SP-6.0, Revision 43, "Tests, Inspections and Maintenance of Security Alarm Systems."
- SP-14.0, Revision 14, "Protected Area Surveillance System."

Associations:

Ch.4 - Compartment: 2-CB-1
Ch.4 - Compartment: 2-CB-5
Ch.4 - Compartment: 2-CB-6
Ch.4 - Compartment: 2-CV-1
Ch.4 - Compartment: 2-CV-2
Ch.4 - Compartment: 2-CV-3
Ch.4 - Compartment: 2-CV-5
Ch.4 - Compartment: 2-DG-1
Ch.4 - Compartment: 2-DG-2
Ch.4 - Compartment: 2-FB-1
Ch.4 - Compartment: 2-PA-3
Ch.4 - Compartment: 2-PA-4
Ch.4 - Compartment: 2-PA-5
Ch.4 - Compartment: 2-SB-1
Ch.4 - Compartment: 2-SB-2
Ch.4 - Compartment: 2-SB-3
Ch.4 - Compartment: 2-SB-4
Ch.4 - Compartment: 2-SB-5
Ch.4 - Compartment: 2-SB-6
Ch.4 - Compartment: 2-SB-7
Ch.4 - Compartment: 2-SB-8
Ch.4 - Compartment: 2-SB-9
Ch.4 - Compartment: 2-SG-1N
Ch.4 - Compartment: 2-SG-1S
Ch.4 - Compartment: 3-CR-1
Fire Protection - Fire Compartment: 2-CB-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CB-5 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CB-6 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CV-1 / Form: Gaseous Suppression
Fire Protection - Fire Compartment: 2-CV-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CV-2 / Form: Gaseous Suppression
Fire Protection - Fire Compartment: 2-CV-2 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CV-3 / Form: Gaseous Suppression
Fire Protection - Fire Compartment: 2-CV-3 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-CV-5 / Form: Passive Protection

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Licensing Action: Fire Doors - Modification of Fire Door Assemblies - BTP C.5.a(5)

Fire Protection - Fire Compartment: 2-CV-6 / Form: Gaseous Suppression
Fire Protection - Fire Compartment: 2-CV-6 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-DG-1 / Form: Gaseous Suppression
Fire Protection - Fire Compartment: 2-DG-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-DG-2 / Form: Gaseous Suppression
Fire Protection - Fire Compartment: 2-DG-2 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-FB-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-PA-3 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-PA-4 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-PA-5 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-S-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-1 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-2 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-3 / Form: Gaseous Suppression
Fire Protection - Fire Compartment: 2-SB-3 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-4 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-5 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-6 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-7 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-8 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SB-9 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SG-1N / Form: Passive Protection
Fire Protection - Fire Compartment: 2-SG-1S / Form: Passive Protection

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Licensing Action #: 07

Licensing Action: Outdoor Transformers - Deviation in Location and Lack of Building Wall 3-Hour Fire Resistance - BTP C.5.a(13)

Basis Date: May 1987 (NUREG-1057, Supplement 5)

To Be Transitioned?: No

Basis:

The BVPS-2 "Updated Final Safety Analysis Report," (BVPS-2 UFSAR), Section 9.5A.2, Item C.5.a(13) states:

The Standard Review Plan states that outdoor oil-filled transformers should be located at least 50 feet distant from buildings, or building walls within 50 feet of oil-filled transformers should be without openings and have a fire resistance rating of at least 3 hours.

Difference from the SRP:

Transformers TR-2A, TR-2C, TR-2D, and TR-MT-2 are located within 50 feet of buildings which do not have a fire-resistance rating of at least 3 hours.

Justification:

The walls within 50 feet of these transformers which do not have a 3-hour fire rating are the turbine building and south office and shops building (SOSB) walls. The turbine building has been provided with an insulated metal siding and 3-ply gypsum board design exterior wall assembly. The SOSB has been provided with 2-hour fire-rated walls in the exposed areas. The SOSB is not part of the production plant. In addition, these transformers are provided with slag-filled sumps for cooling of hot oil. Sumps are of sufficient capacity to retain the total oil inventory associated with each transformer. These transformers are also protected by heat actuated water deluge suppression systems.

Evaluation:

The NRC SSER - NUREG-1057, Supplement 5, Section 9.5.1.4, "General Plant Guidelines," states:

In the SER, the staff stated that the main service transformers are located more than 50 feet away from any building or are separated by 3-hour walls, and that the station service transformers are located within 50 feet of the turbine building; however, no safety-related equipment is located within the turbine building. The applicant stated in Amendment 14 to the FSAR that four transformers, TR-2A, TR-2C, TR-2D, and TR-MT-2, are located within 50 feet of buildings which do not have a fire-resistance rating of at least 3 hours. This is a deviation from Section C.5.a(13) of BTP CMEB 9.5-1. The applicant stated that all walls within 50 feet of the transformers are 2-hour rated and that all four transformers are provided with automatic deluge systems. In addition, the fire hazards analysis identifies safety-related station air compressors in the turbine building; however, they are not required for the safe shutdown of the plant. Therefore, the transformers do not pose a fire threat to plant

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Licensing Action: Outdoor Transformers - Deviation in Location and Lack of Building Wall 3-Hour Fire Resistance - BTP C.5.a(13)

safety, adequate separation and protection has been provided, and the configuration of the four transformers is an acceptable deviation from BTP CMEB 9.5-1.

Validation/Conclusions:

The outdoor transformers were evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- NUREG-1057, Supplement 5, "NRC SSER - NUREG-1057, Supplement 5 dated May 1987."

Associations:

None

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Licensing Action #: 08

Licensing Action: Safe Shutdown Components - Lack of Separation of Redundant Trains - BTP C.5.b

Basis Date: November 1986 (NUREG-1057, Supplement 3), and May 1987 (NUREG-1057, Supplement 5)

To Be Transitioned?: Yes

Basis:

According to the BVPS-2 "Updated Fire Safety Analysis Report," (BVPS-2 UFSAR), in Section 9.5A.2, "Safe Shutdown Components," Item C.5.b:

The Standard Review Plan states that one of the redundant trains is to be free of fire damage so that safe shutdown can be achieved. This can be achieved by:

a) Separating redundant trains by a fire barrier having a 3-hour rating.

b) Separating redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards. In addition, fire detectors and an automatic fire suppression system should be installed in the fire area.

c) Enclosing one redundant train in a fire barrier having a 1-hour rating. In addition, fire detectors and an automatic fire suppression system should be installed in the fire area.

Differences from the SRP:

The following safe shutdown components have not been provided with adequate separation as noted above:

DESCRIPTION	MARK NUMBER	FIRE AREA
(1) Charging Pumps	2CHS*P21A,B,C	PA-3
(2) Component Cooling Water Pumps	2CCP*P21A,B,C	PA-3
(3) Boric Acid Transfer Pumps and Storage Areas	2CHS*P22A,B & TK21A,B	PA-4
(4) Charging System Control Valves	2CHS*LCV115B,D	PA-3
	2CHS*FCV113A	PA-3
	2CHS*MOV350	PA-3
(5) Emergency Switchgear Supply and Exhaust Fans	2HVZ*FN261A,B	CV-4
	2HVZ*FN262A,B	CV-4
(6) Emergency Switchgear Supply and Exhaust Dampers	2HVZ*MOD21A,B	CV-4
	2HVZ*MOD22A,B	CV-4
(7) Emergency Exhaust Fans	2HVP*FN264A,B	PA-4
(8) Auxiliary Feedwater Control Valves	2FWE*HVC100A,B,C,D,E,F	SG-1S

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Licensing Action: Safe Shutdown Components - Lack of Separation of Redundant Trains - BTP C.5.b

DESCRIPTION	MARK NUMBER	FIRE AREA
(9) Atmospheric Steam Dump Valves	2SVS*PCV101A,B,C	MS-1
	2SVS*HVC104	MS-1
(10) Main Steam Isolation Valves	2MSS*AOV101A,B,C	MS-1
(11) Equipment inside containment	(Various)	RC-1

Approval of clarifications relative to this exemption is being requested as part of this LAR submittal and transition to NFPA 805 (See Attachment T "Clarification of Prior NRC Approvals" for requests).

Evaluation:

NRC SSER - NUREG-1057, Supplement 3, Section 9.5.1.4, "Safe-Shutdown Components," states:

By letter dated March 27, 1985, the applicant requested a deviation from Section C.5.b of BTP CMEB 9.5-1 for fire area PA-3 to the extent that it requires the separation of redundant safe-shutdown components by 3-hour fire-rated barriers.

This fire area is located on auxiliary building elevation 735 feet 6 inches. The two redundant and one swing charging pumps are located in this area, one in each of three adjacent cubicles. The walls between cubicles are reinforced concrete with 3-hour fire-rated penetration seals. The west wall of each cubicle is concrete block with a small crane rail opening; the east wall of each cubicle is reinforced concrete with a labyrinth-type opening. A curb is provided across each opening and a drain is provided in each cubicle. The equivalent fire severity per cubicle is less than 1/2 hour. Existing fire protection consists of portable extinguishers, hose stations, and an area wide ionization-type smoke-detection system.

The staff was concerned that a fire originating either outside of or within one of the pump cubicles would result in loss of safe-shutdown capability. However, because the fuel load in each cubicle is low, the staff does not expect a fire of significant magnitude or duration to occur. If a fire occurs anywhere in the fire area, it would be detected by the ionization detectors and extinguished by the plant's fire brigade before spreading into or from a pump cubicle. In the staff's opinion, any fire would, at most, cause damage to one shutdown system, but would not propagate horizontally and damage the redundant pump before self-extinguishing or being extinguished by the plant's fire brigade.

On the basis of this evaluation, the staff concludes that the lack of complete 3-hour fire-rated barriers around each redundant charging pump is an acceptable deviation from Section C.5.b of BTP CMEB 9.5-1.

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Licensing Action: Safe Shutdown Components - Lack of Separation of Redundant Trains - BTP C.5.b

NRC SSER - NUREG-1057, Supplement 5, Section 9.5.1.4, "Safe Shutdown Capability," states:

The staff review of the fire protection afforded the safe shutdown capability of Beaver Valley Unit 2 included the FSAR, up to and including Amendment 16, the fire protection safe shutdown report (FPSSR) provided by transmittal dated March 24, 1987 and additional information provided by letter dated May 11, 1987. FSAR Section 9.5.1 describes the overall fire protection program and the FPSSR discusses the safe shutdown capability, including the potential for spurious operation of equipment in each fire area. FSAR Section 7.4 provides additional information on safe and alternate shutdown system controls capability.

The applicant's safe shutdown analysis demonstrates that systems needed for hot and cold shutdown are redundant and that one of the redundant systems needed for safe shutdown would be free of fire damage because of separation, fire barriers, fire detection and suppression, or a combination of these and/or alternative shutdown capability. Alternative shutdown capability is provided for a fire in the instrumentation and relay room (CB-1), cable spreading room (CB-2), main control room (CB-3), west communication room (emergency shutdown panel station) (CB-6), and cable tunnel (CT-1) because these areas contain more than one division of safe shutdown cabling in close proximity to each other and in-place protection from fire cannot be provided.

For hot shutdown and for cooldown to cold shutdown conditions, at least one train of the following safe shutdown systems would be available: reactor coolant system (RCS), auxiliary feedwater system, main steam system (atmospheric dump valves) and chemical and volume control system (CVCS). For cold shutdown conditions, at least one train of the residual heat removal (RHR) system would be available for long-term decay heat removal. A single train provides the capability to achieve cold shutdown conditions within 72 hours with or without offsite power after a fire. The availability of these systems includes the components, cabling, electrical distribution panels, and support systems necessary to achieve cold shutdown. The support systems include the service water system; reactor plant component cooling water system; emergency diesel generator and its support systems; station service air system; filter water system; necessary heating, ventilation, and air conditioning systems; emergency ac and dc power systems; and necessary instrumentation to monitor plant parameters for safe shutdown. The above systems are used to achieve safe shutdown through various success paths, depending on the location of the fire. Reactivity control is accomplished through control rod insertion followed by boration provided by a charging pump (CVCS) drawing suction from borated water supplies from the refueling water storage tank or from the boric acid tanks through a boric acid transfer pump. RCS makeup/inventory control is provided by a charging pump combined with letdown. RCS pressure control is also accomplished by a charging pump combined with letdown, the power-operated relief valves, or the pressurizer heaters if available. RCS decay heat removal is accomplished initially using the steam generator safety relief valves and by the power-operated relief

room, the use of core exit thermocouples for T-hot indication and use of T-cold as an alternate to steam generator pressure indication are acceptable.

The applicant's fire protection safe shutdown analysis demonstrates that except for the instrument and relay room (CB-1), cable spreading room (CB-2), main control room (CB-3), west communication room (CB-6), and cable tunnel (CT-1), redundant systems and cabling needed for safe shutdown following a fire are separated in accordance with BTP CMEB 9.5-1, Positions C.5.b.1 and C.5.b.2 with some noted deviations that are evaluated elsewhere in Section 9.5.1 of the SER and its supplements. For Fire Areas CB-1, CB-2, CB-3, CB-6, and CT-1, the applicant has provided alternate shutdown capability independent of these areas in accordance with Position C.5.c of BTP CMEB 9.5-1.

NRC SSER - NUREG-1057, Supplement 5, Section 9.5.1.4, "Safe Shutdown Components," states:

Section C.5.b of BTP CMEB 9.5-1 identifies the separation criteria for redundant safe shutdown components. The applicant had originally intended to install new barriers for areas that do not meet these guidelines. By letter dated March 27, 1985, the applicant stated that installation of these barriers would not be possible and that an alternative means of separation would be required, which would necessitate deviations from the SRP. Amendment 14 to the FSAR identified 11 areas in which deviations from the separation criteria exist. One of these areas, the charging pump room, was approved in SSER 3. The remaining deviations have been evaluated through Amendment 14 and during a site audit of January 27-30, 1987. The 10 deviations were found to be acceptable as identified in the following evaluations.

Component Cooling Water Pumps

*The component cooling water pumps (2CCP*P21A, B, and C) are located in the auxiliary building at elevation 735 feet, 6 inches. Pumps A and B are separated by 24 feet; however, the C swing pump is located between pumps A and B and is an intervening combustible. Each pump contains ½ gallon of lube oil and has combustible motor insulation. The combustible loading in the immediate area of the pumps is negligible and there is detection and automatic water suppression over each pump. There is reasonable assurance that a single fire could not jeopardize the operation of both pumps A and B. If a fire were to occur, the plant fire brigade would respond and control it. The automatic suppression would also limit the size and intensity of a fire. Therefore, the lack of at least 20 feet of separation of the component cooling pumps with no intervening combustibles is an acceptable deviation from Section C.5.b of BTP CMEB 9.5-1.*

Boric Acid Transfer Pumps and Storage Tanks

Each of the boric acid pumps and tanks is located in a separate cubicle with 2-foot-thick reinforced concrete walls. The pumps and tanks do not meet the separation criteria because they are located within 20 feet of their redundant components and the cubicles are not totally enclosed. Each of the cubicles has a labyrinth-type

component cooling pumps with no intervening combustibles is an acceptable deviation from Section C.5.b of BTP CMEB 9.5-1.

Boric Acid Transfer Pumps and Storage Tanks

Each of the boric acid pumps and tanks is located in a separate cubicle with 2-foot-thick reinforced concrete walls. The pumps and tanks do not meet the separation criteria because they are located within 20 feet of their redundant components and the cubicles are not totally enclosed. Each of the cubicles has a labyrinth-type opening for missile and radiation protection. Each cubicle will be provided with detection and the combustible loading is low. It is expected that a fire would be detected in its incipient stage and that the plant fire brigade would respond and control it. It is not probable that a fire in any cubicle could travel through the labyrinth opening and into the adjacent cubicle of the redundant component. Therefore, the arrangement of the boric acid transfer pumps and boric acid storage tanks is an acceptable deviation from BTP CMEB 9.5-1 Section C.5.b.

Charging System Suction Valves

There are four valves that can provide suction paths for the charging pumps during shutdown. All four valves are located in the same area; however, only one valve is necessary for safe shutdown. There is approximately 15 feet of separation between the farthest valves. The combustible loading in the area is negligible. Access to the area will be strictly controlled for radiation purposes and therefore, it is unlikely that transient combustibles would accumulate. The area is provided with detection and it is expected that a fire would be detected in its incipient stage and that the plant fire brigade would respond and extinguish it. There is reasonable assurance that a fire would not prevent the operation of at least one of the four valves. Therefore, the lack of charging system suction valve separation is an acceptable deviation from BTP CMEB 9.5-1, Section C.5.b.

Emergency Switchgear Room Supply and Exhaust Fans and Emergency Switchgear Room Supply Dampers

The emergency switchgear room supply and exhaust fans and emergency switchgear room supply dampers do not meet the criteria of the SRP because the redundant components are not separated from each other by a 3-hour barrier. The two supply fans and the two exhaust fans are located in Fire Area CV-4. All of the motors are totally enclosed and are located in separate ductwork. The control cable for supply fan A and exhaust fan A has been protected with 1-hour fire-wrap material in the fire area outside of the ductwork. The combustible loading in the fire area is negligible and detection has been provided. It is anticipated that if a fire were to occur, it would be detected in the incipient stage and the plant fire brigade would respond to extinguish it, using adjacent hose racks. There is reasonable assurance that a fire would not jeopardize both trains of supply fans and exhaust fans. The supply dampers are located in a plenum adjacent to the supply fans. The combustible loading in the plenum is negligible and there is limited access by plant personnel. The damper motors are totally enclosed, which would prevent the

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Licensing Action: Safe Shutdown Components - Lack of Separation of Redundant Trains - BTP C.5.b

burnout of one motor from affecting the operation of the other. There is reasonable assurance that a fire would not affect the operation of both dampers. Therefore, the lack of separation between the emergency switchgear room supply fans and exhaust fans and the emergency switchgear room supply dampers is an acceptable deviation from Section C.5.b of BTP CMEB 9.5-1.

Charging Pump Emergency Exhaust Fans

The charging pump emergency exhaust fans are not in compliance with the SRP because they are not separated by a 3-hour barrier. The fans are located in Fire Area PA-4 and are in a configuration similar to the emergency switchgear supply and exhaust fans. Both fans and motors are totally contained within the ductwork. The combustible loading near the fans is low and detection is provided. Therefore, the lack of separation between the charging pump emergency exhaust fans is an acceptable deviations from Section C.5.b of BTP CMEB 9.5-1.

Auxiliary Feedwater Control Valves

The six auxiliary feedwater control valves are all located in Fire Area SG-1S, which deviates from the separation guidelines of the SRP. However, these valves are hydroelectrically operated, normally open valves, which fail "as is" on loss of electrical control. On loss of hydraulic oil, the auxiliary feedwater flow will open the valves. The applicant stated that auxiliary feedwater flow can be controlled manually throttling the discharge valve at the auxiliary feedwater pump. The combustible loading in fire area SG-1S is less than 1/2 hour and detection is provided. It is anticipated that a fire would be detected early and the plant fire brigade would respond and control it. Even if a fire were to disable all six valves, the plant could still be able to safely shut down. Therefore, the lack of separation between redundant auxiliary feedwater control valves is an acceptable deviation from Section C.5.b. of BTP CMEB 9.5-1.

Atmospheric Steam Dump Valves and Main Steam Isolation Valves

*Atmospheric steam dump valves 2SVS*PCV 101 A, B, and C and main steam isolation valves (MSIVs) 2MSS*HYC 101 A, B, and C are located in the main steam valve house and are not separated in compliance with the SRP guidelines. The combustible loading in the valve house is less than ½ hour and the detection is provided. The steam dump valves are partially separated by concrete walls, which extend at least 2 feet beyond the valves. The MSIVs are spring-loaded valves, which are latched open during plant operation. Only one of the three solenoid-operated valves for each MSIV is required to operate to close the MSIV. Two of the solenoids are designed to de-energize and the third is designed to energize. There is reasonable assurance that a fire would not prevent the operation of the required steam dump valves or main steam isolation valves. By letter dated December 4, 1986, the staff granted an exemption for the Beaver Valley Unit 1 main steam valve room equipment separation. The configuration of the Unit 2 main steam valve room is equivalent to that of Unit 1. Therefore, the lack of separation between valves in*

the main steam valve room is an acceptable deviation from Section C.5.b of BTP CMEB 9.5-1.

Reactor Containment

Equipment inside containment is not in compliance with Section C.5.b of BTP CMEB 9.5-1 because redundant trains of safe shutdown components and circuitry are not separated by 3-hour walls or are not separated by 20 feet with no intervening combustibles. Generally, redundant cables inside the containment are run on opposite sides of the interior wall. Although this does not provide 3-hour separation, the wall is a significant barrier to fire and heat. Cables inside the containment are either qualified to IEEE Standard 383 or are run inside conduit. The only significant combustible loading other than cable is the oil inside the reactor coolant pumps, RHR pumps, and the charcoal filters. The reactor coolant pumps are provided with an oil collection system in compliance with the SRP, which reduces the potential for spread of combustible oil. Both the RHR pumps and the charcoal filters are provided with detection and suppression systems. The penetration area, where redundant divisions are separated by at least 18 feet, is provided with detection and automatic suppression. Because of the low in situ combustibles and the containment's large volume, it is expected that any fire would develop slowly with the heat dissipated to the large air space. In addition, because access to the area is tightly controlled, it is not expected that transient combustibles would contribute to the fire loading. Therefore, there is reasonable assurance that a fire inside the containment would not jeopardize both trains of redundant safe shutdown equipment, and lack of complete separation of redundant trains of safe shutdown components inside containment is an acceptable deviation from Section C.5.b of BTP CMEB 9.5-1.

Safe Shutdown Circuitry

In Amendment 14 to the FSAR, the applicant identified six fire areas where safe shutdown circuitry is not in compliance with Section C.5.b of BTP CMEB 9.5-1. The fire areas include cable vaults (CV-4 and CV-5), primary auxiliary building (PA-4), pipe tunnel (PT-1), south safeguards building (SG-1S), and the service building normal switchgear (SB-4). These fire areas deviate from the SRP because they do not contain automatic suppression in addition to detection and 1-hour separation. All six areas have a combustible loading of less than 1/2 hour and detection is provided. One train of circuitry is wrapped with 1-hour material in each of the six areas. It is expected that a fire would be detected in its incipient stage and the plant fire brigade would respond. All of the areas are provided with hose racks for fire brigade use. Providing automatic suppression in these areas would not significantly increase the level of fire protection. Therefore, the lack of area suppression for Fire Areas CV-4, CV-5, PA-4, PT-1, SG-1S, and SB-4 is an acceptable deviation from Section C.5.b of BTP CMEB 9.5-1.

Electrical Cable Construction, Cable Trays, and Cable Penetrations

In the SER, the staff identified three fire areas where cable tray separation did not meet the guidelines of Section C.5.e (2) of BTP CMEB 9.5-1. They include the

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containment (RC-1) and the primary auxiliary building (PA-3 and PA-4). In Amendment 14 to the FSAR, the applicant provided clarification of this deviation and stated that continuous line-type detection was not provided in any safety-related cable trays; however, all areas containing safety-related cables had general area detection and all areas with concentrated cables, except for RC-1, PA-3, and PA-4, were provided with automatic suppression. As identified previously in the SER, the addition of automatic suppression in these three areas would not significantly enhance fire safety. Also, the general area detection provides adequate assurance that a fire in any safety-related cable will be detected in its incipient stage, making line-type heat detection unnecessary. Therefore, the lack of automatic suppression in fire areas RC-1, PA-3, and PA-4 and the lack of continuous-line type of heat detection in safety-related cable trays are acceptable deviations from Section C.5.b of BTP CMEB 9.5-1.

Validation/Conclusions:

The bases for previous acceptance remain valid as described in the applicable sections above. The deviation for lack of separation of redundant trains for safe shutdown components is being transitioned to the new licensing basis under NFPA 805.

Only items 1 and 11 in the licensing basis is being transitioned as the other items have been analyzed as part of the NFPA 805 program and it was determined that the approval for items 2-10 is no longer required.

Disposition:

Licensing Action acceptable for transition

References:

- 10080-B-085, Revision 14, "Fire Hazard Analysis."
- 10080-RB-0003B, Revision 10, "Fire Protection Arrangement 718' to 735'."
- 10080-RB-0003E, Revision 5, "Fire Protection Arrangement 735' to 752'."
- 10080-RC-0037E, Sheet 5, Revision 8, "Wall Sections & Details Auxiliary Building."
- 2701.620-000-020, Revision A, "Detailed Fire Modeling Report - 2-CR-1."
- BVPS-2 UFSAR, Revision 19, "BVPS-2 Updated Final Safety Analysis Report."
- FPSSR, Addendum 37, "BVPS-2 Fire Protection Safe Shutdown Report."
- NUREG-1057, Supplement 3, "NRC SSER - NUREG-1057, Supplement 3 dated November 1986."
- NUREG-1057, Supplement 5, "NRC SSER - NUREG-1057, Supplement 5 dated May 1987."
- TER-13568, Revision 0, "IEEE-383-74 Cable Flame Test Comparative Analysis."

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Associations:

Ch.4 - Compartment: 2-PA-3
Ch.4 - Compartment: 2-PA-3A
Ch.4 - Compartment: 2-PA-3B
Ch.4 - Compartment: 2-PA-3C
Ch.4 - Compartment: 2-RC-1
Fire Protection - Fire Compartment: 2-PA-3 / Form: Detection
Fire Protection - Fire Compartment: 2-PA-3 / Form: Passive Protection
Fire Protection - Fire Compartment: 2-PA-3 / Form: Water-Based Suppression
Fire Protection - Fire Compartment: 2-PA-3A / Form: Passive Protection
Fire Protection - Fire Compartment: 2-PA-3B / Form: Passive Protection
Fire Protection - Fire Compartment: 2-PA-3C / Form: Passive Protection
Fire Protection - Fire Compartment: 2-RC-1 / Form: Detection
Fire Protection - Fire Compartment: 2-RC-1 / Form: Water-Based Suppression

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Licensing Action: Safe Shutdown Circuitry - Lack of Separation of Redundant Trains - BTP C.5.b

Basis Date: May 1987 (NUREG-1057, Supplement 5)

To Be Transitioned?: No

Basis:

BVPS-2 "Updated Final Safety Analysis Report," (BVPS-2 UFSAR), Section 9.5A.2, Item C.5.b, states:

The Standard Review Plan states that one of the redundant trains is to be free of fire damage so that safe shutdown can be achieved. This can be achieved by:

a) Separating redundant trains by a fire barrier having a 3-hour rating.

b) Separating redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards. In addition, fire detectors and an automatic fire suppression system should be installed in the fire area.

c) Enclosing one redundant train in a fire barrier having a 1-hour rating. In addition, fire detectors and an automatic fire suppression system should be installed in the fire area.

Differences from the SRP:

The following areas have redundant circuitry and do not meet the guidelines of C.5.b, nor is alternate shutdown capability provided for the following areas except SB-4 which relies on the ASP for monitoring of certain instrumentation and ventilation control....

(1) Cable Vaults (CV-1, CV-2, CV-3, CV-4 and CV-5)

(2) Primary Auxiliary Building (PA-4)

(3) South Safeguards Building (SG-1S)

(4) Service Building Normal Switchgear (SB-4)

(5) Primary Auxiliary Building (PA-3)

(6) Alternate Shutdown Panel (ASP)

(7) Emergency Switchgear Rooms (SB-1 and SB-2)

(8) Service Building Cable Tray Area (SB-3)

(9) Reactor Containment (RC-1)

Justification:

(1) Fire Areas CV-4 and CV-5 contain redundant circuitry for various components of the emergency switchgear ventilation systems. The combustible loading for each area is less than 1/2 hour. All cables in these areas are routed in conduit. In addition, orange cables for the equipment have been adequately protected using a fire-wrap material. Fire detection for these areas consists of area ionization

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detectors which alarm locally and in the control room. Portable fire extinguishers are located in these areas with manual hose stations located immediately adjacent to these areas. Based on the low combustible loading fire detection present, and the fact that redundant cabling required for shutdown has been provided with additional protection, the means of suppression is adequate to protect the hazard and provide the required separation.

(2) The auxiliary building, elevation 755 ft-6 in. contains redundant circuitry for various shutdown components. The combustible loading for this area is less than 1/2 hour. This area is compartmentalized for radiological and safety-related concerns.

Various cabling has been adequately protected using a fire-wrap material. Fire detection for these areas consists of area ionization detectors which alarm locally and in the control room. Portable fire extinguishers are located in the area and manual hose stations are located in the stairwells adjacent to this area. Based on the low amount of combustible loading, the fire detection present, and the fact that redundant cabling required for shutdown has been provided with additional protection, the means of suppression available is adequate to protect the hazard and provide the required separation.

(3) The south safeguards building contains redundant circuitry for various components of the auxiliary feedwater system. The loading for the combustible fire area is less than 1/2 hour. Purple cables for this equipment have been adequately protected using fire-wrap material. Fire detection for this area consists of area ionization detectors which alarm locally and in the control room. Portable fire extinguishers and manual hose stations are located in this area. Based on the low combustible loading, the fire detection present, and the fact that redundant cabling required for shutdown has been provided with additional protection, the means of suppression is adequate to protect the hazard and provide the required separation.

(4) The service building normal switchgear room contains redundant circuitry for the ventilation systems to the emergency diesel generator building. The combustible loading for this fire area is less than 1 hour. Orange cables for the equipment have been adequately protected using a fire-wrap material. Fire detection for this area consists of area ionization smoke detectors which alarm locally and in the control room. Portable fire extinguishers and manual hose stations are located in the area. Based on the low combustible loading, the fire detection present, and the fact that redundant cabling required for shutdown has been provided with additional protection, the means of suppression is adequate to protect the hazard and provide the required separation.

(5) The auxiliary building, elevation 735 ft-6 in. contains redundant circuitry for various shutdown components. The combustible loading for this area is less than 1/2 hour. This area is compartmentalized for radiological and safety-related concerns. Various cabling has been adequately protected using a fire-wrap material. Fire detection for these areas consists of area ionization detectors which alarm

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locally and in the control room. Portable fire extinguishers are located in the area and manual hose stations are located in the stairwells adjacent to this area. Based on the low amount of combustible loading, the fire detection present, and the fact that redundant cabling required for shutdown has been provided with additional protection, the means of suppression available is adequate to protect the hazard and provide the required separation.

*(6) The charging system suction valve area which is located on the 718'-6" and 710'-6" elevations of the auxiliary building contains redundant circuitry for the charging pump suction valves 2CHS*LCV115D and B, 2CHS*MOV350 and 2CHS*FCV113A. The fire loading for this area is less than 1/2 hour. All cables in this area are routed in conduit. In addition, for radiation hazard reasons, these areas are restricted access and are out of normal plant travel routes. The cables for 2CHS*LCV115D have been adequately protected by a fire-wrap material. Due to the fact that only one out of the four valves has to operate, the area contains negligible combustibles and the area is provided with general area fire detection, hose racks and portable fire extinguishers; a fire in the area will not prevent safe shutdown and adequate separation is provided.*

(7) Spurious Operation of the PORVs

A deviation from the requirements of BTP CMEB 9.5-1, Section C.5.b has been identified relative to the separation of the electrical circuits of the pressurizer power operated relief valves and their associated motor operated block valves. The circuits for redundant valves which isolate the high-low pressure interface lines do not meet the separation criteria of C.5.b. A potential for spurious operation of the pressurizer power operated relief valves has been identified for fire areas ASP, CV-1, CV-2, CV-3, RC-1, SB-1, SB-2, and SB-3, and the normally open block valve could also be rendered inoperable. Alternate shutdown capability has not been provided for these fire areas. In the event of a serious fire in these areas, the operator will open the d-c circuit breakers to deenergize the electrical power to the PORV.

The PORV circuits affected are ungrounded 125 VDC circuits and are routed in thermoset cable. A single fire-induced cable-to-cable hot short will not result in spurious opening of the PORVs. With the power circuit deenergized, in order to open a single PORV, multiple shorts of the proper polarity, on thermo-set multiconductor cables, would be required.

EPRI TR-1003326, Characterization of Fire-Induced Circuit Failures: Results of Cable Fire Testing, Final Report December 2002, indicates that inter-cable (cable to cable) shorting is much less likely than intra-cable shorts. One area discussed by this report is the potential duration of spurious operation events. The testing strongly suggests that fire induced hot shorts will likely self-mitigate (e.g., short to ground) after some limited period of time. The test data shows that a majority of the circuit failures resulting in spurious operation had a duration of less than 1 minute. Less than 10% of all failures lasted more than 5 minutes, with the longest duration recorded for the tests equal to 10 minutes. From this it may be concluded that the

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Licensing Action: Safe Shutdown Circuitry - Lack of Separation of Redundant Trains - BTP C.5.b

chance of having two such faults at the same time on the specific conductors to cause a spurious actuation of sufficient duration to affect safe shutdown would be extremely unlikely.

BV Design Analysis Calculation No. 10080-DMC-0820 has determined that no core damage would occur in the event of a spurious PORV opening under credible fire protection scenarios.

Acceptability of this deviation is documented in accordance with 10080-DEC-0254.

Evaluation:

The NRC SSER - NUREG-1057, Supplement 5, Section 9.5.1.4, "General Plant Guidelines" states:

Safe Shutdown Circuitry

In Amendment 14 to the FSAR, the applicant identified six fire areas where safe shutdown circuitry is not in compliance with Section C.5.b of BTP CMEB 9.5-1. The fire areas include cable vaults (CV-4 and CV-5), primary auxiliary building (PA-4), pipe tunnel (PT-l), south safeguards building (SG-1S), and the service building normal switchgear (SB-4). These fire areas deviate from the SRP because they do not contain automatic suppression in addition to detection and 1-hour separation. All six areas have a combustible loading of less than 1/2 hour and detection is provided. One train of circuitry is wrapped with 1-hour material in each of the six areas. It is expected that a fire would be detected in its incipient stage and the plant fire brigade would respond. All of the areas are provided with hose racks for fire brigade use. Providing automatic suppression in these areas would not significantly increase the level of fire protection. Therefore, the lack of area suppression for Fire Areas CV-4, CV-5, PA-4, PT-1, SG-1S, and SB-4 is an acceptable deviation from Section C.5.b of BTP CMEB 9.5-1.

Validation/Conclusions:

The safe shutdown circuitry was evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- NUREG-1057, Supplement 5, "NRC SSER - NUREG-1057, Supplement 5 dated May 1987."

Associations:

None

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Licensing Action: Alternative or Dedicated Safe Shutdown Capability - Deviation When Protection or Separation is Not Adequate - BTP C.5.c(7)

Basis Date: May 1987 (NUREG-1057, Supplement 5)

To Be Transitioned?: No

Basis:

The BVPS-2 "Updated Final Safety Analysis Report" (BVPS-2 UFSAR), Section 9.5A, Item C.5.c, "Alternative or Dedicated Shutdown Capability" states:

Item C.5.c(7) requires that the alternate safe shutdown equipment and systems be isolated from associated circuits such that a postulated fire will not prevent safe shutdown. Alternate safe shutdown capability, which has been provided for fire areas CB-1, CB-2, CB-3, CB-6, and CT-1, does not provide for isolation of the pressurizer PORVs in the event of multiple cable-to-cable hot shorts. Technical justification for the alternate shutdown fire areas is the same as documented under C.5.b above.

Justification from "Safe Shutdown Circuitry," C.5.b:

(1) Fire Areas CV-4 and CV-5 contain redundant circuitry for various components of the emergency switchgear ventilation systems. The combustible loading for each area is less than 1/2 hour. All cables in these areas are routed in conduit. In addition, orange cables for the equipment have been adequately protected using a fire-wrap material. Fire detection for these areas consists of area ionization detectors which alarm locally and in the control room. Portable fire extinguishers are located in these areas with manual hose stations located immediately adjacent to these areas. Based on the low combustible loading fire detection present, and the fact that redundant cabling required for shutdown has been provided with additional protection, the means of suppression is adequate to protect the hazard and provide the required separation.

(2) The auxiliary building, elevation 755 ft-6 in. contains redundant circuitry for various shutdown components. The combustible loading for this area is less than 1/2 hour. This area is compartmentalized for radiological and safety-related concerns.

Various cabling has been adequately protected using a fire-wrap material. Fire detection for these areas consists of area ionization detectors which alarm locally and in the control room. Portable fire extinguishers are located in the area and manual hose stations are located in the stairwells adjacent to this area. Based on the low amount of combustible loading, the fire detection present, and the fact that redundant cabling required for shutdown has been provided with additional protection, the means of suppression available is adequate to protect the hazard and provide the required separation.

(3) The south safeguards building contains redundant circuitry for various components of the auxiliary feedwater system. The loading for the combustible fire area is less than 1/2 hour. Purple cables for this equipment have been adequately protected using fire-wrap material. Fire detection for this area consists of area

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ionization detectors which alarm locally and in the control room. Portable fire extinguishers and manual hose stations are located in this area. Based on the low combustible loading, the fire detection present, and the fact that redundant cabling required for shutdown has been provided with additional protection, the means of suppression is adequate to protect the hazard and provide the required separation.

(4) The service building normal switchgear room contains redundant circuitry for the ventilation systems to the emergency diesel generator building. The combustible loading for this fire area is less than 1 hour. Orange cables for the equipment have been adequately protected using a fire-wrap material. Fire detection for this area consists of area ionization smoke detectors which alarm locally and in the control room. Portable fire extinguishers and manual hose stations are located in the area. Based on the low combustible loading, the fire detection present, and the fact that redundant cabling required for shutdown has been provided with additional protection, the means of suppression is adequate to protect the hazard and provide the required separation.

(5) The auxiliary building, elevation 735 ft-6 in. contains redundant circuitry for various shutdown components. The combustible loading for this area is less than 1/2 hour. This area is compartmentalized for radiological and safety-related concerns. Various cabling has been adequately protected using a fire-wrap material. Fire detection for these areas consists of area ionization detectors which alarm locally and in the control room. Portable fire extinguishers are located in the area and manual hose stations are located in the stairwells adjacent to this area. Based on the low amount of combustible loading, the fire detection present, and the fact that redundant cabling required for shutdown has been provided with additional protection, the means of suppression available is adequate to protect the hazard and provide the required separation.

*(6) The charging system suction valve area which is located on the 718'-6" and 710'-6" elevations of the auxiliary building contains redundant circuitry for the charging pump suction valves 2CHS*LCV115D and B, 2CHS*MOV350 and 2CHS*FCV113A. The fire loading for this area is less than 1/2 hour. All cables in this area are routed in conduit. In addition, for radiation hazard reasons, these areas are restricted access and are out of normal plant travel routes. The cables for 2CHS*LCV115D have been adequately protected by a fire-wrap material. Due to the fact that only one out of the four valves has to operate, the area contains negligible combustibles and the area is provided with general area fire detection, hose racks and portable fire extinguishers; a fire in the area will not prevent safe shutdown and adequate separation is provided.*

(7) Spurious Operation of the PORVs

A deviation from the requirements of BTP CMEB 9.5-1, Section C.5.b has been identified relative to the separation of the electrical circuits of the pressurizer power operated relief valves and their associated motor operated block valves. The circuits for redundant valves which isolate the high-low pressure interface lines do not meet

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the separation criteria of C.5.b. A potential for spurious operation of the pressurizer power operated relief valves has been identified for fire areas ASP, CV-1, CV-2, CV-3, RC-1, SB-1, SB-2, and SB-3, and the normally open block valve could also be rendered inoperable. Alternate shutdown capability has not been provided for these fire areas. In the event of a serious fire in these areas, the operator will open the d-c circuit breakers to deenergize the electrical power to the PORV.

The PORV circuits affected are ungrounded 125 VDC circuits and are routed in thermoset cable. A single fire-induced cable-to-cable hot short will not result in spurious opening of the PORVs. With the power circuit deenergized, in order to open a single PORV, multiple shorts of the proper polarity, on thermo-set multiconductor cables, would be required.

EPRI TR-1003326, Characterization of Fire-Induced Circuit Failures: Results of Cable Fire Testing, Final Report December 2002, indicates that inter-cable (cable to cable) shorting is much less likely than intra-cable shorts. One area discussed by this report is the potential duration of spurious operation events. The testing strongly suggests that fire induced hot shorts will likely self-mitigate (e.g., short to ground) after some limited period of time. The test data shows that a majority of the circuit failures resulting in spurious operation had a duration of less than 1 minute. Less than 10% of all failures lasted more than 5 minutes, with the longest duration recorded for the tests equal to 10 minutes. From this it may be concluded that the chance of having two such faults at the same time on the specific conductors to cause a spurious actuation of sufficient duration to affect safe shutdown would be extremely unlikely.

BV Design Analysis Calculation No. 10080-DMC-0820 has determined that no core damage would occur in the event of a spurious PORV opening under credible fire protection scenarios.

Acceptability of this deviation is documented in accordance with 10080-DEC-0254.

Evaluation:

NRC SSER - NUREG-1057, Supplement 5, Section 9.5.1.4, "General Plant Guidelines," states:

Alternate Shutdown Capability

The applicant has provided alternate shutdown capability for a fire in the instrumentation and relay room (CB-l), cable spreading room (CB-2), main control room (CB-3), west communication room (CB-6) and cable tunnel (CT-1) via the alternate shutdown panel (ASP), transfer switch panel and local stations outside the above areas. FSAR Section 7.4 and fire protection safe shutdown report Appendix A-2 describes the alternate shutdown panel capability and identifies the instrumentation and control located thereon. The alternate shutdown panel is located at elevation 755 feet, 6 inches in the auxiliary building and control one train (train A) of redundant shutdown components which are necessary for cold shutdown

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of the plant. Transfer switches isolate the safe shutdown equipment cables from the affected fire areas to ensure independent control of the alternate shutdown panel.

The alternate shutdown capability provides direct reading and controls to monitor the process variables and take the necessary action to perform reactivity control, reactor coolant makeup/inventory control and reactor heat removal. The applicant has provided the following essential indications at the alternate shutdown panel independent of the control room for achieving and maintaining safe shutdown:

(1) pressurizer level

(2) reactor coolant system (RCS) wide-range pressure

(3) RCS wide-range hot-leg temperature

(4) RCS wide-range cold-leg temperature

(5) steam generator wide-range pressure

(6) steam generator wide-range level

(7) auxiliary feedwater flow to two steam generators

(8) source and startup-range reactor flux

The alternate shutdown panel also includes controls for the following essential systems or components:

(1) charging and boric acid pumps

(2) auxiliary feedwater (AFW) pump

(3) residual heat removal (RHR) pump

(4) component cooling water (CCW) pump

(5) service water pump

(6) charging pump flow control valve and suction isolation valve from the RWST

(7) letdown orifice, isolation and coolant recovery valves

(8) AFW flow control valves

(9) atmospheric steam dump valves

(10) pressurizer power operated relief valves

(11) pressurizer heaters

(12) nitrogen supply valves to safety injection accumulations

(13) RHR isolation valves

(14) CCW supply valve to RHR heat exchanger

(15) service water pump discharge valve and supply valve to diesel generator

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(16) emergency diesel generator set and supply breakers

Local indications and controls will be used for other components required for shutdown.

The design of the alternate shutdown system complies with the performance goals outlined in Position C.5.c of BTP CMEB 9.5-1. Reactivity control is accomplished by (1) manual scram (before the operator leaves the control room), (2) boron addition via the chemical and volume control system (CVCS) using the refueling water storage tank or boric acid tank, and (3) controlling the RCS letdown. The reactor coolant makeup and pressure control functions are also performed by the charging pump, letdown and RWST. Reactor coolant inventory is ensured by maintaining reactor coolant pump seal injection and by isolating possible locations of inventory loss such as PORVs, RHR suction lines, letdown line and reactor head vents. RCS pressure control is also provided by the PORV or actuation of the pressurizer heaters. Heat is removed from the RCS by the AFW system, main steam safety valves or the power-operated main steam relief valves. When the RCS temperature falls to 350oF, the heat removal function is transferred to the RHR system. All these operations can be accomplished from outside the control room.

In addition to scramming the reactor from the control room, the applicant has included procedures for other actions that are to be performed before the control room is evacuated. These actions, however can be performed outside the control room regardless of circuit damage within the control room. They include, among other, tripping MSIVs, closing the PORV block valves and letdown isolation valves, and aligning the charging pump suction to the RWST. The above actions will prevent spurious actuations, failure of specific automatic functions, and the operation of other specific automatic functions from causing an unrecoverable condition. The transfer switches are designed so that even if fire damages the circuits before the position of a transfer switch is changed, fuse replacement is not required for equipment operation after the transfer is complete. Thus, the design of transfer switches adequately cover the concern identified in Inspection and Enforcement (IE) Information Notice 85-09, 'Isolation Transfer Switches and Post-Fire Safe Shutdown Capability.'

The staff has reviewed the actions required by the procedures for achieving and maintaining safe plant shutdown following a control room area fire. For hot standby, the immediate actions are primarily precautionary measures to ensure that no unacceptable spurious actuations take place because of a control room fire. Should they occur before these actions are accomplished, the procedures provide guidance for overcoming and correcting the inadvertent spurious actuations. The procedures also describe other operator actions at the ASP and local stations for safe hot and cold shutdown from outside the control room. Portable ventilation may have to be provided for the charging pump cubicles within 24 hours, as described previously. Repairs for opening the containment isolation valves for the component cooling water and service water systems may be required for cold shutdown. Repairs

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consist of lifting leads, installing jumpers, and replacing fuses. Component cooling water provides cooling to the RHR heat exchangers. Service water provides cooling water to the containment air recirculation coils for RHR pump room ventilation. Portable ventilation and other materials for repairs are stored in a dedicated area on site. The staff has reviewed the proposed actions and manpower requirements for alternate safe shutdown and concludes they are in accordance with Position C.5.c of BTP CMEB 9.5-1, including the use of portable ventilation for the charging pump cubicles and repairs of valves for cold shutdown, since they can be accomplished exclusive of fire brigade members.

On the basis of its review, the staff concludes that the alternate shutdown capability complies with the requirements of GDC 3 and the criteria of Appendix R, Section III.L as contained in SRP Section 9.5.1, and BTP CMEB 9.5-1, Position C.5.c and is, therefore acceptable. This closes the alternate shutdown part of open issue 5.

Validation/Conclusions:

The dedicated safe shutdown capability was evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- NUREG-1057, Supplement 5, "NRC SSER - NUREG-1057, Supplement 5 dated May 1987."

Associations:

None

BVPS-2

Licensing Action #: 11

Licensing Action: Hydrogen Piping - Deviation in Seismic Classification - BTP C.5.d(5)

Basis Date: October 1985 (NUREG-1057)

To Be Transitioned?: Yes

Basis:

The "BVPS-2 Updated Final Safety Analysis Report," (BVPS-2 UFSAR), Section 9.5A.2, Item C.5.d(5), states:

The SRP states that hydrogen lines in safety-related areas should be either designed to seismic Class I requirements, or sleeved such that the water pipe is directly vented to the outside, or should be equipped with excess flow valves so that in case of a line break, the hydrogen concentration in the affected areas will not exceed 2 percent.

Difference From the SRP:

The term 'Seismic Class I' is undefined and the Regulatory Guide 1.29 classification 'Seismic Category I' is not applicable to hydrogen piping at BVPS-2 as described in the Regulatory Guide.

Justification:

BVPS-2 has seismically designed all hydrogen piping in safety-related areas to Seismic Category II requirements, as defined in UFSAR Section 3.2.1.2. This piping is designed and supported to withstand SSE inertia loading, and the integrity of the pressure boundary is maintained in accordance with Appendix F of the 1972 ASME Code Winter Edition which states that the faulted condition design procedures contained in subparagraph F-1300 are provided for limiting the consequences of the specified event. They are intended (see NA-1130) to assure that violation of the pressure retaining boundary will not occur in components or supports which are in compliance with these procedures. Therefore, the pressure boundary of piping designed in accordance with these criteria will remain intact during a seismic event and no leakage will result.

Evaluation:

The NRC SER - NUREG-1057, Section 9.5.1.4, "General Plant Guidelines," states:

Control of Combustibles

Safety-related systems have been isolated or separated from combustible materials as much as possible. The storage of flammable liquids complies with National Fire Protection Standard 30 (NFPA 30). Compressed gases are stored either outdoors or in non-safety-related structures whenever possible. Hydrogen piping, however, passes through safety-related areas.

By letter dated May 23, 1984, the applicant committed to provide hydrogen piping that is seismically designed and supported to withstand the SSE. This design will ensure that the piping will remain intact during a seismic event.

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Licensing Action #: 11

Licensing Action: Hydrogen Piping - Deviation in Seismic Classification - BTP C.5.d(5)

On the basis of its evaluation, the staff concludes that the hydrogen piping meets Section C.5.d of BTP CMEB 9.5-1 and is, therefore, acceptable.

Validation/Conclusions:

The bases for previous acceptance (Seismic Category II requirements) remain valid as described in the applicable sections above. The deviation for the seismic classification of the hydrogen piping in safety-related areas is being transitioned to the new licensing basis under NFPA 805.

Disposition:

Licensing Action acceptable for transition

References:

- 10080-RM-0071A, Revision 25, "Flow Diagram H2 & CO2 Supply Piping."
- 10080-RP-0052A, Revision 4, "H2 and CO2 Supply Piping."
- 10080-RP-0110J, Sheet 9, Revision 6, "Auxiliary Building Piping."
- 10080-RP-0110K, Sheet 10, Revision 5, "Auxiliary Building Piping."
- ASME, Revision 1972, "Code Winter Edition."
- BVPS-2 UFSAR, Revision 19, "BVPS-2 Updated Final Safety Analysis Report."
- NUREG-1057, "NRC SER - NUREG-1057 dated October 1985."

Associations:

Ch.4 - Compartment: 2-PA-4

BVPS-2

Licensing Action #: 12

Licensing Action: Continuous Line-Type Heat Detectors - Deviation for Alternative Fire Detection - BTP C.5.e(2)

Basis Date: May 1987 (NUREG-1057; Supplement 5)

To Be Transitioned?: No

Basis:

The BVPS-2 "Updated Final Safety Analysis Report" (BVPS-2 UFSAR), under Section 9.5A.2, Item C.5.e(2), states:

The Standard Review Plan states that cable trays containing portions of redundant safety-related cable systems outside the cable spreading room should be provided with continuous line-type heat detectors.

Difference from the SRP:

BVPS-2 has been equipped with alternate means of detecting cable fires.

Justification:

Safety-related cable areas are provided with smoke detectors as part of the early warning detection system and will annunciate in the main control room and alarm locally. General area coverage smoke detector systems are provided in all areas containing safety-related cables except the reactor containment building (See deviation documented for Containment - General Area Detection, Item C.7.a(l)(c)). The response time of smoke detectors is at least as effective in detecting cable fires as the line-type heat detectors.

Evaluation:

The NRC SSER - NUREG-1057, Supplement 5, Section 9.5.1.4, "General Plant Guidelines," states:

Electrical Cable Construction, Cable Trays, and Cable Penetrations

In the SER, the staff identified three fire areas where cable tray separation did not meet the guidelines of Section C.5.e (2) of BTP CMEB 9.5-1. They include the containment (RC-1) and the primary auxiliary building (PA-3 and PA-4). In Amendment 14 to the FSAR, the applicant provided clarifications of this deviation and stated that continuous line-type detection was not provided in any safety related cable trays; however, all areas containing safety-related cables had general area detection and all areas with concentrated cables, except for RC-1, PA-3, and PA-4, were provided with automatic suppression. As identified previously in the SER, the addition of automatic suppression in these three areas would not significantly enhance fire safety. Also, the general area detection provides adequate assurance that a fire in any safety-related cable will be detected in its incipient stage, making line-type heat detection unnecessary. Therefore, the lack of automatic suppression in fire areas RC-1, PA-3, and PA-4 and the lack of continuous-line type of heat detection in safety-related cable trays are acceptable deviations from Section C.5.b of BTP CMEB 9.5-1.

BVPS-2

Licensing Action #: 12

Licensing Action: Continuous Line-Type Heat Detectors - Deviation for Alternative Fire Detection - BTP C.5.e(2)

Validation/Conclusions:

Ionization heat detectors are acceptable alternatives and continuous-line type of heat detection is no longer required by NFPA 805; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- NUREG-1057, Supplement 5, "NRC SSER - NUREG-1057, Supplement 5 dated May 1987."

Associations:

None

BVPS-2

Licensing Action #: 13

Licensing Action: Concentrated Cable Trays in Reactor Containment and Auxiliary Building - Deviation for Fire Protection Features - BTP C.5.e(2)

Basis Date: October 1985 (NUREG-1057)

To Be Transitioned?: No

Basis:

The BVPS-2 "Updated Final Safety Analysis Report" (BVPS-2 UFSAR), Section 9.5A.2, Item C.5.e (2), states:

The Standard Review Plan states that manual hose stations may be relied upon to provide the primary suppression for safety-related cable trays of a single division that are separated from redundant cables by a 3-hour fire barrier and are normally accessible for manual firefighting if all of the following conditions are met:

(a) The number of equivalent standard 24 in. wide cable trays is six or less,

(b) The cabling does not provide instrumentation control, or power to systems required to achieve and maintain hot shutdown, and

(c) Smoke detectors are provided in the area of these cable routings, and continuous line-type heat detectors are provided in the cable trays.

Difference from the SRP:

The following areas do not have automatic fire suppression and are provided with cable trays that:

a) Exceed six trays

b) Contain cabling necessary for shutdown

c) Are not provided with continuous line-type heat detectors:

Reactor Containment (RC-1)

Auxiliary Building (PA-3 and PA-4)

Justification:

The reactor containment (Fire Area RC-1) contains concentrations of cable trays in excess of the six tray limit between the crane wall and containment wall, which have not been provided with automatic suppression. The cables in these trays are all IEEE-383 for safety related applications or similarly qualified for non-safety applications (Refer to Section 8.3.3 for further details), and the trays with major power cables ("L" and "H" cables) have been provided with metal tray covers. The cable trays have been laid out such that all trays can be effectively reached by a fire hose stream, and the fire severity for the reactor containment is less then 1 hour. The safe shutdown analysis summary for this area is provided in Section 9.5A.1.3.29 and demonstrates that safe shutdown is not prevented by a fire in the cable trays.

The Auxiliary Building (Fire Areas PA-3 and PA-4) contains four 30-inch wide cable trays. This exceeds the limit of six 24-inch wide trays as defined in BTP CMEB 95-1.

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Licensing Action #: 13

Licensing Action: Concentrated Cable Trays in Reactor Containment and Auxiliary Building - Deviation for Fire Protection Features - BTP C.5.e(2)

These areas that contain slightly higher than recommended cable tray concentration have been laid out such that all trays can be effectively reached by a hose stream.

The early warning smoke detection system assures that the fire brigade has sufficient time to respond to a fire. The fire severity for PA-3 and PA-4 is less than 1/2 hour each. Transient combustibles are administratively controlled and do not constitute a significant increase in combustible loading. The safe shutdown summaries for PA-3 and PA-4 (see Sections 9.5A.1.3.23 and 24, respectively) demonstrate that safe shutdown is not prevented by a fire in these areas. The smoke detection system, the fact that only IEEE-383 for safety related applications or similarly qualified cables for non-safety applications (Refer to Section 8.3.3 for further details) are used, required safe shutdown cables are adequately protected in place by a fire wrap material for PA-3 and PA-4, and the accessibility of all cable trays to fire hose streams, provide adequate assurance that any postulated fire can be readily contained and that safe shutdown is not prevented.

Evaluation:

The NRC SER - NUREG-1057, Section 9.5.1.4, "General Plant Guidelines," states:

Electrical Cable Construction, Cable Trays, and Cable Penetrations

Cable trays are of all-metal construction. Electrical cable construction passes the Institute of Electrical and Electronics Engineers (IEEE) 383-1974 flame test. The cables are designed to allow wetting down with fire suppression water without electrical faulting.

Safety-related cable trays outside the cable spreading room are separated from potential fire exposure hazards by either 3-hour-rated fire barriers, 1-hour rated fire barriers with automatic suppression, or 20 feet of separation with automatic suppression.

Except for the following three areas, all areas containing cable trays are provided with early warning smoke detectors:

(1) containment (fire area RC-1)

(2) auxiliary building (fire area PA-3)

(3) auxiliary building (fire area PA-4)

All areas containing concentrated cable trays are provided with automatic total flooding carbon dioxide systems. The three areas listed above have eight or fewer cable trays, spread out over a large area. The cable tray configuration permits a hose stream to be effectively applied. On the basis of its evaluation, the staff concludes that the fire protection safety of these configurations would not be greatly enhanced by the addition of automatic suppression.

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Licensing Action: Concentrated Cable Trays in Reactor Containment and Auxiliary Building - Deviation for Fire Protection Features - BTP C.5.e(2)

On the basis of its evaluation, the staff concludes that the protection provided for the cable trays and the approved deviations meet Section C.5.e of BTP CMEB 9.5-1 and are, therefore, acceptable.

Validation/Conclusions:

The concentrated cable trays were evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- NUREG-1057, "NRC SER - NUREG-1057 dated October 1985."

Associations:

None

BVPS-2

Licensing Action #: 14

Licensing Action: Cable Rooms - CO2 versus Water Fire Suppressant - BTP C.5.e(2)

Basis Date: October 1985 (NUREG-1057)

To Be Transitioned?: No

Basis:

The BVPS-2 "Updated Final Safety Analysis Report" (BVPS-2 UFSAR), Section 9.5A.2, Item C.5.e(2), states:

The SRP states that in other areas where it may not be possible because of other overriding design features necessary for reasons of nuclear safety to separate redundant safety-related cable systems by 3-hour-rated fire barriers, cable trays should be protected by an automatic water system with open-head deluge or open directional spray nozzles arranged so that adequate water coverage is provided for each cable tray. Such cable trays should also be protected from the effects of a potential exposure fire by providing automatic water suppression in the area where such a fire could occur. The capability to achieve and maintain safe shutdown considering the effects of a fire involving fixed and potential transient combustibles should be evaluated with and without actuation of the automatic suppression system and should be justified on a suitably defined basis.

Difference from the SRP:

The following fire areas use CO2 as the primary automatic suppressant instead of water:

a) Control Building (Fire Areas CB-1, CB-2, and CT-1)

b) Cable Vaults (CV-1, 2, and 3)

c) Service Building Elevation 745 ft-6 in. (SB-4)

Justification:

The automatic or manual, double-capacity, total flooding CO2 system, in conjunction with the hose rack stations and portable fire extinguishers, provides adequate protection to extinguish fires and ensure the safety of these areas.

Two potential fires are postulated for these areas: a short-circuit-induced cable fire and a fire involving transient combustibles. Hazardous quantities of transient combustibles are not expected in these areas for several reasons. First, the areas are not near any major plant traffic route. Second, maintenance and operations in these areas do not involve the use of combustible materials. Third, accessibility to these areas is restricted to personnel performing essential duties. The potential for a cable fire is limited by the use of IEEE 383 for safety related applications or similarly qualified cable for non-safety applications throughout (Refer to UFSAR Section 8.3.3 for further details). The cable trays are provided with cable tray covers and/or bottoms to conform with Regulatory Guide 1.75.

Fire detection is provided by the early warning fire detection system which provides fire alarms locally and in the control room.

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Licensing Action: Cable Rooms - CO2 versus Water Fire Suppressant - BTP C.5.e(2)

The CO2 system is designed to attain a 50-percent concentration as recommended for cable fires (NFPA-12). Automatic actuation of the CO2 system is provided by the "XL-3" fire detection system which is a "Priority" system with local and control room alarms. The alarms enable the control room to be aware of the status and availability of the CO2 system at all times. A timed delay is provided in the CO2 initiation cycle to provide for personnel evacuation. CO2 supply capacity is available for a second manual application. CO2 will penetrate to the source of the fire and is less likely to cause damage to electrical equipment. Hose racks are provided at the entrance to the cable spreading room, and all trays can be reached by hose streams.

Penetrations to these areas are sealed to prevent leakage of CO2 to occupied spaces. Operating personnel of Unit 1 have had several years of experience with total flooding CO2 systems. All personnel are trained in alarm recognition and evacuation procedures. The systems are generally disarmed only during an outage for major maintenance functions, and a fire watch is posted during the disarmed period. The system is not disarmed during daily operational activities in the area. In the unlikely event of a fire in this area, the fire brigade would be required to have breathing apparatus.

The cable trays located in these areas are utilized largely for instrumentation and control cables. These trays will be provided with flat, unventilated covers and/or bottoms. The presence of tray covers inhibits the ability of water to reach potential tray fires. CO2 by virtue of its gaseous state, will penetrate into the cable trays and provide fire suppression to the fire in its incipient stage and will prevent a deep-seated fire from occurring. Due to the stack arrangements of the cable trays and the fact that the trays are provided with covers and/or bottoms, a ceiling-mounted automatic water suppression system would not provide adequate assurance that a fire will be extinguished.

Evaluation:

The NRC SER - NUREG-1057, Section 9.5.1.6, "Fire Protection of Specific Plant Areas," states:

Cable Spreading Room

The cable spreading room is separated from the balance of the plant by 3-hour fire-rated walls and floor/ceiling assemblies. All penetrations through fire-rated barriers are fitted with 3-hour-fire-rated dampers and/or 3-hour-fire rated penetration seals.

An alternate shutdown system has been provided for the cable spreading room. The alternate shutdown system is reviewed in Section 9.5.1.4 of this report.

In the final draft SER, the staff reported that the automatic carbon dioxide extinguishing system provided for the cable spreading room as the primary extinguishing system, with manual hose stations as a backup, did not meet Position C.7.c of BTP CMEB 9.5-1. Position C.7.c of BTP CMEB 9.5-1 requires that the

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Licensing Action: Cable Rooms - CO2 versus Water Fire Suppressant - BTP C.5.e(2)

primary fire suppression system for a cable spreading room be an automatic water system, and any deviations should be justified.

In a letter dated May 30, 1984, the applicant identified the staff's requirements on fire suppression in the cable spreading room as a backfit. The applicant referenced NRC Manual Chapter 0514 (enclosure to Generic Letter 84-08) and requested that the staff requirements be submitted to NRC management for review.

As a result of the applicant's request, a backfit appeal meeting was held by the Director, Division of Licensing (DL), on February 28, 1985 followed by a March 13, 1985 site visit to obtain additional information. On the basis of the information presented at the backfit appeal meeting, information obtained from the site visit, and information obtained from some technical reports, a decision by the Director, DL, was rendered on the applicant's appeal, and the results are presented below.

The staff had two major concerns about the use of the carbon dioxide System as the primary fire suppression system in the cable spreading room. One was the effectiveness of carbon dioxide in extinguishing deep-seated cable fires, and the other was the accessibility within areas of the cable spreading room for manual fire fighting.

Recent fire tests performed by Sandia Laboratory and reported in draft NUREG/CR-3656 showed that carbon dioxide is an adequate suppressive agent for extinguishing cable fires.

In the applicants Fire Protection Evaluation Report, the applicant has demonstrated that the design of the carbon dixoide system for concentration, anoxia and toxicity, thermal shock, overpressurization, and location of detectors is in accordance with Position C.6.d of BTP CMEB 9.5-1.

The Director, DL, concluded that the carbon dioxide extinguishing system with manual hose streams as a backup will provide an adequate level of protection for the cable spreading room and is, therefore, an acceptable deviation from the SRP guidelines.

On March 13, 1985, the staff made a site visit to the cable spreading room to determine the accessibility of the room for manual firefighting during periods of limited visibility.

On the basis of the site visit, the Director, DL, concluded that personnel accessibility for manual firefighting, although not close to being ideal, was demonstrated for the existing passageways in the cable spreading room.

However, to provide reasonable assurance that adequate accessibility exists for passageways during periods of limited visibility, the applicant should implement the recommendations provided by DLC's human factors expert in his letter to the NRC dated April 15, 1985. Furthermore, the temporary ramps and platforms needed to facilitate passage should be replaced with permanent installations that are of sufficient size and design to allow safe passage for firefighters. Training of the fire

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Licensing Action: Cable Rooms - CO2 versus Water Fire Suppressant - BTP C.5.e(2)

brigade should include walkthroughs in full equipment under anticipated conditions of limited visibility impaired communications, and high temperature. Simulation of these conditions either in the cable spreading room or at a fire training facility would be acceptable.

*In addition, during the March 13, 1985 site visit, the Director, DL, concluded that there was not reasonable assurance that a hose stream would be able to reach the dense cable tray array in the northwest corner of the cable spreading room in order to extinguish deep-seated fires inside the array. The Director, DL, considers this a deviation from the SRP, and a justification acceptable to the staff is required.**

NOTE: This deviation was subsequently approved and documented in NRC SSER 5, per the following:

The NRC SSER - NUREG-1057, Supplement 5, Section 9.5.1.6, 'Fire Protection of Specific Plant Areas,' states:

Cable Spreading Room

In the SER, the staff raised concerns regarding the use of automatic CO2 in the cable spreading room. As a result, the applicant made certain modifications to ensure that fire brigade members could adequately access all areas of the room. In SSER 3, the staff indicated that this issue would remain as backfit issue 7 pending a site visit which would verify that (1) the applicant had implemented the recommendations provided by a human factors expert in a letter dated March 18, 1985, (2) the temporary ramps and platforms needed to facilitate passages had been replaced with permanent versions, and (3) training was provided to the fire brigade. The staff identified a fourth item, the reach of hose streams to the northwest corner, as a deviation and requested the applicant to justify their design. In Amendment 14 to the FSAR, the applicant identified the cable spreading room as a deviation and provided a detailed discussion of the room's fire protection features. During the site audit, the room was reviewed against Items 1, 2, and 3 of SSER 3. The staff noted that issues identified by the human factors expert have been corrected, permanent ramps have been installed to ease accessibility to certain areas, and training procedures were reviewed to ensure that the cable spreading room is specifically addressed. Thus, the issues identified in previous evaluations have been adequately addressed by the applicant, and backfit issue 7 is considered closed. The applicant's deviation request in Amendment 14 to the FSAR was also reviewed and found to adequately resolve previous concerns. Therefore, the existing fire protection for the cable spreading room is an acceptable deviation from Section C.7.c of BTP CMEB 9.5-1.

Validation/Conclusions:

The cable spreading room was evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

Disposition:

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Licensing Action: Cable Rooms - CO2 versus Water Fire Suppressant - BTP C.5.e(2)

Not being transitioned

References:

- NUREG-1057, "NRC SER - NUREG-1057 dated October 1985."

Associations:

None

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Licensing Action #: 15

Licensing Action: Control Room Ventilation - Deviation in the Redundant Ventilation System Control Location - BTP C.5.f(3)

Basis Date: October 1985 (NUREG-1057)

To Be Transitioned?: No

Basis:

The BVPS-2 FSAR, "Beaver Valley Unit 2 Updated Final Safety Analysis Report," in Section 9.5A.2, Item C.5.f(3), reports:

> *The SRP states that power supply and controls for mechanical ventilation systems should be run outside the fire area served by the system where practical.*
>
> *Difference from the SRP:*
>
> *The controls for the redundant ventilation systems serving the control room are located in the control room.*
>
> *Justification:*
>
> *BVPS-2 relies on several alternate methods of ventilating the control room if necessary.*
>
> *The primary smoke removal for the BVPS-2 control room is provided by one of the two 100-percent capacity fans of the control room air conditioning system. If a single fire renders both fans inoperable, other methods of smoke removal are available. Since this is a common control room for both Units 1 and 2, the Unit 1 ventilation system, which is completely separated from the Unit 2 system, can be utilized. If additional smoke removal is required, the double doors to the outside can be opened for natural ventilation. If further ventilation is necessary, two portable gasoline driven emergency exhaust fans can be utilized. These fans are part of the fire brigade equipment inventory located in the brigade staging area.*

Evaluation:

The NRC SER - NUREG-1057, Section 9.5.1.4, "General Plant Guidelines," states:

> *The power supply controls for the redundant ventilation systems provided for the control room are located in the equipment room without separation.*
>
> *The primary smoke removal for the control room is provided by one of the two 100% capacity fans of the control room A/C system. If a single fire renders both fans inoperable, the Unit 1 ventilation system, which is completely separated from the Unit 2 system, can be used. If additional smoke removal is required, the double doors to the outside can be opened for natural ventilation. If further ventilation is necessary, portable exhaust fans can be utilized. These fans are part of the fire brigade equipment inventory located in the brigade staging area.*
>
> *Because three diverse methods of cooling the control room are provided, the staff finds this an acceptable deviation from its guidelines.*

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Licensing Action #: 15

Licensing Action: Control Room Ventilation - Deviation in the Redundant Ventilation System Control Location - BTP C.5.f(3)

Validation/Conclusions:

The redundant ventilation system control location is no longer required by NFPA 805; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- NUREG-1057, "NRC SER - NUREG-1057 dated October 1985."

Associations:

None

BVPS-2

Licensing Action #: 16

Licensing Action: Lighting of Yard Areas - Lack of Eight-Hour Battery-Powered Lights - BTP C.5.g(1)

Basis Date: May 1987 (NUREG-1057, Supplement 5)

To Be Transitioned?: No

Basis:

The BVPS-2 "Updated Final Safety Analysis Report" (BVPS-2 UFSAR), in Section 9.5A.2, Item C.5.g(1), states:

The SRP states that fixed self-contained lighting consisting of fluorescent or sealed-beam units with individual 8-hour minimum battery power supplies should be provided in areas that must be manned for safe shutdown and for access and egress routes to and from all fire areas.

Difference from the SRP:

BVPS-2 is equipped with emergency lighting for access and egress routes used in performance of alternate shutdown procedures. For outside yard areas, an alternate form of lighting is used for such routes. The fire brigade room has 2-hour rated emergency lighting instead of 8-hour rated lighting.

Justification:

For certain fire scenarios, the operators may be required to follow outdoor pathways to achieve and maintain safe shutdown from outside the control room.

The security perimeter lighting system consists of permanently mounted lights on poles and on outside building walls. This permanent lighting system is powered from motor control center MCC-I-37 located in the security guardhouse which, on loss of offsite power, would be supplied from the security diesel generator (NHS-EG-1). This emergency diesel generator has a fuel supply capable of operating for at least 24 hours. This system is common for both Units 1 and 2.

The security perimeter lighting circuits powered from MCC-1-37 are not routed through any fire areas where safe shutdown equipment or cables are located. For all BVPS-2 fire areas of concern, the security diesel generator and transfer circuitry are independent.

Operators performing the alternate safe shutdown procedure are provided with flashlights to enhance the permanently installed outdoor yard area emergency lighting system. Portable lighting would supplement the fixed emergency lighting system to provide versatility and effectiveness for operators to perform their intended shutdown functions.

The security perimeter lighting system would provide emergency outside yard area lighting capability equivalent to the guidelines of BTP CMEB 9.5-1 (8-hour battery power supply) based on the following:

a. The security perimeter lighting system including its emergency power supply are independent of fire areas where control room evacuation may be required under the postulated fire scenario.

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Licensing Action: Lighting of Yard Areas - Lack of Eight-Hour Battery-Powered Lights - BTP C.5.g(1)

b. The security lighting system provides an acceptable margin of safety equivalent to the guidelines of BTP CMEB 9.5-1.

c. Use of portable flashlights would offer more flexibility with respect to aiming which may be needed for unexpected transient hazards or any unanticipated events.

The 2-hour rated emergency lighting is adequate for the fire brigade room. The expected time duration for use of the fire brigade room as a staging area would be less than 30 minutes; therefore, 2-hour lighting is acceptable.

Evaluation:

The NRC SSER - NUREG-1057, Supplement 5, Section 9.5.1.4, "General Plant Guidelines," states:

Lighting and Communication

In the SER, the staff stated that fixed, self-contained lighting units with individual 8-hour battery-powered supplies are installed in all areas that will be staffed for shutdown and in all areas for access to and egress from all fire areas. In Amendment 14 to the FSAR, the applicant identified a deviation from Section C.5.9(1) of BTP CMEB 9.5-1 because certain yard areas are used for access routes to and from alternate shutdown areas and separate battery-powered lights were not provided. The applicant stated that lighting for these exterior routes is provided by the security lighting system. The security lighting system is powered by a dedicated diesel generator, which operates in the event of a loss of normal power supplied to the security system. The security diesel generator is separate from the main plant and the control room. A fire in any area requiring alternate shutdown will not cause loss of security lighting. The security generator has a sufficient capacity and fuel supply to power the yard lighting for the 8-hour specified time period. The applicant also stated that operators are provided with portable flashlights to enhance the emergency lighting system. There is reasonable assurance that adequate lighting for required yard areas is provided and that the lack of 8-hour battery-powered emergency lighting units in the outside yard areas will not prevent the plant from safely shutting down. Therefore, the use of the security lighting system for outside areas in lieu of battery-powered lights is an acceptable deviation from Section C.5.g(1) of BTP CMEB 9.5-1.

Validation/Conclusions:

An 8-hour battery-powered light in the yard area is no longer required by NFPA 805; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

BVPS-2

Licensing Action #: 16

Licensing Action: Lighting of Yard Areas - Lack of Eight-Hour Battery-Powered Lights - BTP C.5.g(1)

References:

- NUREG-1057, Supplement 5, "NRC SSER - NUREG-1057, Supplement 5 dated May 1987."

Associations:

None

BVPS-2

Licensing Action #: 17

Licensing Action: Fire Detection - Lack of Detection in Areas with No Combustible Loadings - BTP C.6.a(1)

Basis Date: May 1987 (NUREG-1057, Supplement 5)

To Be Transitioned?: No

Basis:

The BVPS-2 "Updated Final Safety Analysis Report" (BVPS-2 UFSAR), Section 9.5A.2, Item C.6.a (1), states:

The Standard Review Plan states that detection systems should be provided for all areas that contain or present a fire exposure to safety-related equipment.

Difference from the SRP:

Certain areas that contain safety-related piping required for safe shutdown and which do not contain or present a fire hazard (that is, any cables present are in conduit, and any oils present are contained in valves, piping, or pumps) will not be provided with fire detection coverage.

Justification:

Fire detection coverage is provided within areas that contain safety-related equipment/cables required for safe shutdown and where combustible loadings (cables and oils), which could present a fire hazard, are normally present. The only safety-related equipment required for safe shutdown contained in the areas described above is the piping associated with the charging, service water, and component cooling water systems. These areas do not contain or present a fire hazard as defined above. Also, hazardous quantities of transient combustibles would not be expected in these areas for the following reasons:

a) These areas are not adjacent to or near any major plant traffic route.

b) Storage of transient combustibles in these areas is prohibited by plant administrative procedures.

c) Maintenance and operations activities in these areas do not involve the use of large quantities of combustible materials.

d) The accessibility to these areas is restricted due to the security system.

Table 9.5A-3 provides the list of areas where fire detection coverage is not provided since they do not contain or present a fire hazard as defined above.

Evaluation:

The NRC SSER - NUREG-1057, Supplement 5, Section 9.5.1.5, "Fire Detection and Suppression," states:

Fire Detection:

During the site audit on January 27-30, 1987, it was observed that smoke detection was not provided in areas containing the boric acid storage tanks, charging system suction valves, and auxiliary feedwater control valves as identified in Amendment 14

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Licensing Action: Fire Detection - Lack of Detection in Areas with No Combustible Loadings - BTP C.6.a(1)

to the FSAR. Plant installation drawings were reviewed and it appeared that these areas were overlooked. For this reason, the applicant was required to completely review smoke detector installations and to notify the staff that all areas requiring detection have been identified and that detectors have been installed. By letter dated March 5, 1987, the applicant stated that smoke detector installations had been reviewed. As a result of this review, eight areas were identified in which detection should have been installed but had not been and four areas were identified in which there were no plans to install detectors. The applicant indicated that the eight areas will be provided with the required fire detection. In an FSAR revision, the applicant identified the four areas (Fire Areas PA-3, PT-1, SG-1N and SG-1S) as a deviation from Section C.6a(1) BTP CMEB 9.5-1 because general area detection has not been provided. However, the applicant stated that all areas containing combustible materials or that represent a potential exposure to safety-related equipment are provided with detection. On the basis of this information, the deviation from lack of general area detection for the four areas identified is acceptable.

Validation/Conclusions:

Detection systems for areas that contain or present a fire exposure to safety-related equipment are no longer required by NFPA 805; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- 1/2-ADM-1900, Revision 27, "Fire Protection Program."
- 1/2-ADM-1906, Revision 7, "Control of Transient Combustible and Flammable Materials."
- 2OST-33.16D, Revision 0, "Early Warning Smoke Detection Instrumentation Test Auxiliary Building and MSCV Building."
- 2PFP-AXLB-718, Revision 1, "Auxiliary Building General Area Fire Area PA-3."
- BVPS-2 UFSAR, Revision 19, "BVPS-2 Updated Final Safety Analysis Report."
- NUREG-1057, Supplement 5, "NRC SSER - NUREG-1057, Supplement 5 dated May 1987."

Associations:

None

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Licensing Action #: 18

Licensing Action: Fire Hydrant - Deviation in Spacing - BTP C.6.b (7)

Basis Date: May 1987 (NUREG-1057, Supplement 5)

To Be Transitioned?: Yes

Basis:

The BVPS-2 "Updated Final Safety Analysis Report," (BVPS-2 UFSAR), Section 9.5A.2, Item C.6.b(7), states:

The Standard Review Plan states that hydrants should be installed approximately every 250 feet on the yard main system.

Difference from the SRP:

Fire Hydrant No. 16, located outside of the southwest corner of the Turbine Building, is located 340 feet from Fire Hydrant No. 15 which is located outside of the South Office Shops Building.

Justification:

Fire Hydrant No. 16 has been relocated due to field interferences. Sufficient lengths of hose have been provided in the associated hose cart houses to provide coverage in the event of a fire. The specific hazards in the area are the main transformer and the two station service transformers. These transformers have been provided with automatic deluge suppression systems.

Evaluation:

The NRC SSER - NUREG-1057, Supplement 5, Section 9.5.1.5, "Fire Detection and Suppression," states:

Fire Protection Water Supply System

During the site audit, the applicant stated that fire hydrant 16, located at the southwest corner of the turbine building, was relocated because it interfered with the installation of the auxiliary boiler and the security perimeter fence, thus providing a 370-foot spacing indicated in Section C.6.b(7) of BTP CMEB 9.5-1. The area was observed during the audit and coverage for nearby hazards appeared adequate. Therefore, the spacing between hydrants 15 and 16 is an acceptable deviation from the SRP.

Validation/Conclusions:

The bases for previous acceptance are still valid as described in the applicable sections above. The deviation for fire hydrant spacing is being transitioned to the new licensing basis per NFPA 805.

Disposition:

Licensing Action acceptable for transition

References:

- 10080-RB-0002A, Sheet 1, Revision 13, "Yard Piping Underground."

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Licensing Action #: 18

Licensing Action: Fire Hydrant - Deviation in Spacing - BTP C.6.b (7)

- 10080-RB-0002C, Sheet 3, Revision 6, "Yard Piping Underground."
- 10080-RB-0003B, Revision 10, "Fire Protection Arrangement 718' to 735'."
- 10080-RM-0433-001F, Revision 10, "Valve Operation Number Diagram Fire Protection Water Conditioning Polishing Building/Waste Handling Building/Yard."
- 2OST-33.2B, Revision 12, "Fire Protection Hose Stations Inspection, Flush, & Hose Replacement."
- 8700-RB-0002V, Sheet 5, Revision 4, "General Arrangement Fire Protection."
- BVPS-2 UFSAR, Revision 19, "BVPS-2 Updated Final Safety Analysis Report."
- NUREG-1057, Supplement 5, "NRC SSER - NUREG-1057, Supplement 5 dated May 1987."

Associations:

Ch.3 - Section: 3.5 / Subsection: 3.5.15

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Licensing Action #: 19

Licensing Action: Containment - Lack of General Area Detection - BTP C.7.a(1)(c)

Basis Date: May 1987 (NUREG-1057, Supplement 5)

To Be Transitioned?: No

Basis:

The BVPS-2 "Updated Final Safety Analysis Report" (BVPS-2 UFSAR), Section 9.5A.2, Item C.7.a(1)(c), states:

> *The Standard Review Plan states that general area fire detection capability should be provided in the primary containment as backup to detection systems for specific hazards.*
>
> *Difference from the SRP:*
>
> *The reactor containment is not provided with a general area detection system.*
>
> *Justification:*
>
> *Specific hazards within the reactor containment are provided with fire detection systems. The residual heat removal (RHR) pumps and cable penetrations are provided with smoke detectors and a water spray deluge system. The iodine charcoal filters are provided with heat detectors and a water spray deluge system. The reactor coolant pumps have been provided with an oil collection system.*
>
> *Due to the compartmentalization of the containment, the fact that fire detection is provided for specific hazards, the low amount of transient combustibles, and the large volume of the containment along with the dilution caused by the ventilation high recirculation flow, general area fire detection would be ineffective.*

Evaluation:

The NRC SSER - NUREG-1057, Supplement 5, Section 9.5.1.4, "General Plant Guidelines," states:

> *Reactor Containment*
>
> *Equipment inside containment is not in compliance with Section C.5.b of BTP CMEB 9.5-1 because redundant trains of safe shutdown components and circuitry are not separated by 3-hour walls or are not separated by 20 feet with no intervening combustibles. Generally, redundant cables inside the containment are run on opposite sides of the interior wall. Although this does not provide 3-hour separation, the wall is a significant barrier to fire and heat. Cables inside the containment are either qualified to IEEE Standard 383 or are run inside conduit. The only significant combustible loading other than cable is the oil inside the reactor coolant pumps, RHR pumps, and the charcoal filters. The reactor coolant pumps are provided with an oil collection system in compliance with the SRP, which reduces the potential for spread of combustible oil.*
>
> *Both the RHR pumps and the charcoal filters are provided with detection and suppression systems. The penetration area, where redundant divisions are separated by at least 18 feet, is provided with detection and automatic suppression. Because of the low insitu combustibles and the containment's large volume, it is*

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Licensing Action #: 19

Licensing Action: Containment - Lack of General Area Detection - BTP C.7.a(1)(c)

expected that any fire would develop slowly with the heat dissipated to the large air space. In addition, because access to the area is tightly controlled, it is not expected that transient combustibles would contribute to the fire loading. Therefore, there is reasonable assurance that a fire inside the containment would not jeopardize both trains of redundant safe shutdown equipment, and lack of complete separation of redundant trains of safe shutdown components inside containment is an acceptable deviation from Section C.5.b of BTP CMEB 9.5-1.

ECP 08-0168 removed the combustible charcoal from the Containment Iodine Filtration System. This fire protection is no longer required.

ECP 08-0711 will mechanically and electrically isolate, and abandon-in-place, the portion of the fire suppression system located downstream of zone isolation valves 2FPW-390 & 2FPW-377 that once protected the Containment Iodine Filtration System.

Validation/Conclusions:

The general area detection features in the Reactor Containment area were evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- NUREG-1057, Supplement 5, "NRC SSER - NUREG-1057, Supplement 5 dated May 1987."

Associations:

None

BVPS-2

Licensing Action #: 20

Licensing Action: Control Room - Deviation in Fire Protection Features - BTP C.7.b

Basis Date: May 1987 (NUREG-1057, Supplement 5)

To Be Transitioned?: No

Basis:

The BVPS-2 "Updated Final Safety Analysis Report" (BVPS-2 UFSAR), Section 9.5A.2, Item C.7.b, states:

The SRP states that:

a. Peripheral rooms in the control room complex should have automatic water suppression and should be separated from the control room by noncombustible construction with a fire resistance rating of 1 hour. Ventilation system openings between the control room and peripheral rooms should have automatic smoke dampers that close on operation of the fire detection or suppression system.

b. Area automatic fire suppression should be provided for underfloor and ceiling spaces if used for cable runs unless all cable is run in 4 in. or smaller steel conduit.

c. There should be no carpeting in the control room.

Differences from the SRP:

a. The shift supervisor's office is constructed as an integral part of the control room and does not require 1 hour separation or dedicated ventilation or suppression features.

b. Aluminum conduit is run under a portion of the raised floor section. Steel conduit, equal to or smaller than 4 inches, is used in the raised floor sections for the operator consoles, which meets the requirements of the BTP.

c. Carpeting may be provided in the control room to enhance operator comfort and reduce fatigue (human factors).

Justification:

a. The shift supervisor's office is constructed of low hazard materials. Its contents are those which would normally be expected to be found in the control room regardless of the addition of the office walls. Since the office is largely constructed of glass and the control room is occupied at all times, fires in the room would be quickly noticed and extinguished using equipment available in the control room.

b. The aluminum conduit is located in a small portion of raised floor which is less than 3 feet in width and exists between the vertical section and benchboard section of the main control board. Since smoke detectors are installed in the vertical board section and the main control room is continuously manned, a fire will be detected in its incipient stages and extinguished.

c. The benefits to control room comfort outweigh the slight potential for igniting the carpet based upon the carpet test results. The carpeting has a critical radiant flux which exceeds the minimum of 0.45 watts per cm2 (ASTM E648) used to define Class 1 interior finishes in accordance with NFPA 101 Life Safety Code.

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Licensing Action #: 20

Licensing Action: Control Room - Deviation in Fire Protection Features - BTP C.7.b

Evaluation:

Section 9.5.1.6, "Fire Protection of Specific Plant Areas," NRC SSER - NUREG-1057, Supplement 5 states:

Control Room"

In Amendment 14 to the FSAR, the applicant identified the following deviations from Section C.7.b of BTP CMEB 9.5-1: (1) 1-hour separation was not provided between the control room and the shift supervisor's office, (2) aluminum conduit rather than steel was run under the raised floor, and (3) carpeting may be provided.

During the site audit, the shift supervisor's office was observed to be a small area in the back of the control room that had been created by installing partial-height unrated walls. The ceiling of the office was observed to be of solid drop-type construction, which would preclude any smoke from reaching the detectors at the ceiling. The addition of a 1-hour rated barrier would not significantly increase the level of fire safety; however, the applicant should either install detection in the office area or replace the ceiling with open lattice-type panels. By letter dated March 5, 1987, in order to resolve this concern, the applicant committed to install a smoke detector in the shift supervisor's office. The staff finds this acceptable.

The use of aluminum conduit in a raised-floor area is limited to a 3-to 4-foot-wide section between the bench board and the vertical boards. Smoke detection is provided in the boards and no combustible material, except conduit, is located in the raised-floor area. Replacing the aluminum conduit with steel would not significantly increase the level of fire protection, and the aluminum conduit is, therefore, acceptable.

Although carpeting has not yet been installed in the control room, the applicant may install it the future. The applicant stated that if carpeting is installed, it will have a flame-spread rating of less than 50 per ASTM E-84 tunnel test and a critical radiant flux that exceeds the minimum of 0.45 watts per square centimeter used to define Class 1 interior finishes. The control room is continuously manned and extinguishers are provided in the immediate areas. Thus, the addition of carpeting of this type in the control room would not significantly reduce the level of fire safety, and is acceptable.

Validation/Conclusions:

The fire protection features in the Control Room were evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

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Licensing Action #: 20

Licensing Action: Control Room - Deviation in Fire Protection Features - BTP C.7.b

References:

- NUREG-1057, Supplement 5, "NRC SSER - NUREG-1057, Supplement 5 dated May 1987."

Associations:

None

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Licensing Action #: 21

Licensing Action: Cable Spreading Room - Deviation in Fire Protection Features - BTP C.7.c

Basis Date: May 1987 (NUREG-1057, Supplement 5)

To Be Transitioned?: No

Basis:

BVPS-2 "Updated Fire Safety Analysis Report," (BVPS-2 UFSAR), Section 9.5A.2, "Cable Spreading Room," Item C.7.c states:

The Standard Review Plan states that:

a. The primary fire suppression in the cable spreading room should be an automatic water system.

b. A 3 feet wide by 8 feet high aisle separation should be provided between tray stacks.

c. Continuous line-type heat detectors should be provided for cable trays.

Differences from the SRP:

a. The primary fire suppression system for the BVPS-2 cable spreading room is an automatic or manual, double capacity, total flooding CO2 system. Hose rack stations and portable fire extinguishers are provided as backup suppression.

b. There are certain aisles in the cable spreading room which are partially blocked by structural members resulting in aisle dimensions which are less than the 3 feet wide by 8 feet high criterion.

c. BVPS-2 has been equipped with alternate means of detecting cable fires.

Justification:

a. The automatic or manual, double-capacity, total flooding CO2 system, in conjunction with the hose rack stations and portable fire extinguishers, provides adequate protection to extinguish fires and ensure the safety of the cable spreading room. Two potential fires are postulated for the cable spreading areas: a short-circuit-induced cable fire and a fire involving transient combustibles. Hazardous quantities of transient combustibles are not expected in these areas for several reasons. First, the areas are not near any major plant traffic route. Second, maintenance and operations in these areas do not involve the use of combustible materials. Third, accessibility to these areas is restricted to personnel performing essential duties. The potential for a cable fire is limited by the use of IEEE 383 for safety related applications or similarly qualified cable for non-safety applications throughout (Refer to Section 8.3.3 for further details). The cable trays are provided with cable tray covers and/or bottoms to confirm with Regulatory Guide 1.75. Fire detection is provided by the early warning fire detection system which provides fire alarms locally and in the control room.

The CO2 system is designed to attain a 50-percent concentration as recommended for cable fires (NFPA-12). Automatic actuation of the CO2 system is provided by the "XL-3" fire detection system which is a "Priority" system with local and control room

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Licensing Action: Cable Spreading Room - Deviation in Fire Protection Features - BTP C.7.c

alarms. The alarms enable the control room to be aware of the status and availability of the CO2 system at all times. A timed delay is provided in the CO2 initiation cycle to provide for personnel evacuation. CO2 supply capacity is available for a second manual application. CO2 will penetrate to the source of the fire and is less likely to cause damage to electrical equipment. Hose racks are provided at the entrance to the cable spreading room, and all trays can be reached by hose streams.

Penetrations to the control room complex are sealed to prevent leakage of CO2 to occupied spaces. Operating personnel of Unit 1 have had several years of experience with total flooding CO2 systems. All personnel are trained in alarm recognition and evacuation procedures. The systems are generally disarmed only during an outage for major maintenance functions, and a fire watch is posted during the disarmed period. The system is not disarmed during daily operational activities in the area. In the unlikely event of a fire in this area, the fire crew would be required to have breathing apparatus. The cable trays located in this area are utilized largely for instrumentation and control cables. These trays will be provided with flat, unventilated covers and/or bottoms. Power cables are run in rigid conduit. The presence of tray covers inhibits the ability of water to reach potential tray fires. CO2 by virtue of its gaseous state will penetrate into the cable trays and provide fire suppression to the fire in its incipient stage and will prevent a deep-seated fire from occurring. Due to the stack arrangements of the cable trays and the fact that the trays are provided with covers and/or bottoms, a ceiling-mounted automatic water suppression system would not provide adequate assurance that a fire will be extinguished.

Finally, in the unlikely event of a total fire area burnout, BVPS-2 has alternate shutdown capability.

b. The BVPS-2 cable spreading room is accessible to the fire brigade from three remote and separate entrances. Sufficient aisle separation between cable tray stacks is provided for adequate accessibility for fire fighting. Those stations are located at each end of the cable spreading room and at the cable tunnel interface and are capable of providing hose stream coverage to the entire room, thereby enhancing manual fire fighting capability.

c. Refer to the justification provided for Item C.5.e(2).

Evaluation:

Section 9.5.1.6, Fire Protection of Specific Plant Areas, of NRC SSER - NUREG-1057, Supplement 5, states:

Cable Spreading Room:

In the SER, the staff raised concerns regarding the use of automatic C02 in the cable spreading room. As a result, the applicant made certain modifications to ensure that fire brigade members could adequately access all areas of the room. In

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Licensing Action: Cable Spreading Room - Deviation in Fire Protection Features - BTP C.7.c

SSER 3, the staff indicated that this issue would remain as backfit issue 7 pending a site visit which would verify that (1) the applicant had implemented the recommendations provided by a human factors expert in a letter dated March 18, 1985, (2) the temporary ramps and platforms needed to facilitate passages had been replaced with permanent versions, and (3) training was provided to the fire brigade. The staff identified a fourth item, the reach of hose streams to the northwest corner, as a deviation and requested the applicant to justify their design. In Amendment 14 to the FSAR, the applicant identified the cable spreading room as a deviation and provided a detailed discussion of the room's fire protection features. During the site audit, the room was reviewed against Items 1, 2, and 3 of SSER 3. The staff noted that issues identified by the human factors expert have been corrected, permanent ramps have been installed to ease accessibility to certain areas, and training procedures were reviewed to ensure that the cable spreading room is specifically addressed. Thus, the issues identified in previous evaluations have been adequately addressed by the applicant, and backfit issue 7 is considered closed. The applicant's deviation request in Amendment 14 to the FSAR was also reviewed and found to adequately resolve previous concerns. Therefore, the existing fire protection for the cable spreading room is an acceptable deviation from Section C.7.c of BTP CMEB 9.5-1.

Validation/Conclusions:

The fire protection features in the Cable Spreading Room were evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- NUREG-1057, Supplement 5, "NRC SSER - NUREG-1057, Supplement 5 dated May 1987."

Associations:

None

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Licensing Action #: 22

Licensing Action: Safety-Related Pumps - Lack of 3-Hour Fire Barriers - BTP C.7.k

Basis Date: May 1987 (NUREG-1057, Supplement 5)

To Be Transitioned?: No

Basis:

BVPS-2 "Updated Fire Safety Analysis Report," (BVPS-2 UFSAR), Section 9.5A.2, "Safety-Related Pumps," Item C.7.k states:

The Standard Review Plan recommends that pump houses and rooms housing redundant safety-related pump trains should be separated from each other and from other areas of the plant by fire barriers having at least 3-hour ratings.

Difference from the SRP:

The fuel pool cooling pumps are not required for safe shutdown following a fire and are protected by means other than 3-hour barriers. (For safety-related pumps and tanks used for safe shutdown, see Item C.5.b - Safe Shutdown Components.)

Justification:

The fuel pool cooling pumps are not required for safe shutdown as a result of fire in any plant area. Fire detection is accomplished by the use of ionization detectors, which have audible alarms locally and audiovisual annunciation in the main control room. Portable extinguishers and hose rack stations are available for fire suppression.

These pumps are located in areas with low combustible loading. Refer to the fire hazards analysis for area FB-1. In the event that both fuel pool cooling pumps are lost, the fuel pool can be cooled with service water through a connection provided for this purpose.

Evaluation:

Section 9.5.1.6, Fire Protection of Specific Plant Areas, of NRC SSER - NUREG-1057, Supplement 5 states:

Safety-Related Pumps:

Section C.7.k of BTP CMEB 9.5-1 states that redundant safety-related pumps should be separated from each other by a 3-hour fire barrier. In Amendment 14 to the FSAR, the applicant stated that the fuel-pool cooling pumps are not separated by a 3-hour barrier. The pumps are located in the fuel building in a fire area with minimal combustibles. Smoke detectors are provided over the pumps, and hose racks are in the immediate area. The fuel-pool cooling pumps are not required for safe shutdown, and loss of the pumps would not affect plant safety. Therefore, the lack of 3-hour separation between the redundant fuel-pool cooling pumps is an acceptable deviation from BTP CMEB 9.5-1, Section C.7.k.

Validation/Conclusions:

The safety-related pumps were evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

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Licensing Action #: 22

Licensing Action: Safety-Related Pumps - Lack of 3-Hour Fire Barriers - BTP C.7.k

Disposition:

Not being transitioned

References:

- NUREG-1057, Supplement 5, "NRC SSER - NUREG-1057, Supplement 5 dated May 1987."

Associations:

None

BVPS-2

Licensing Action #: 23

Licensing Action: New Fuel Area - Lack of Detection - BTP C.7.I

Basis Date: May 1987 (NUREG-1057, Supplement 5)

To Be Transitioned?: No

Basis:

BVPS-2 "Updated Fire Safety Analysis Report," (BVPS-2 UFSAR), Section 9.5A.2, "New Fuel Area," Item C.7.I states:

> *The Standard Review Plan states that automatic fire detection should alarm and annunciate in the control room and alarm locally.*
>
> *Difference from the SRP:*
>
> *Automatic detection in the new fuel storage area is not required.*
>
> *Justification:*
>
> *The new fuel storage area is an enclosed cubicle within the fuel building. Combustible loading in the area and the building in general, is extremely low. Administrative controls will be implemented for the new fuel storage area such that the door will be locked and combustible storage in the area will be prohibited. A postulated fire in any area of the fuel building will not impact the ability to safely shut down the plant. Since the fuel building access is controlled, and the building is a low traffic area, potential for accumulation of transient combustibles is negligible. Fire hose stations and portable extinguishers are provided.*

Evaluation:

Section 9.5.1.6, Fire Protection of Specific Plant Areas, of NRC SSER - NUREG-1057, Supplement 5 states:

> *The New Fuel Area, Section C.7.I of BTP CMEB 9.5-1 state that detection should be provided for the new fuel areas. The applicant stated in Amendment 14 to the FSAR that detection is not provided for this area. Combustible loading in this area is negligible. During the site audit of January 27-30, 1987, this area was observed and it was determined that because of limited floor space and controlled personnel access an accumulation of transient combustibles is unlikely. However, the new fuel storage room was observed to have some transient combustibles. By letter dated February 11, 1987, the applicant committed to provide administrative controls on access to this area in order to limit storage of transient combustibles. Therefore, the addition of detection in the new fuel area would not significantly enhance fire safety. With the addition of administrative controls to control combustibles in the new fuel storage room, the lack of detection in the new fuel area is an acceptable deviation from Section C.7.I of BTP CMEB 9.5-1.*

Validation/Conclusions:

The new fuel area was evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

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Licensing Action #: 23

Licensing Action: New Fuel Area - Lack of Detection - BTP C.7.I

Disposition:

Not being transitioned

References:

- NUREG-1057, Supplement 5, "NRC SSER - NUREG-1057, Supplement 5 dated May 1987."

Associations:

None

BVPS-2

Licensing Action #: 24

Licensing Action: Spent Fuel Pool Area - Lack of Detection - BTP C.7.m

Basis Date: May 1987 (NUREG-1057, Supplement 5)

To Be Transitioned?: No

Basis:

BVPS-2 "Updated Fire Safety Analysis Report," (BVPS-2 UFSAR), in Section 9.5A.2, "Spent Fuel Pool Area," Item C.7.m states:

The Standard Review Plan states that automatic fire detection should alarm and annunciate in the control room and alarm locally.

Difference from the SRP:

Automatic detection in the spent fuel pool area is not required.

Justification:

The spent fuel pool area is void of any concentration of combustibles which could pose a threat to the building or, more importantly, plant safety in general. A postulated fire in any area of the fuel building will not impact the ability to safely shut down the plant. Since the fuel building access is controlled, and the building is a low traffic area, potential for accumulation of transient combustibles is negligible. The fuel pool cooling pumps are provided with detection coverage by ionization detectors which alarm locally and in the control room. Fire hose stations and portable extinguishers are provided.

Evaluation:

Section 9.5.1.6, Fire Protection of Specific Plant Areas, of NRC SSER - NUREG-1057, Supplement 5 states:

New Fuel Area and Spent Fuel Pool Area:

Sections C.7.k and C.7.m of BTP CMEB 9.5-1 state that detection should be provided for the new fuel and spent fuel pool areas. The applicant stated in Amendment 14 to the FSAR that detection is not provided for these areas. Combustible loading in these areas is negligible and detection is provided for the fuel-pool cooling pumps. During the site audit of January 27-30, 1987, this area was observed and it was determined that because of limited floor space and controlled personnel access an accumulation of transient combustibles is unlikely. However, the new fuel storage room was observed to have some transient combustibles. By letter dated February 11, 1987, the applicant committed to provide administrative controls on access to this area in order to limit storage of transient combustibles. Therefore, the addition of detection in the new and spent-fuel pool areas would not significantly enhance fire safety. With the addition of administrative controls to control combustibles in the new fuel storage room, the lack of detection in the new and spent-fuel areas is an acceptable deviation from Section C.7.m of BTP CMEB 9.5-1.

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Licensing Action #: 24

Licensing Action: Spent Fuel Pool Area - Lack of Detection - BTP C.7.m

Validation/Conclusions:

The spent fuel area was evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- NUREG-1057, Supplement 5, "NRC SSER - NUREG-1057, Supplement 5 dated May 1987."

Associations:

None

BVPS-2

Licensing Action #: 25

Licensing Action: Radwaste and Decontamination Areas - Lack of Fire Suppression and Detection - BTP C.7.n

Basis Date: May 1987 (NUREG-1057, Supplement 5)

To Be Transitioned?: No

Basis:

BVPS-2 "Updated Fire Safety Analysis Report," (BVPS-2 UFSAR), Section 9.5A.2, "Radwaste and Decontamination Areas," Item C.7.n states:

The Standard Review Plan states that automatic fire suppression and detection should be provided.

Difference from the SRP:

Radwaste and decontamination areas are provided with partial suppression and/or detection to the extent necessary considering the fire hazards in the area. This may include automatic suppression or detection for specific hazards only.

Justification:

Radwaste and decontamination areas are considered to be the waste handling building (WH-1), the condensate polishing building (CP-1), and the decontamination building (FB-1).

The condensate polishing building area (CP-1) is largely free of combustibles which could be considered significant hazards. For areas such as the resin storage area, and the primary chemistry lab, where concentrations of combustibles occur, automatic water suppression with control room indication is provided. Local alarms are also provided.

The decontamination building is void of any concentration of combustibles which could pose a threat to the building, or more importantly, plant safety in general. Automatic detection and suppression are not necessary.

The waste handling area (WH-1) is essentially free of combustibles which could be considered significant hazards. For the radwaste baler area where concentrations of combustibles occur, automatic water suppression with control room indication is provided. Local alarms are also provided.

All of these buildings are separated from other structures by 3-hour fire barriers and contain no equipment used for safe shutdown of the plant. Manual hose stations and portable extinguishers are provided throughout the buildings.

Evaluation:

NRC SSER - NUREG-1057, Supplement 5 states:

Section 9.5.1.6 Fire Protection of Specific Plant Areas

Radwaste and Decontamination Area:

The applicant stated in Amendment 14 to the FSAR that the radwaste and decontamination areas deviate from C.7.n of BTP CMEB 9.5-1 because they are not

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Licensing Action: Radwaste and Decontamination Areas - Lack of Fire Suppression and Detection - BTP C.7.n

provided with detection and suppression throughout. These areas include the waste handling building (WH-1), condensate polishing building (CP-1), and the decontamination building (FP-1). The majority of these areas are essentially free of combustibles; however, the applicant has provided automatic suppression where there is a possibility of the accumulation of transient combustibles.

These areas include the resin storage area, the primary chemistry lab, and the radwaste baler area. A suppression system is also provided for the charcoal filter unit in the decontamination building. Hose racks are provided throughout the area. No equipment or circuitry required for safe shutdown is located in these areas. The addition of general area detection and suppression would not significantly increase the level of plant fire safety. Therefore, the lack of area detection and suppression for the radwaste and decontamination areas is an acceptable deviation from C.7.m of BTP CMEB 9.5-1.

Validation/Conclusions:

The radwaste and decontamination areas were evaluated using the performance-based approach NFPA 805, Section 4.2.4; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- NUREG-1057, Supplement 5, "NRC SSER - NUREG-1057, Supplement 5 dated May 1987."

Associations:

None

BVPS-2

Licensing Action #: 26

Licensing Action: Fire Detection System Secondary Power Supplies - Use of Plant Emergency Power Supply - BTP C.6.a(6)

Basis Date: October 1985 (NUREG-1057)

To Be Transitioned?: Yes

Basis:

The "Standard Review Plan" (SRP) in the Branch Technical Position of the Chemical Engineering Branch (BTP CMEB) 9.5-1, Section C.6.a (6), "Fire Detection," states:

Primary and secondary power supplies should be provided for the fire detection system and for electrically operated control valves for automatic suppression systems. Such primary and secondary power supplies should satisfy provisions of Section 2220 of NFPA 72D. This can be accomplished by using normal offsite power as the primary supply with a 4-hour battery supply as secondary supply; and by providing capability for manual connection to the Class IE emergency power bus within 4 hours of loss of offsite power. Such connection should follow the applicable guidelines in Regulatory Guides 1.6, 1.32, and 1.75.

The May 23, 1984 SER, "Beaver Valley Power Station - Unit No. 2 Fire Protection - Draft Safety Evaluation Report," item FP-9 states:

Fire Detection

The licensee has not provided information on whether they meet Section 2220 of NFPA Std. 72D. We will require the applicant to verify that reliable power supplies, as recommended by Section C.6.b of BTP CMEB 9.5-1, will be provided. This can be accomplished by using normal offsite power as the primary supply with a 4-hour battery supply as secondary supply, and by providing capability for manual connection to the Class 1E emergency power bus within 4 hours of loss of offsite power. Such connection should follow the applicable guidelines in Regulatory Guides 1.6, 1.32, and 1.75.

Response:

BVPS-2 meets the intent of Section 2220 of NFPA Standard 72D in the following manner:

The primary supply for the early warning fire detection system and the independent fire detection and suppression systems is the normal offsite power supply system.

The secondary supply for the fire detection systems is the ERF nonsafety diesel generator. The switchover capability is an automatic function. The ERF diesel generator supplies the 120-V ac uninterruptible power supply system required for the early warning detection system and the 125-V dc panels for the fire detection and suppression systems.

A battery backup system with a 2-hour rated capability is provided as a backup for the 125-V dc systems.

A battery backup system with a 30-minute capability is provided as a backup to the 120-V ac systems. This is to provide electrical power continuity for the 10 seconds

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Licensing Action #: 26

Licensing Action: Fire Detection System Secondary Power Supplies - Use of Plant Emergency Power Supply - BTP C.6.a(6)

required to start the ERF diesel and achieve rated voltage and frequency. See attached Figure FP-9.

The central processing unit for the early warning fire detection system, which is shared by both BVPS-2 and BVPS-1, is powered by BVPS-1 and has the capability of being supplied from either normal station power or a BVPS-1 Class 1E safety related diesel generator.

Approval of clarifications relative to this exemption is being requested as part of this LAR submittal and transition to NFPA 805 (See Attachment T "Clarification of Prior NRC Approvals").

Evaluation:

NRC SER - NUREG-1057, Section 9.5.1.5, "Fire Detection and Suppression," states:

Fire Detection

A fire detection system is provided for all areas containing safety-related equipment and for all areas that present a fire exposure to safety-related equipment.

The system complies with NFPA 72D for a Class A system, with detectors installed in accordance with NFPA 72E.

By letter dated May 23, 1984, the applicant committed to provide a reliable power supply for the fire detection system as follows:

(1) The primary supply for the fire detection system and suppression systems is the normal offsite power supply system.

(2) The secondary supply for the fire detection systems is a non-safety diesel generator. The switchover capability is an automatic function. The diesel generator supplies the 120-V ac uninterruptible power supply system required for the detection system and the 125-V dc panels for the fire detection and suppression systems.

(3) A battery backup system with a 2-hour rated capability is provided as a backup to the 125-V dc systems.

A battery backup system with a 30-minute capability is provided as a backup to the 120-V ac systems. This is to provide electrical power continuity for the 10 seconds required to start the diesel and achieve rated voltage and frequency. The staff finds this an acceptable primary and secondary source of power.

On the basis of its evaluation, the staff concludes that the fire detection system will meet Section C.6.a of BTP CMEB 9.5-1 and is, therefore, acceptable.

Validation/Conclusions:

The bases for previous acceptance remain valid as described in the applicable sections above. The deviation for the Fire Detection System Secondary Power Supplies - Use of Plant Emergency Power Supply is being transitioned to the new licensing basis per NFPA 805.

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Licensing Action: Fire Detection System Secondary Power Supplies - Use of Plant Emergency Power Supply - BTP C.6.a(6)

Disposition:

Licensing Action acceptable for transition

References:

- 10080-E-037, Revision 8, Addendum 2, "Battery Duty Cycle and Size Calculation."
- 1OM-33.3.C, Revision 13, "Power Supply and Control Switch List."
- 84-05-23, "BVPS-2 Fire Protection - Draft SER."
- 3SQS-33.1, Revision 2, "Fire Protection System - Student Handout."
- BVS-0564, Revision 0, "Specification for Fire Detection System."
- NUREG-1057, "NRC SER - NUREG-1057 dated October 1985."

Associations:

Ch.3 - Section: 3.8 / Subsection: 3.8.1

BVPS-2

Licensing Action #: 27

Licensing Action: Cable Construction - Lack of Compliance with IEEE-383-1974 Flame Test

Basis Date: October 1985 (NUREG-1057), and May 1987 (NUREG-1057, Supplement 5)

To Be Transitioned?: Yes

Basis:

NFPA 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition, Ch. 3.3.5.3, states:

Electric cable construction shall comply with a flame propagation test as acceptable to the AHJ.

Exception: Existing cable in place prior to the adoption of this standard shall be permitted to remain as is.

BVPS-2 "Updated Fire Safety Analysis Report" (BVPS-2 UFSAR), Section 8.3.3, states:

Specifications of electrical cables include flame-retardant requirements, low gas generation during combustion, and the ability to operate in a wet environment. All cables installed in trays at BVPS-2, either:

1. have passed the vertical cable tray gas burner flame test delineated in Section 2.5.4.4 of IEEE-383-1974 or,

2. additionally, the flame testing for cables specified after January 1978 was modified in accordance with Reg. Guide 1.131-77 or,

3. for non-safety applications, are flame retardant and have passed equivalent industry flame testing as approved by engineering evaluation.

Evaluation:

The NRC SER NUREG-1057, Section 9.5.1.4, states:

Cable trays are of all-metal construction. Electrical cable construction passes the Institute of Electrical and Electronics Engineers (IEEE) 383-1974 flame test.

The NRC SSER NUREG-1057, Supplement 5, Section 17.5.4.2, "Technical Assessments," states:

Action Item E-04 involved power cables delivered before May 1984 which do not meet the requirements of FSAR Section 8.3.3. This section of the FSAR addresses the flame testing requirements of Regulatory Guide (RG) 1.131 which supplement the requirements of IEEE Standard 383-1974. During the FSAR revision process, exception to these requirements for the subject cables was not taken. As a result, the applicant has issued Licensing Change Notice 1615, dated October 20, 1986, clarifying the actual extent of compliance with RG 1.131. The FSAR change has to be resolved between the staff and the applicant as a part of the normal licensing process. For the purpose of the design verification, this item is closed.

BVPS-2

Licensing Action #: 27

Licensing Action: Cable Construction - Lack of Compliance with IEEE-383-1974 Flame Test

Validation/Conclusions:

The bases for previous acceptance remain valid as described in the applicable sections above. The deviation for the lack of compliance with IEEE-383-1974 flame test for cable construction is being transitioned to the new licensing basis per NFPA 805.

Disposition:

Licensing Action acceptable for transition

References:

- BVPS-2 UFSAR, Revision 19, "BVPS-2 Updated Final Safety Analysis Report."
- NFPA 805, Revision 2001, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants."
- NUREG-1057, "NRC SER - NUREG-1057 dated October 1985."
- NUREG-1057, Supplement 5, "NRC SSER - NUREG-1057, Supplement 5 dated May 1987."
- NUREG/CR-7010, Revision 1, "Cable Heat Release, Ignition, and Spread in Tray Installations During Fire (CHRISTIFIRE) - Phase 1: Horizontal Trays."
- NUREG/CR-7150, Revision 1, "Joint Assessment of Cable Damage and Quantification of Effects from Fire (JACQUE-FIRE) - Phenomena Identification and Ranking Table (PIRT) Exercise for Nuclear Power Plant Fire-Induced Electrical Circuit Failure."
- TER-13568, Revision 0, "IEEE-383-74 Cable Flame Test Comparative Analysis."

Associations:

Ch.3 - Section: 3.3 / Subsection: 3.3.5.3

BVPS-2

Licensing Action #: 28

Licensing Action: Bulk Storage of Flammable Liquids - Deviation from NFPA 30 Requirements - BTP C.7.i

Basis Date: October 1985 (NUREG-1057)

To Be Transitioned?: No

Basis:

BVPS-2 "Updated Final Safety Analysis Report" (BVPS-2 UFSAR), "Fire Area DG-1 - Diesel Generator Cubicle (Orange)" states:

The primary fire suppression system for this area is an automatic or manual, double capacity, total flooding, CO2 system. Hose rack stations and portable fire extinguishers provide backup. Fire detection is provided by the early warning fire detection system which provides fire alarms locally and in the control room.

The CO2 system is designed to attain a 34-percent concentration as recommended for surface fires (oil fires) by NFPA-12. Automatic actuation of the CO2 system is provided by heat detectors with local and control room alarms. The alarms enable the control room to be aware of the status and availability of the CO2 system at all times.

A set of heat detectors with temperature settings below the heat detectors used to actuate the CO2 system have been provided to shut down the ventilation system before CO2 is discharged.

The floor drain system for the diesel generator cubicles is routed to an oil separator before being discharged to the storm sewer system, thus precluding the possibilities of spreading fires to any other plant area.

The fuel oil day tanks are provided with a curb to prevent the fuel oil from spreading throughout the cubicles area.

The postulated fire for this fire area is a break in a diesel fuel oil line with the diesel running which causes ignition of the fuel oil. The CO2 system along with the fire barrier separating the two fire areas would limit the fire to only one fire area; therefore, the remaining diesel would be available.

The diesel fuel oil storage tanks are located beneath the diesel building; one under each diesel room. The tanks are separated from the diesel building by a minimum of 3 feet of reinforced concrete. The only access to the tanks is a manhole for each tank, located in the diesel room vestibules. Based on the location of the tanks, no special protection has been provided for the tanks.

A fire in this area will be controlled and extinguished within the area.

BVPS-2 UFSAR, "Fire Area DG-2 - Diesel Generator Cubicle (Purple)" states:

The primary fire suppression system for this area is an automatic or manual, double capacity, total flooding, CO2 system. Hose rack stations and portable fire extinguishers provide backup. Fire detection is provided by the early warning fire detection system which provides fire alarm locally and in the control room.

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Licensing Action: Bulk Storage of Flammable Liquids - Deviation from NFPA 30 Requirements - BTP C.7.i

The CO2 system is designed to attain a 34-percent concentration as recommended for surface fires (oil fire) by NFPA-12. Automatic actuation of the CO2 system is provided by heat detectors with local and control room alarms. The alarms enable the control room to be aware of the status and availability of the CO2 system at all times.

A set of heat detectors with temperature settings below the heat detectors used to actuate the CO2 system have been provided to shut down the ventilation system before CO2 is discharged.

The floor drain system for the diesel generator cubicles is routed to an oil separator before being discharged to the storm sewer system, thus precluding the possibilities of spreading fires to any other plant area.

The fuel oil day tanks are provided with a curb to prevent the fuel oil from spreading throughout the cubicles area.

The postulated fire for this fire area is a break in a diesel fuel oil line with the diesel running which causes ignition of the fuel oil. The CO2 system along with the fire barrier separating the two fire areas would limit the fire to only one fire area; therefore, the remaining diesel would be available.

The diesel fuel oil storage tanks are located beneath the diesel building; one under each diesel room. The tanks are separated from the diesel building by a minimum of 3 feet of reinforced concrete. The only access to the tanks is a manhole for each tank, located in the diesel room vestibules. Based on the location of the tanks, no special protection has been provided for the tanks.

A fire in this area will be controlled and extinguished within the area.

Evaluation:

NRC SER - NUREG-1057, Section 9.5.1.4, "Control of Combustibles," states:

Safety-related systems have been isolated or separated from combustible materials as much as possible. The storage of flammable liquids complies with National Fire Protection Standard 30 (NFPA 30).

Section 9.5.1.6, "Emergency Diesel Generator Rooms," states:

The emergency diesel generators are in individual rooms separated from each other and from other areas of the plant by fire barriers having a fire rating of 3 hours.

The primary fire suppression systems for these cubicles are individual, automatic, total flooding carbon dioxide systems. Ultraviolet flame detectors and portable carbon dioxide fire extinguishers are located in each room. Manual fire hose stations are located at the entrance to each room as a backup to the carbon dioxide system.

Each diesel generator cubicle has a floor-mounted, 1100-gallon fuel oil day tank within a curbed area. An oil sump pit with a drain is provided within the curbed area

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Licensing Action: Bulk Storage of Flammable Liquids - Deviation from NFPA 30 Requirements - BTP C.7.i

and is connected to an underground oil separator. The curbed volume is sufficient to contain 1100 gallons.

On the basis of this review, the staff concludes that the protection provided for the diesel generator rooms meets Section C.7.i of BTP CMEB 9.5-1, and is, therefore, acceptable.

Validation/Conclusions:

The diesels and their day tanks were constructed consistent with NFPA 30; therefore, this licensing action is no longer necessary.

Disposition:

Not being transitioned

References:

- 10080-B-085, Revision 14, "Fire Hazard Analysis."
- 10080-RB-0003B, Revision 10, "Fire Protection Arrangement 718' to 735'."
- 10080-RB-0090B, Revision 21, "Flow Diagram - CO2 Fire Protection & Smoke Detection System - Sheet 2."
- 10080-RB-0094A, Revision 6, "CO2 Fire Protection System, Service & Diesel Generator Building."
- 10080-RM-0013A, Revision 8, "Arrangement Diesel Generator Building."
- BVPS-2 UFSAR, Revision 19, "BVPS-2 Updated Final Safety Analysis Report."
- NUREG-1057, "NRC SER - NUREG-1057 dated October 1985."

Associations:

Ch.3 - Section: 3.3 / Subsection: 3.3.8
Ch.4 - Compartment: 2-DG-1
Ch.4 - Compartment: 2-DG-2

BVPS-2

Licensing Action #: 29

Licensing Action: Standpipe and Hose Systems - Class II versus Class III Requirement - BTP C.6.c

Basis Date: October 1985 (NUREG-1057)

To Be Transitioned?: Yes

Basis:

NFPA 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," Chapter 3.6.1, states:

> *For all power block buildings, Class III standpipe and hose systems shall be installed in accordance with NFPA 14, Standard for the Installation of Standpipe, Private Hydrant, and Hose Systems.*

The BVPS-2 "Updated Final Safety Analysis Report," BVPS-2 UFSAR, Section 9.5.1.7.3, states that:

> *Compliance with hose rack spacing is met. The hose stations are designed for flow of at least 100 gpm through a 1.5" hose. The system is more similar to a Class II type standpipe and hose system in that it has 1.5"-size hose valves only, and does not have 2.5"-size hose valves as required for Class III systems.*

Evaluation:

The SER NUREG-1057, Section 9.5.1.5 states:

> *The wet pipe sprinkler systems, deluge systems, and pre-action systems meet the provisions of NFPA 13 and NFPA 15. The areas equipped with water suppression systems are listed in Table 1 of the applicant's fire protection evaluation report.*
>
> *Each automatic sprinkler system and interior hose standpipe is supplied through separate connections from the yard main or from the internal cross-connections through buildings to ensure that no single failure in the water supply system will impair both the primary and backup fire protection in building areas.*
>
> *Each sprinkler and standpipe system connection to the distribution system is equipped with an indicating gate valve so that groups of sprinkler systems and/or manual hose stations can be isolated without interrupting the supply to other sprinkler systems and manual hose stations connected to the same header.*
>
> *On the basis of its evaluation, the staff finds that sprinkler and standpipe systems have been provided in accordance with Section C.6.c of BTP CMEB 9.5-1, and are, therefore, acceptable.*
>
> *Manual hose stations are located throughout the plant in accordance with NFPA 14. Standpipe system piping for hose stations protecting safe shutdown equipment has been analyzed for SSE loading and is provided with seismic supports. The staff concludes that the design of the standpipe system piping meets Section C.6.c of BTP CMEB-9.5-1, and is, therefore, acceptable.*

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Licensing Action #: 29

Licensing Action: Standpipe and Hose Systems - Class II versus Class III Requirement - BTP C.6.c

Validation/Conclusions:

The bases for previous acceptance remain valid as described in the applicable sections above. The deviation for the standpipe and hose system Class III is being transitioned to the new licensing basis per NFPA 805.

Disposition:

Licensing Action acceptable for transition

References:

- 10080-RB-0003A, Revision 12, "Fire Protection Arrangement."
- 10080-RB-0003B, Revision 10, "Fire Protection Arrangement 718' to 735'."
- 10080-RB-0003C, Revision 6, "Fire Protection Arrangement 735' to 760'."
- 10080-RB-0003D, Revision 7, "Fire Protection Arrangement 760' to 794'."
- 10080-RB-0003E, Revision 5, "Fire Protection Arrangement 735' to 752'."
- 10080-RB-0043B, Revision 12, "Fire Protection - Auxiliary Building."
- 10080-RB-0091A, Sheet 1, Revision 27, "Flow Diagram Fire Protection."
- 10080-RB-0091B, Sheet 2, Revision 13, "Flow Diagram Fire Protection."
- 10080-RB-0091C, Sheet 3, Revision 17, "Flow Diagram Fire Protection."
- 10080-RB-0091D, Sheet 4, Revision 21, "Flow Diagram Domestic Water System."
- 10080-RB-0091E, Sheet 5, Revision 8, "Flow Diagram Domestic Water System."
- 10080-RB-0091F, Sheet 6, Revision 5, "Flow Diagram Domestic Water System."
- 10080-RB-0091G, Sheet 7, Revision 18, "Flow Diagram Fire Protection."
- 10080-RB-0091H, Sht. 8, Revision 9, "Flow Diagram Fire Protection."
- 10080-RM-0433-001A, Revision 21, "Valve Operation Number Diagram - Fire Protection Water Distribution Network."
- 10080-RM-0433-001B, Revision 8, "Valve Operation Number Diagram - Fire Protection Water - Miscellaneous Buildings."
- 10080-RM-0433-001C, Revision 19, "Valve Operation Number Diagram Fire Protection Water - Auxiliary Building."
- 10080-RM-0433-001D, Revision 12, "Valve Operation Number Diagram Fire Protection Water Containment Building."
- 10080-TLD-033C-010-02, Revision 4, "Test Loop Diagram Fire Protection Water - Service Building Fire Hose Racks Flow."

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Licensing Action #: 29

Licensing Action: Standpipe and Hose Systems - Class II versus Class III Requirement - BTP C.6.c

- 10080-TLD-033C-028-02, Revision 3, "Test Loop Diagram Fire Protection Water - Control Building Fire Hose Racks Flow."
- 211-B-041A, Revision 0, "Auxiliary Building Fire Protection Sizing Piping for Hose Racks."
- 2BVS-0173, Revision final, "Sprinkler and Water Spray Fire Protection."
- 2BVS-0914, Revision 4, "Specification for Interior Fire Protection System."
- 2DBD-M-004, Revision 2, "Design Basis Document for Piping, Tubing and Duct Supports."
- 2OM-33.1.E, Revision 10, "Specific Instrument and Control."
- 2OST-33.1, Revision 20, "Fire Protection System Monthly Inspection."
- BVPS-2 UFSAR, Revision 19, "BVPS-2 Updated Final Safety Analysis Report."
- ES-G-001, Revision 3, "Seismic Classification for BVPS-2 Structures, Systems and Components."
- NFPA 14, Revision 1974, "Standard for the Installation of Standpipe and Hose Systems."
- NFPA 805, Revision 2001, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants."
- NUREG-1057, "NRC SER - NUREG-1057 dated October 1985."

Associations:

Ch.3 - Section: 3.6 / Subsection: 3.6.1

BVPS-2

Licensing Action #: 30

Licensing Action: Intake Structure - Detection and 3-Hour Barriers versus Sprinklers - BTP C.6.c

Basis Date: June 6, 1979 BVPS-1 SER

To Be Transitioned?: Yes

Basis:

The BVPS-2 "Updated Final Safety Analysis Report" (BVPS-2 UFSAR), states:

9.5A.1.3.19 FIRE AREA IS-2 - INTAKE STRUCTURE

9.5A.1.3.19.1 Fire Area Description

*Fire Area IS-2 contains the 'swing' service water pump (2SWS*P21C). The barriers that comprise the perimeter of this area consist of reinforced concrete walls and slabs with a minimum thickness of 18 inches. All door openings between other cubicles have 3-hour fire-rated doors. All penetrations of intercompartment walls are sealed with a material having a rating equivalent to the fire barrier. This area contains equipment for both BVPS-1 and BVPS-2.*

A 12-inch-wide slot exists in the ceiling of this cubicle for the ventilation system. This slot will not allow a fire to spread to other areas. There are no ventilation penetrations between IS-2 and adjacent areas.

No components or cables located in this area are required for plant shutdown.

9.5A.1.3.19.2 Methods of Suppression/Detection

Early warning detection and control room alarm is provided by BVPS-1 for IS-2. Hose racks and portable fire extinguishers are provided outside the cubicles. Fire suppression by water can also be gained by utilizing the outside hose headers test connections.

The postulated fire for IS-2 is a fire in the service water pump. Based on the existing fire loading, fire detection which alarms in the common control room, manual hose stations and 3-hour fire-rated walls, the fire would be contained within the cubicle.

9.5A.1.3.19.3 Safe Shutdown Summary

Plant shutdown can be achieved with either orange or purple power components from the main control room.

The BVPS-2 UFSAR also states:

9.5A.1.3.20 FIRE AREA IS-3 - INTAKE STRUCTURE

9.5A.1.3.20.1 Fire Area Description

This area contains the Train B service water pump. The area is comprised of reinforced concrete walls and a floor slab with a minimum thickness of 18 inches. All doors leading to adjacent areas have a 3-hour fire rating. This area contains equipment for both BVPS-1 and BVPS-2.

A 12-inch wide slot exists in the ceiling of this pump cubicle for the ventilation system. This slot will not allow a fire in one cubicle to propagate to another. All

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Licensing Action: Intake Structure - Detection and 3-Hour Barriers versus Sprinklers - BTP C.6.c

penetrations of intercompartment walls are sealed with a material having a rating equivalent to the fire barrier. There are no ventilation penetrations between IS-3 and adjacent cubicles.

The shutdown components located in fire area IS-3 are listed in the Fire Protection Safe Shutdown Report.

Power and control cables enter this area from duct lines. All Class 1E and non-Class 1E circuits within this area are routed in conduit.

The two emergency MCCs are fed from separate emergency 480 V substations and enter the cubicles from a duct line.

Cables associated with safe shutdown located in this fire area have been identified and evaluated.

9.5A.1.3.20.2 Methods of Suppression/Detection

Early warning detection and control room alarm is provided by BVPS-1 for IS-3. Hose racks and portable fire extinguishers are provided outside the cubicles. Fire suppression by water can also be gained by utilizing the outside hose headers test connections.

The postulated fire for IS-3 is a fire in the service water pump. Based on the existing fire loading, fire detection which alarms in the common control room, manual hose stations, and 3-hour fire-rated walls, the fire would be contained within the cubicle. As a result of redundancy and separation, a loss of availability of one service water pump would not affect the ability to achieve safe shutdown. Availability of the alternate intake structure, which provides total redundancy for BVPS-2 service water pumps in an isolated structure approximately 1,800 feet upstream, provides the capability to achieve safe shutdown on loss of this entire structure.

9.5A.1.3.20.3 Safe Shutdown Summary

Fire Area IS-3 contains the Train B service water pump. This pump is assumed lost and subsequently renders the purple emergency diesel generator unavailable. The purple train (in addition to white and yellow channel-related shutdown equipment) is assumed lost during a fire in this area. Orange train equipment is utilized to achieve shutdown from the main control room, supplemented by manual operator actions.

BVPS-2 UFSAR further states:

9.5A.1.3.21 FIRE AREA IS-4 - INTAKE STRUCTURE

9.5A.1.3.21.1 Fire Area Description

This area contains the Train A service water pump. The area is comprised of reinforced concrete walls and a floor slab with a minimum thickness of 18 inches. All doors leading to adjacent areas have a 3-hour fire rating. This area contains equipment for both BVPS-1 and BVPS-2.

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Licensing Action: Intake Structure - Detection and 3-Hour Barriers versus Sprinklers - BTP C.6.c

A 12-inch-wide slot exists in the ceiling of this pump cubicle for the ventilation system. This slot will not allow a fire in one cubicle to spread to another. All penetrations of intercompartment walls are sealed with a material having a rating equivalent to the fire barrier. There are no ventilation penetrations between IS-4 and adjacent areas.

The shutdown components located in fire area IS-4 are listed in the Fire Protection Safe Shutdown Report.

Power and control cables enter this area from duct lines. All Class 1E and non-Class 1E circuits within this area are routed in conduit.

The two emergency MCCs are fed from separate emergency 480 V substations and enter the cubicles from a duct line.

Cables associated with safe shutdown located in this fire area have been identified and evaluated.

9.5A.1.3.21.2 Methods of Suppression/Detection

Detection and control room alarm is provided by BVPS-1 for IS-4. Hose racks and portable fire extinguishers are provided outside the cubicles. Fire suppression by water can also be gained by utilizing the outside hose headers test connections that are normally used for fire pump performance testing and system flushing.

The postulated fire in IS-4 occurs in the fire pump, fuel oil tank which also disables the diesel-driven fire pump. The motor-driven fire pump is located in IS-1 which is over 40 feet away and separated from IS-4 by IS-2 and IS-3. A fire in IS-4 would not impair the operation of the motor-driven fire pump and, therefore, manual hose station would be available and the fire limited to IS-4. As a result of the redundancy and separation, a loss of availability of one service water pump would not affect the ability to achieve safe shutdown. Availability of the alternate intake structure, which provides total redundancy for BVPS-2 service water pumps in an isolated structure approximately 1,800 feet upstream, provides the capability to achieve safe shutdown on the loss of this entire structure.

A fire in this area will be controlled and extinguished within the area.

9.5A.1.3.21.3 Safe Shutdown Summary

Fire Area IS-4 contains the Train A service water pump. This pump is assumed lost and subsequently renders the orange emergency diesel generator unavailable. The orange train (in addition to red and blue channel-related shutdown equipment) is assumed lost during a fire in this area. Purple train equipment is utilized to achieve shutdown from the main control room, supplemented by manual operator actions.

NOTE: Among the conditions cited in the NRC SER dated June 6, 1979, that requires clarification is lack of sprinklers in the Intake Structure for the diesel fire pump area (Cubicle IS-4). The NRC approved this configuration in the Intake Structure, however, diesel fire

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Licensing Action: Intake Structure - Detection and 3-Hour Barriers versus Sprinklers - BTP C.6.c

pumps are required per Appendix A to BTP-CMEB 9.5-1 and NFPA 805 Section 3.9.4 to have automatic sprinklers installed.

Approval of clarifications relative to this exemption is being requested as part of this LAR submittal and transition to NFPA 805 (See Attachment T "Clarification of Prior NRC Approvals").

Evaluation:

The June 6, 1979 BVPS-1 SER, "Safety Evaluation by the Office on NRR Related to Amendment No. 18," Section 5.13.3, "Consequences if No Fire Suppression," states:

An unmitigated fire in the intake structure would not result in compromising safe shutdown capability because of the separation and barriers between redundant safety-related equipment. The river water pumps are located in separate compartments and cabling is in conduit. A separate alternate water intake structure with redundant river water pumps is provided 1800 feet away.

Because of the curbing at the diesel day tank and the trench to the diesel engine, a leak from the tank or supply lines would not spread to other areas.

5.13-4 Fire Protection System

Manual hose stations and portable extinguishers are provided within the building for manual firefighting. Thermal type fire detectors which alarm in the control room are provided in the compartments housing the river water pumps and the compartment housing the diesel fire pump.

Separation between pump compartments is provided by 18" thick reinforced concrete walls with 3 hour fire rated doors.

5.13.5 Adequacy of Fire Protection

Because of the redundancy of the safety-related equipment and separation between cables and components, the provisions of manual firefighting equipment are adequate. The significant quantities of unnecessary combustibles observed in this area, however, jeopardizes this capability.

A fire originating in one of the safety-related pump compartments, (IS-1 through IS-3), would go undetected for some time and result in the loss of one of these units.

5.13-6 Modification

The licensee will remove all unnecessary combustibles from the intake structure and will allow only fire retardant treated lumber to be used within the building. The licensee will also provide automatic fire detectors in the safety-related pump compartments IS-1, IS-2 and IS-3 arranged to alarm in the control room.

We find that, upon implementation of the above described modifications, the Intake Structure fire protection satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.

BVPS-2

Licensing Action #: 30

Licensing Action: Intake Structure - Detection and 3-Hour Barriers versus Sprinklers - BTP C.6.c

Validation/Conclusions:

The bases for previous acceptance remain valid as described in the applicable sections above. The deviation for detection and 3-hour barriers in lieu of sprinklers in the intake structure is being transitioned to the new licensing basis under NFPA 805.

Disposition:

Licensing Action acceptable for transition

References:

- 10080-RB-0002A, Sheet 1, Revision 13, "Yard Piping Underground."
- 10080-RB-0002C, Sheet 3, Revision 6, "Yard Piping Underground."
- 1OST-33.16C, Revision 1, "Early Warning Smoke Detection Instrument Test Main Intake Structure."
- 1OST-33.2A, Revision 5, "Fire Protection System Monthly Hose Stations Test."
- 1PFP-INTS-705-Pump Cubicles, Revision 1, "Fire Areas IS-1, 2, 3, 4."
- 2OST-33.1, Revision 20, "Fire Protection System Monthly Inspection."
- 2OST-33.2B, Revision 12, "Fire Protection Hose Stations Inspection, Flush, & Hose Replacement."
- 79-06-06, "SER by the Office of Nuclear Reactor Regulation Related to Amendment No. 18 to Facility Operating License No. DPR-66."
- 8700-B-084, Revision 12, "Fire Hazards Analysis."
- 8700-RB-0002S, Sheet 2, Revision 6, "General Arrangement Fire Protection System."
- 8700-RB-0002V, Sheet 5, Revision 4, "General Arrangement Fire Protection."
- 8700-RM-0059E, Sheet 1, Revision 13, "Arrangement Intake Structure."
- 8700-RM-0059F, Sheet 2, Revision 10, "Arrangement Intake Structure."
- BVPS-2 UFSAR, Revision 19, "BVPS-2 Updated Final Safety Analysis Report."
- FPSSR, Addendum 37, "BVPS-2 Fire Protection Safe Shutdown Report."
- UFPARR, Revision 30, "Updated Fire Protection Appendix R Review."

Associations:

Ch.3 - Section: 3.9 / Subsection: 3.9.4
Ch.4 - Compartment: 3-IS-1
Ch.4 - Compartment: 3-IS-2
Ch.4 - Compartment: 3-IS-3
Ch.4 - Compartment: 3-IS-4

BVPS-2

Licensing Action #: 30

Licensing Action: Intake Structure - Detection and 3-Hour Barriers versus Sprinklers - BTP C.6.c

Fire Protection - Fire Compartment: 3-IS-1 / Form: Detection
Fire Protection - Fire Compartment: 3-IS-2 / Form: Detection
Fire Protection - Fire Compartment: 3-IS-3 / Form: Detection
Fire Protection - Fire Compartment: 3-IS-4 / Form: Detection

BVPS-2

Licensing Action #: 31

Licensing Action: Access Hatch - Unrated Containment Hatch - BTP C.5.a(5)

Basis Date: May 1987 (NUREG-1057, Supplement 5)

To Be Transitioned?: Yes

Basis:

NFPA 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition, Section 3.11.3, "Fire Barrier Penetrations," states:

Penetrations in fire barriers shall be provided with listed fire-rated door assemblies or listed rated fire dampers having a fire resistance rating consistent with the designated fire resistance rating of the barrier as determined by the performance requirements established by Chapter 4. (See 3.11.3.4 for penetration seals for through penetration fire stops.) Passive fire protection devices such as doors and dampers shall conform with the following NFPA standards, as applicable:

(1) NFPA 80, Standard for Fire Doors and Fire Windows

BVPS-2 "Updated Final Safety Analysis Report" (BVPS-2 UFSAR), states:

The Standard Review Plan states that door openings in fire barriers should be protected with equivalently rated doors, frames, and hardware that have been tested and approved by a nationally recognized laboratory. Such doors should be self-closing or provided with closing mechanisms and should be inspected semiannually to verify that automatic hold-open, release, and closing mechanisms and latches are operable. (See NFPA 80, 'Fire Doors and Windows.')

Areas protected by automatic total flooding gas suppression systems should have electrically supervised self-closing fire doors or fire doors should be kept closed and electrically supervised at a continuously manned location.

The BVPS-2 UFSAR, in "Differences from the SRP," states:

c. Special purpose-type door assemblies (containment access doors/hatches) are not UL rated.

It continues on under "Justifications" to state:

c. These containment area special purpose-type door assemblies are capable of providing adequate fire protection for the area. The doors provide a pressure boundary and no UL fire-rated doors for these purposes are available.

Evaluation:

The NRC SSER - NUREG-1057, Supplement 5, Section 9.5.1.4, "General Plant Guidelines," states:

During the audit, the applicant also stated that the containment access hatch did not contain a UL label or certification of fire testing. The hatch was observed to be similar to air locks used at other facilities and was designed to meet multiple accident criteria. The combustible loading near the hatch is low; therefore, there is reasonable assurance that a fire of significant magnitude or duration will not occur near the air lock. If a fire does occur, it is probable that the substantial construction

BVPS-2

Licensing Action #: 31

Licensing Action: Access Hatch - Unrated Containment Hatch - BTP C.5.a(5)

of the air lock will prevent fire propagation through the containment boundary. Therefore, an unrated containment access hatch is an acceptable deviation from Section C.5.a (5) of BTP CMEB 9.5-1.

Validation/Conclusions:

The bases for previous acceptance remain valid as described in the applicable sections above. The deviation for the unrated containment access hatch is being transitioned to the new licensing basis per NFPA 805.

Disposition:

Licensing Action acceptable for transition

References:

- 10080-B-085, Revision 14, "Fire Hazard Analysis."
- BVPS-2 UFSAR, Revision 19, "BVPS-2 Updated Final Safety Analysis Report."
- NFPA 805, Revision 2001, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants."
- NUREG-1057, Supplement 5, "NRC SSER - NUREG-1057, Supplement 5 dated May 1987."

Associations:

Ch.4 - Compartment: 2-RC-1
Fire Protection - Fire Compartment: 2-RC-1 / Form: Passive Protection

L. NFPA 805 Chapter 3 Requirements for Approval (10 CFR 50.48(c)(2)(vii))

13 Pages Attached

Approval Request 1

NFPA 805 Section 3.3.5.1 states:

Wiring above suspended ceiling shall be kept to a minimum. Where installed, electrical wiring shall be listed for plenum use, routed in armored cable, routed in metallic conduit, or routed in cable trays with solid metal top and bottom covers.

FENOC is requesting approval for the use of existing wiring above suspended ceiling that may not comply with the requirements of NFPA 805, Section 3.3.5.1. Suspended ceilings are used sparingly throughout the power block areas at BVPS-1 and BVPS-2, as the majority of power block areas use non-suspended ceilings. The areas with suspended ceilings within the power block areas of BVPS-1 and BVPS-2 include the following examples: (2701.620-000-012, Revision B, "Beaver Valley Power Station (BVPS) Units 1 and 2 - Power Block Definition")

- Office Enclosures in Unit 1 Primary Auxiliary Building (1-PA-1A)
- Offices, miscellaneous support areas in Unit 1 Service Building (1-SB-GEN)
- Chemistry Lab, Sampling Room, and Office Enclosure in Unit 1 Turbine Building (1-TB-1)
- Break Room and Office in Unit 1 Warehouse (1-WH-1)
- Primary Chemistry Lab Area in Unit 2 Condensate Polishing Building (2-CP-1)
- Office Enclosure in Unit 2 Turbine Building (2-TB-1)
- Health Physics Facility in Unit 2 Waste Handling Building (2-WH-1)
- Control Room (3-CR-1)
- Office Enclosure in Unit 2 Primary Auxiliary Building (2-PA-5)

With the exception of the Control Room, 3-CR-1, these areas are not risk-significant and do not contain systems and equipment essential to address nuclear safety performance criteria.

Basis for Approval Request 1:

The potentially non-enclosed or non-plenum rated wiring located above suspended ceilings in the areas listed above do not pose a significant fire hazard due to the following:

- The cables routed above suspended ceilings include telephone, voice paging system, lighting, audio and computer network type cables serving the corresponding areas. These are low power cables, and therefore, unlikely to carry enough electrical energy for self- ignition.
- Fixed ignition sources located in the space above the suspended ceilings are limited to small hazards such as low voltage lighting. It is not likely that the low-power cables making up these configurations provide credible ignition sources. Therefore it is not credible for a significant fire to originate in the space above suspended ceilings such that the fire would challenge the nuclear safety performance criteria.
- The cables throughout BVPS-1 and BVPS-2 are classified according to various levels of service. High power and medium power cables are grouped separately from low power, control, and instrument cables (Ref. BVS-368). Cables located above

suspended ceilings serving lighting, telephone, page party, and similar types of communication or signal systems are low power and are not required to achieve the nuclear safety performance criteria.

- The Control Room is a risk significant area; however, it is continuously occupied by operators, which constitutes a continuous fire watch, and manual suppression is available in the area. This significantly minimizes fire risk in the area.
- Plant procedures will be revised to require future cable installations above suspended ceilings to meet NFPA 805, Section 3.3.5.1 (LAR Table S-3).

Acceptance Criteria Evaluation:

Nuclear Safety and Radiological Release Performance Criteria:

The presence of non-enclosed or non-plenum rated cables above the suspended ceilings in the areas identified above does not adversely affect nuclear safety performance criteria. The cables routed above suspended ceilings include telephone, voice paging system, lighting, audio and computer network type cables serving the corresponding areas. These are low power cables, and therefore, unlikely to carry enough electrical energy for self-ignition. Fixed ignition sources located in the space above the suspended ceilings are limited to small hazards such as low voltage lighting. It is not likely that the low-power cables making up these configurations provide credible ignition sources. Therefore it is not credible for a significant fire to originate in the space above suspended ceilings such that the fire would challenge the nuclear safety performance criteria. Furthermore, the fire risk in the Control Room is minimized due to the continuous occupation by trained personnel and availability of manual suppression equipment. The location of non-enclosed or non-rated plenum wiring above suspended ceilings has no impact on the radiological release criteria, since there will be no impact on fire suppression activities. The radiological review was performed based on the potential location of radiological concerns and is not dependent on the type of wiring or locations of suspended ceilings.

Safety Margin and Defense-in-Depth:

The use of limited amounts of non-enclosed or non-plenum rated low voltage wiring above the suspended ceilings in power block areas is an insignificant fire hazard. The wiring routed above suspended ceilings does not impact fire protection defense-in-depth. Such wiring does not compromise automatic or manual fire suppression functions, fire suppression for systems and structures, or adversely impact nuclear safety performance criteria.

Conclusion:

NRC approval is requested for the presence of wiring located above the suspended ceilings in power block areas which do not meet the requirements of NFPA 805, Section 3.3.5.1. Beaver Valley determined that the performance-based approach satisfies the following criteria:

- Satisfies the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release,
- Maintains safety margins, and
- Maintains fire protection defense-in-depth (fire prevention fire detection, fire suppression, mitigation, and post-fire safe and stable capability).

Approval Request 2

NFPA 805 Section 3.3.12(1) states:

The oil collection system for each reactor coolant pump shall be capable of collecting lubricating oil from all potential pressurized and non-pressurized leakage sites in each reactor coolant pump oil system.

NFPA 805 Section 3.3.12(4) states:

Leakage points on a reactor coolant pump motor to be protected shall include but not be limited to the lift pump and piping, overflow lines, oil cooler, oil fill and drain lines and plugs, flanged connections on oil lines, and the oil reservoirs, where such features exist on the reactor coolant pumps.

The underlying purposes of 10 CFR Part 50, Appendix R, Section III.O and NFPA 805, Section 3.3.12 is to ensure that failure of the RCP lube oil system will not cause a fire during normal or design basis accident conditions and that there is reasonable assurance that the system will withstand the Safe Shutdown Earthquake. The intention of the regulation is for licensees to accomplish this by extending the concept of defense-in-depth to fire protection in fire areas essential to nuclear safety performance criteria, with the following objectives:

1) to prevent fires from starting;
2) to rapidly detect, control, and extinguish promptly those fires that do occur;
3) to provide protection for structures, systems, and components essential to address nuclear safety performance criteria so that a fire that is not promptly extinguished by the fire suppression activities will not prevent the SSD of the plant.

An approval is requested for BVPS-1 and BVPS-2 reactor coolant pumps (RCP) oil collection systems (OCS) from the requirements of NFPA 805 Section 3.3.12(1) and 3.3.12(4) in that the RCP oil misting is not captured within the originally approved OCS 10 CFR Part 50 Appendix R review. The RCP, steam generator, and piping associated with each of the three reactor coolant loops are partitioned from one another at various levels by radial reinforced concrete walls positioned approximately 120 degrees from adjacent radial walls. Oil collection pans with spray shields and enclosures for the RCP lubricating oil system are provided. This design is intended to prevent the RCP lubricating oil system from becoming a potential source of fire. Appendix R, Item III.O of 10 CFR Part 50 requires that the RCP be equipped with an OCS to mitigate the fire hazard associated with the RCP lubricating system. BVPS-1 and BVPS-2 have installed stainless steel shrouds to encompass each of the following potential oil discharge points: upper bearing assembly, oil cooler assembly, lower bearing assembly, oil lift pump motor assembly, motor catch basin assembly, and oil retention ring.

These shrouds will catch oil leakage that may be sprayed from these points. The associated drain lines are large enough to accommodate the largest anticipated oil leakages. Each of the three RCPs has an oil collection tank that can accommodate the entire oil capacity of its associated RCP (320 gallons for BVPS-1 and 300 gallons for BVPS-2). In BVPS-1, the tank is located at the 692'-11" elevation and in BVPS-2, the tank is located at the 718'-6" elevation in their respective Containment Buildings. A flame arrestor/vent assembly continuously vents each oil collection tank to containment. The RCP OCS is seismically supported and has been designed to accommodate the differential movement of the reactor coolant loops (Refs. 8700-RB-140A for BVPS-1 and

10080-RS-0050M for BVPS-2). The RCP OCS was designed and reviewed in accordance with 10 CFR Part 50, Appendix R, Section III.O for BVPS-1 and Section C.7.a of BTP CMEB 9.5.1 for BVPS-2 to collect leakage from pressurized and non-pressurized leakage sites in the RCP OCS. The RCP OCS design and installation was approved for BVPS-1 in NRC SER, dated June 6, 1979, and approved for BVPS-2 in NUREG-1057, dated October 1985. The NRC approval did not discuss the collection of oil mist.

Basis for Approval Request 2:

RCP motors are large and will consume oil during the course of normal operation. Large motors tend to lose some oil due to heat through the seals, and the oil potentially will become atomized in the ventilation system. The previously approved RCP OCSs are designed and sized to collect and contain oil from potential pressurized and non-pressurized leakage areas in a seismic event resulting in failure of the lubrication system. The OCS design cannot wholly contain the atomized oil mist, as its design is not completely sealed in order to permit adequate air cooling for safe motor operation. A design change to a completely sealed motor of this size would be a significant modification that would contribute little to reducing fire risk.

The oil mist resulting from normal operation can accumulate on surfaces in the vicinity of the RCP and motor and will not adversely impact the ability of a plant to achieve safe and stable conditions even if ignition occurs. The quantity of oil that may be found in areas of the Containment Building due to the RCP oil vapor mist is very small and does not contribute significantly to fire loading nor create potential fire propagation between fire compartments.

In addition, Generic Letter 86-10, "Response to Industry Questions," dated April 24, 1986, Question 6.2 (presented below) discussed oil dripping. The response concluded that there was no concern with oil consumption (which is an oil misting phenomena) but the primary concern was with an oil fire started from a pressurized leakage point and/or spilled leakage.

Question 6.2 states:

> *It would appear that a literal reading of Section III.O regarding the oil collection system for the reactor coolant pump could be met by a combination of seismically designed splash shields and a sump with sufficient capacity to contain the entire lube oil system inventory. If the reactor coolant pump is seismically designed and the nearby piping hot surfaces are protected by seismically designed splash shields such that any spilled lube oil would contact only cold surfaces, does this design concept conform to the requirements of the rule?*

The response states:

> *If the reactor coolant pump, including the oil system, is seismically designed and the nearby hot surfaces of piping are protected by seismically designed splash shields such that any spilled lube oil would contact only cold surfaces, and it could be demonstrated by engineering analysis that sump and splash shields would be capable of preventing a fire during normal and design basis accident conditions, the safety objective of Section III.O would be achieved. Such a design concept would have to be evaluated under the exemption process. The justification for the exemption should provide reasonable assurance that oil from all potential pressurized and unpressurized leakage points would be safely collected and drained to the sump. The sump should be shown capable of safely containing all of the*

anticipated oil leakage. The analysis should verify that there are no electric sources of ignition.

Historically, there have been no fires attributed to oil misting based on normal operation in the industry. Fires have occurred due to oil leakage from equipment failure such as cracked welds on piping or inadequate collection pan design. Beaver Valley does not have a history (34 years of operation for BVPS-1 and 25 years of operation for BVPS-2) of significant oil loss from the RCPs as a result of oil misting or oil leakage that is not contained by the properly designed and installed OCS.

- The OCS as designed complies with 10 CFR 50, Appendix R, Section III.O and was approved to collect leakage from pressurized and non-pressurized leakage sites in the RCP oil system.
- Oil misting from normal operation is not leakage; it is normal motor oil consumption.
- Oil misting from normal operation does not significantly reduce the oil inventory.
- Oil misting does not account for an appreciable heat release rate or accumulation near potential ignition sources or non-insulated reactor coolant piping.
- The RCPs use synthetic oil having a high flash point in excess of 400 degrees Fahrenheit. This temperature is well above the expected design surface temperature (150 degrees Fahrenheit) of any of the mirror insulation and other small components that the vaporized oil might contact.
- The RCP piping is covered with metal mirror insulation which will not absorb/accumulate oil mist in quantities that will create a fire ignition source.

Acceptance Criteria Evaluation:

Nuclear Safety and Radiological Release Performance Criteria:

The radiological release performance criteria is met because (1) the entire Containment Building during power operations is an environmentally sealed radiological area, (2) the potential for oil mist from the RCPs does not change the radiological release evaluation performed for each fire zone where potentially contaminated water and smoke is contained and monitored, (3) the oil mist does not add additional radiological materials to the area or challenge systems boundaries that contain such materials, and (4) fire brigade control of water runoff and smoke is not hindered because of the existence of the misting.

Safety Margin and Defense-in-Depth:

Oil mist resulting from normal operation will not adversely impact the ability of a plant to achieve and maintain fire safe shutdown, even if ignition occurs. There are redundant RCPs to achieve and maintain safe and stable conditions, if required; therefore, the safety margin inherent in the analysis for the fire event has been preserved.

The potential for oil mist from the RCPs does not directly result in compromising automatic fire suppression functions, manual fire suppression functions, or post-fire safe shutdown capability.

Conclusion:

NRC approval is requested for the potential of oil misting from the present configuration of Beaver Valley's RCPs OCS due to normal consumption and not captured by the OCS that is designed for pressurized and non-pressurized leakage and spillage. As discussed

above, oil misting does not create an ignition source within the Containment Building requiring modification to the previously approved OCS that fully complies with 10 CFR 50, Appendix R, Section III.O. No fires have occurred in the BVPS-1 and BVPS-2 Containments as a result of RCP oil misting during the 59 accumulated years of RCP operation.

Beaver Valley determined that the performance-based approach satisfies the following criteria:

- Satisfies the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release,
- Maintains safety margins, and
- Maintains fire protection defense-in-depth (fire prevention fire detection, fire suppression, mitigation, and post-fire safe and stable capability).

Approval Request 3

NFPA 805 Section 3.5.11 states:

Means shall be provided to isolate portions of the yard fire main loop for maintenance or repair without simultaneously shutting off the supply to both fixed fire suppression systems and fire hose stations provided for manual backup. Sprinkler systems and manual hose station standpipes shall be connected to the plant fire protection water main so that a single active failure or a crack to the water supply piping to these systems can be isolated so as not to impair both the primary and backup fire suppression systems.

The underlying purpose of NFPA 805, Section 3.5.11 is to ensure that there is available water supply for suppression (automatically or manually) after isolation for maintenance, or during a repair of the fire protection supply piping.

A Duquesne Light letter dated October 27, 1976, stated in the response for BTP Position IV C.2.a:

The fire protection underground yard loop has been installed using NFPA 24 as a guide and found satisfactory by the NELPIA inspector.... Approved post indicator valves (PIVs) are installed to provide isolation capability of the underground loop.... BVPS 1 is in compliance with this position.

Maintenance or repair activities can be performed by isolating a portion of the loop.

In addition, BTP Position IV C.3.a states in part:

Each automatic sprinkler and manual hose station should have an independent connection to the plant underground water main.

The BVPS-1 response states:

The manual hose rack system for the fuel building and auxiliary building have separate independent connections to the yard underground main. The hose rack systems for the service building, warehouse areas, auxiliary bay, and turbine building can be fed from two different yard underground sources. The sprinkler system headers in the turbine building and new warehouse can be fed from two different yard underground connections. The sprinkler system header in the old warehouse has only one connection to the underground yard main, however, all areas serviced by this header have backup water hose racks from another yard connection or backup protection from outside hydrants.

Amendment No.18 to the BVPS-1 facility Operating License No. DPR-66 dated June 6, 1979, Section 4.3.1.3 "Fire Water Piping System" states:

Post Indicator type valves are strategically located along the fire loop which provides sectionalized control and isolation of portions of the fire main loop....The arrangement of the sectionalizing valves insure that a single break in the system will not deprive water supply to both primary and secondary protection systems in the fire zone.

The intention of the regulation is for licensees to accomplish the above by extending the concept of defense-in-depth to fire protection in fire areas essential to nuclear safety performance criteria, with the following objectives:

1) to prevent fires from starting;
2) to rapidly detect, control, and extinguish promptly those fires that do occur;
3) to provide protection for structures, systems, and components essential to address nuclear performance criteria so that a fire that is not promptly extinguished by the fire suppression activities will not prevent the plant from achieving safe and stable conditions.

Basis for Approval Request 3:

BVPS-1 meets the current license condition by providing sectionalizing valves to isolate individual building and zones. This BVPS-1 request addresses the issue that depending on the location of isolation or repair, such as locations in the Auxiliary Building and Safeguards Area, a single active failure or a crack in the interior fire protection water supply piping may not be isolable without impairing both the primary fixed suppression and the backup manual fire hose stations because both are supplied by the same internal water supply header (Refs. 8700-RB-0030E and 8700-RB-0030F). However, portions of the system can be isolated with the available sectionalizing valves in combination with other compensatory measures to restore suppression capabilities to the area or zone, with the use of staged temporary fire hoses or through bypassing the isolated portion of piping with fire hoses.

As an example, drawings 8700-RM-433-2 and 8700-RB-16C illustrate that a single active failure or piping crack in the interior building fire protection header in the Auxiliary Building can eliminate water supply for both the standpipe system as well as the fixed fire suppression systems to the Component Cooling Pumps area and the Waste Storage areas.

Therefore, depending on the section of piping being isolated for maintenance or repair, there are locations in BVPS-1 where the arrangement of valves on the outdoor fire mains in combination with the valves on the interior building does not meet the specific intent of the NFPA 805 Section 3.5.11 requirement, such that a single active failure or piping crack can be isolated without shutting off the supply to both primary and backup fire suppression in a particular zone or area.

The BVPS-1 Fire Protection water supply headers for BVPS-1 are located inside buildings, and these headers supply both fixed fire suppression systems and the standpipes supplying the manual hose stations. Many of the internal headers are supplied by two connections to the yard loop.

Where maintenance and/or repair actions for BVPS-1 may be required, the closing of some sectional valves to isolate the piping section may also isolate both suppression systems and backup manual hose stations serving the area. In these situations, compensatory measures would be enacted as required in 1/2-ADM-1900, "Fire Protection Program," Attachment B, which requires providing an equivalent capacity backup fire hose protection to the unprotected area, unless the area does not contain safety-related equipment, and the establishment of fire surveillance within the related area or zone. These compensatory measures would ensure effective and adequate temporary fire protection for the subject areas during the time when the primary fire suppression features are nonfunctional.

Additional fire hose and fittings are available, per 1/2-ADM-2108, "Mutual Aid Fire and Emergency Response Plan," 1/2OST-33.33, "Fire Brigade Equipment Inventory Verification," and 1/2OST-33.34, "Fire Protection Equipment Readiness" to provide temporarily fire protection water supply by bypassing the isolated section of piping with water from the non-isolated section of piping to serve the affected area or alternatively, to develop a sufficient hose length supplying the area from an available source of fire water. The additional hoses are located at various and diverse locations around the site, such as in hydrant hose houses, on emergency vehicles, at hose stations outside the fire area, and on responding mutual aid fire department trucks.

Acceptance Criteria Evaluation:

Nuclear Safety and Radiological Release Performance Criteria:

The radiological release performance criteria is met because (1) the potential for the fire brigade to suppress a fire is not diminished in radiological areas should a failure in the supply piping because of the available additional fire hose to either bypass the isolated sections of piping or reach the isolated areas directly, and (2) the fire brigade control of water runoff and smoke is not hindered because of a potential isolation to a section of the fire protection water supply piping.

Safety Margin and Defense-in-Depth:

The isolation of a section of the fire protection supply piping will not adversely impact the ability of a plant to achieve and maintain fire safe shutdown in the event of a fire. Plant personnel are familiar with periodic isolation of sections of piping to perform routine maintenance. Prior to this activity, the site evaluates the areas that are unprotected and creates appropriate compensatory measures, such as the readiness of additional fire hose to reach the affected areas, additional fire prevention controls, and fire surveillances. There are many ready sources for additional fire hoses that are available to retrieve the needed temporary fire hoses as discussed above. Fire protection piping inside the power block buildings, except for the Intake Structure, is not required to achieve and maintain safe and stable conditions. Therefore, the safety margin inherent in the post-fire safe shutdown analysis for the fire event has been preserved and the safe and stable capability has not been reduced.

Conclusion:

NRC approval is requested for the present configuration of the fire protection water supply piping to BVPS-1. There are piping arrangements that do have adequate isolation capabilities because of the many sectionalizing valves. However, in various locations, isolation has the potential to remove from service both the fixed fire suppression systems and the fire hose stations providing the manual backup in an area during a period of maintenance or repair. As discussed above, BVPS-1 has the capability to provide additional fire hose(s) from other available locations to facilitate a bypass around the isolated section of piping or to directly reach any unprotected area. The NRC previously reviewed and approved the BVPS-1 sectional arrangement of the automatic suppression systems and the fire hose stations as is evident in the Amendment No.18 to the BVPS-1 facility Operating License No. DPR-66 dated June 6, 1979, Section 4.3.13. Therefore, the intent of NFPA 805 Section 3.5.11 is met since, BVPS-1 can supplement fire suppression water capabilities by using temporary fire hose(s) in the place of installed piping.

Beaver Valley determined that the performance-based approach utilized to evaluate a variance from the requirements of NFPA 805 Chapter 3:

- Satisfies the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release,
- Maintains safety margins, and
- Maintains fire protection defense-in-depth (fire prevention fire detection, fire suppression, mitigation, and post-fire safe and stable capability).

Approval Request 4

NFPA 805 Section 3.5.14 states:

All fire protection water supply and fire suppression system control valves shall be under a periodic inspection program and shall be supervised by one of the following methods.

3.5.14(a): Electrical supervision with audible and visual signals in the main control room or other suitable constantly attended location.

3.5.14(b): Locking valves in their normal position. Keys shall be made available only to authorized personnel.

3.5.14(c): Sealing valves in their normal positions. This option shall be utilized only where valves are located within fenced areas or under the direct control of the owner/operator.

BVPS-1 Amendment 18 SER, dated June 1979 states:

The license will implement supervision of the post indicator sectionalizing valves to assure they are in the open position by means of electrical switches and alarms or chains, locks or tamper proof seals with administrative procedures conforming to NFPA 26. The arrangement of the sectionalizing valves insure that a single break in the system will not deprive water supply to both primary and secondary protection systems in the fire zone.

Yard hydrants with isolation curb box valves are installed along the yard loop at intervals of approximately 250 feet.

BVPS-2 SER NUREG-1057, dated October 1985 states:

Yard hydrants are provided at intervals of less than 250 feet along the protection water supply loop. The lateral to each yard hydrant is provided with a key-operated isolation valve to facilitate hydrant maintenance and repairs without shutting down any part of the fire water supply system....

Approved post-indicator sectional control valves are provided to isolate portions of the underground main for maintenance or repair without shutting off the supply to primary and backup fire suppression systems that serve areas containing or exposing safety-related systems.

By letter dated May 23, 1984, the applicant committed to supervise all valves in the fire protection water supply system, in accordance with NFPA 26.

On the basis of its evaluation and the above commitment, the staff concludes the fire protection water supply meets Section C.6.b of BTP CMEB 9.5-1 and is, therefore, acceptable.

Both versions of the BTP, for pre- and post-1979 operating plants, require electrical or administrative control over the fire protection water supply valves. The documents also refer to NFPA 26. In 1988, NFPA 26 was withdrawn and is no longer an active fire protection code (Provision of valve supervision was incorporated into individual codes governing a variety of suppression systems). An earlier version, NFPA 26-1976 is a Recommend Practice rather than a Standard. NFPA 26 Chapter 6, "Methods of Supervision" includes Subsection 6-1: "The various methods of supervision, in addition to

systematic weekly (or monthly in the case of locked valves) inspection by a competent plant employee, are as follows: central station, proprietary or remote station alarm service; local alarm service which will cause the sounding of an audible signal at a constantly attended point; locking valves open; sealing of valves; and notification systems." NFPA 26 subsection 6-2 states in part: "If valves are locked, distribution of keys should be restricted to only those directly responsible for the fire protection system...."

Basis for Approval Request 4:

The control valves in the supply lines to the individual fire hydrants are underground valves and are not supervised as required by NFPA 805 - 2001 Section 3.5.14. These valves do not have an extended permanently attached method of changing the valve's position. This type of valve was selected because the location of the underground piping in the yard precludes the installation of a post indicator valve above the surface level which would interfere with vehicle traffic, equipment movement, and have the potential for damage. The valves were referred to as curb box type valve in the BVPS-1 SER and as key-operated valves in the BVPS-2 SER. Plant procedures refer to them only as curb box valves. The term "key" comes from the description of the long T-handle portable valve operating tool.

This section of NFPA 805 requires the valves to be electrically supervised, locked, or sealed. The underground control valves supplying each outdoor fire hydrant are provided with a curb box for access, and require the use of a long handle T-wrench to reposition the valve. These valves are noted in the surveillance portion 1/2-ADM-1900, "Fire Protection Program," and are inspected and position noted in 1OST-33.12 "Fire Protection System Valve Stroke Test," 2OST-33.1 "Fire Protection System Valve Inspection Test" and 2OST-33.12 "Fire Protection System Valve Stroke Test" to confirm that they are periodically in the required open position.

- The underground valves and/or curb boxes are not designed to accept monitoring switches, locks and chains, or sealing devices.
- The valves are not subject to inadvertent closure or tampering because they require the use of special T-wrench for operation. Each valve controls the water supply to only one outdoor fire hydrant.
- The valves are located underground and without the special long handle valve wrench for operation, the valves cannot be inadvertently operated or misaligned accidently.
- The valves are included in a periodic inspection program.

Even though the valves are not equipped to monitor tampering or repositioning, their inaccessibility and the physical requirement to obtain and use the special T-wrench prevents them from being subject to tampering. In addition, the valves are included in the Beaver Valley inspection program.

Acceptance Criteria Evaluation:

Nuclear Safety and Radiological Release Performance Criteria:

The non-supervision of curb valves for the underground yard fire main loop does not affect nuclear safety performance criteria. The valves are operated only by trained personnel to ensure that water is available to plant fire protection systems as required, and therefore, there is no impact on the nuclear safety performance criteria. Similarly, the non-supervision of curb valves has no impact on the radiological release performance criteria.

Safety Margin and Defense-in-Depth:

The non-supervised curb valves for the underground fire main loop require a special wrench for operation, and they are operated by authorized personnel only. Therefore, the safety margin inherent in the analysis for the fire event has been preserved. Based on these justifications, this condition does not negatively affect the system pressure or flow and therefore does not impact fire protection defense-in-depth. The non-supervision of curb valves does not directly result in compromising fire suppression functions, manual fire suppression functions, or post-fire safe shutdown capability.

Conclusion:

NRC approval is requested for unsupervised fire hydrant curb box valves as required by NFPA 805 - 2001, Section 3.5.14 based on the following:

The underground valves and/or curb boxes are not designed to accept monitoring switches, locks and chains, or sealing devices. The valves are not subject to inadvertent closure or tampering because they require the use of special T-wrench to be operated, and each valve controls the water supply to only one outdoor fire hydrant. The valves are located underground and require a particular long handle valve wrench for operation. The valves cannot be inadvertently operated or misaligned accidently. The valves are included in a periodic inspection program. The long handle tools (used to manipulate the valve position) are not maintained on the valve.

Therefore, even though the valves are not equipped to monitor tampering or repositioning, their inaccessibility and the physical requirement to obtain the special T-wrench prevents them from being subject to tampering. The valves are also included in the Beaver Valley inspection program.

Beaver Valley has determined that the performance based approach utilized to evaluate a variance from the requirements of NFPA 805 Chapter 3:

- Satisfies the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release,
- Maintains safety margins, and
- Maintains fire protection defense-in-depth (fire prevention fire detection, fire suppression, mitigation, and post-fire safe and stable capability).

M. License Condition Changes

12 Pages Attached

The Beaver Valley Power Station, Unit 1 and Unit 2, current fire protection operating license (OL) condition 2.C(5) and 2.F will be replaced with the standard operating license condition in Regulatory Position 3.1 of Regulatory Guide 1.205, Revision 1, "Risk-Informed, Performance-Based Fire Protection for Light-Water Nuclear Power Plants," Revision 1, as modified by FAQ 06-0008, Revision 9 (ML073380976).

It is FENOC's understanding that, implicit in the superseding of these license conditions, prior fire protection SERs and commitments have been superseded in their entirety by the revised license condition. However, Commission Order EA-02-026 (TAC No. MD4496 and MD4497) incorporated the mitigation strategies required by Section B.5.b. This order requires that strategies for addressing large fires and explosions be maintained for key areas. The elements of license conditions 2.C(11), Beaver Valley Power Station, Unit 1, DPR-66, and 2.C(13), Beaver Valley Power Station, Unit 2, NPF-73, will be coordinated with the station organizations responsible for these License Conditions in order to provide effective station integration relative to the Beaver Valley NFPA 805 project implementation. This OL condition will remain in effect.

No other license conditions need to be superseded or revised. FENOC implemented the following process for determining that OL condition 2.C(5) and 2.F are the only license conditions required to be superseded to implement the new fire protection program which meets the requirements of 10 CFR 50.48(a) and 50.48(c):

Reviews of the current Beaver Valley OL DPR-66, Amendment 285, and OL NPF-73, Amendment 174, were performed by using electronic searches of the FENOC FileNet System. The FENOC FileNet System contains Beaver Valley licensing documents, correspondence, regulatory, and guidance materials, including documents related to the operating license, the Technical Specifications, the fire protection program, the UFSAR and subsequent revisions, and correspondence to and from the NRC.

Supersede the following BVPS-1 Operating License Condition 2.C(5)

2.C(5) Fire Protection

FENOC shall implement and maintain in effect all provisions of the approved fire protection program as described in the Updated Final Safety Analysis Report (UFSAR) for the facility, subject to the following provision: FENOC may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

Supersede the following BVPS-2 Operating License Condition 2.F

2.F Fire Protection Program (Section 9.5.1 of SER Supplement 3)

FENOC shall implement and maintain in effect all provisions of the approved fire protection program as described in the Final Safety Analysis Report through Amendment No. 17, and submittals dated May 18, May 20, May 21, June 24, and July 6, 1987, and as described in the Safety Evaluation Report dated October 1985, and Supplements 1 through 6, subject to the following provision:

FENOC may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

Replace with New License Condition:

DOCKET NO. 50-334, BEAVER VALLEY POWER STATION, UNIT NO. 1, RENEWED FACILITY OPERATING LICENSE, DPR-66, **2.C(5), page 4**

DOCKET NO. 50-412, BEAVER VALLEY POWER STATION, UNIT NO. 2, RENEWED FACILITY OPERATING LICENSE, NPF-73, **2.F, page 8**

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FENOC shall implement and maintain in effect all provisions of the approved fire protection program that comply with 10 CFR 50.48(a) and 10 CFR 50.48(c) as specified in the license amendment request dated (__________) and as approved in the safety evaluation report dated (__________) except where NRC approval for changes or deviations is required by 10 CFR 50.48(c), and provided no other regulation, technical specification, license condition or requirement would require prior NRC approval, the licensee may make changes to the fire protection program without prior approval of the Commission if those changes satisfy the provisions set forth in 10 CFR 50.48(a) and 10 CFR 50.48(c), the change does not require a change to a technical specification or a license condition, and the criteria listed below are satisfied.

(a) Risk-Informed Changes that May Be Made Without Prior NRC Approval

A risk assessment of the change must demonstrate that the acceptance criteria below are met. The risk assessment approach, methods and data shall be acceptable to the NRC and shall be appropriate for the nature and scope of the change being evaluated; be based on the as-built, as operated, and maintained

plant; and reflect the operating experience at the plant. Acceptable methods to assess the risk of the change may include methods that have been used in the peer reviewed fire PRA model, methods that have been approved by NRC through a plant-specific license amendment or NRC approval of generic methods specifically for use in NFPA 805 risk assessments, or methods that have been demonstrated to bound the risk impact.

1. *Prior NRC review and approval is not required for a change that results in a net decrease in risk. The proposed change must also be consistent with the defense-in-depth philosophy and must maintain sufficient safety margins. The change may be implemented following completion of the change evaluation.*
2. *Prior NRC review and approval is not required if the change results in a risk increase less than 1E-7/yr for CDF and less than 1E-8/yr for LERF. The proposed change must also be consistent with the defense in-depth philosophy and must maintain sufficient safety margins. The change may be implemented following completion of the change evaluation.*

(b) Other Changes that May Be Made Without Prior NRC Approval

1. *Changes to NFPA 805, Chapter 3, Fundamental Fire Protection Program:*

   Prior NRC review and approval are not required for changes to the NFPA 805, Chapter 3, fundamental fire protection program elements and design requirements for which an engineering evaluation demonstrates that the alternative to the Chapter 3 element is functionally equivalent or adequate for the hazard. The licensee may use an engineering evaluation to demonstrate that a change to NFPA 805, Chapter 3, element is functionally equivalent to the corresponding technical requirement. A qualified fire protection engineer shall perform the engineering evaluation and conclude that the change has not affected the functionality of the component, system, procedure, or physical arrangement, using a relevant technical requirement or standard.

   The licensee may use an engineering evaluation to demonstrate that changes to certain NFPA 805, Chapter 3, elements are acceptable because the alternative is "adequate for the hazard." Prior NRC review and approval would not be required for alternatives to four specific sections of NFPA 805, Chapter 3, for which an engineering evaluation demonstrates that the alternative to the Chapter 3 element is adequate for the hazard. A qualified fire protection engineer shall perform the engineering evaluation and conclude that the change has not affected the functionality of the component, system, procedure, or physical arrangement using a relevant technical requirement or standard.

   The four specific sections of NFPA 805, Chapter 3, are as follows:

   - *Fire Alarm and Detection Systems (Section 3.8)*
   - *Automatic and Manual Water-Based Fire Suppression Systems (Section 3.9)*
   - *Gaseous Fire Suppression Systems (Section 3.10)*
   - *Passive Fire Protection Features (Section 3.11)*

2. *Fire Protection Program Changes that Have No More than Minimal Risk Impact:*

   Prior NRC review and approval are not required for changes to the licensee's fire protection program that have been demonstrated to have no more than a minimal risk impact. The licensee may use its screening process as described in NEI 04-02, Section 5.3.3 and Appendix I to determine that certain fire protection program changes meet the minimal criterion. The licensee shall ensure that fire protection defense-in-depth and safety margins are maintained when changes are made to the fire protection program.

(c) *Transition License Conditions*

1. *Before achieving full compliance with 10 CFR 50.48(c), as specified by (2) below, risk-informed changes to the licensee's fire protection program may not be made without prior NRC review and approval unless the change has been demonstrated to have no more than a minimal risk impact, as described in (2) above.*

2. *The licensee shall implement the (Unit 1 or Unit 2) modifications to its facility, as described in Attachment S, Table S-2, "Plant Modifications Committed," in FENOC letter ____________, dated ____________, to complete the transition to full compliance with 10 CFR 50.48(c), by the completion of the second (Unit 1 or Unit 2) refueling outage after {date of approval of the safety evaluation report}. The licensee shall maintain appropriate compensatory measures in place until completion of these modifications.*

3. *The Licensee shall implement the items listed in Attachment S, Table S-3, "Implementation Items" of FENOC Letter ____________, dated ____________, by 180 days after {date of approval of the safety evaluation report}.*

BVPS-1 Markup

(3) Less Than Three Loop Operation

Deleted per License Amendment No. 239.

(4) Steam Generator Water Rise Rate

Deleted per License Amendment No. 24.

(5) Fire Protection Program

~~FENOC shall implement and maintain in effect all provisions of the approved fire protection program as described in the Updated Final Safety Analysis Report (UFSAR) for the facility, subject to the following provision: FENOC may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.~~

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Revised BVPS-1 DPR-66 Operating License Pages

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(3) Less Than Three Loop Operation

Deleted per License Amendment No. 239.

(4) Steam Generator Water Rise Rate

Deleted per License Amendment No. 24.

(5) Fire Protection Program

FENOC shall implement and maintain in effect all provisions of the approved fire protection program that comply with 10 CFR 50.48(a) and 10 CFR 50.48(c) as specified in the license amendment request dated (__________) and as approved in the safety evaluation report dated (__________) except where NRC approval for changes or deviations is required by 10 CFR 50.48(c), and provided no other regulation, technical specification, license condition or requirement would require prior NRC approval, the licensee may make changes to the fire protection program without prior approval of the Commission if those changes satisfy the provisions set forth in 10 CFR 50.48(a) and 10 CFR 50.48(c), the change does not require a change to a technical specification or a license condition, and the criteria listed below are satisfied.

(a) Risk-Informed Changes that May Be Made Without Prior NRC Approval

A risk assessment of the change must demonstrate that the acceptance criteria below are met. The risk assessment approach, methods and data shall be acceptable to the NRC and shall be appropriate for the nature and scope of the change being evaluated; be based on the as-built, as operated, and maintained plant; and reflect the operating experience at the plant. Acceptable methods to assess the risk of the change may include methods that have been used in the peer reviewed fire PRA model, methods that have been approved by NRC through a plant-specific license amendment or NRC approval of generic methods specifically for use in NFPA 805 risk assessments, or methods that have been demonstrated to bound the risk impact.

1. Prior NRC review and approval is not required for a change that results in a net decrease in risk. The proposed change must also be consistent with the defense-in-depth philosophy and must maintain sufficient safety margins. The change may be implemented following completion of the change evaluation.
2. Prior NRC review and approval is not required if the change results in a risk increase less than 1E-7/yr for CDF and less than 1E-8/yr for LERF.

The proposed change must also be consistent with the defense in-depth philosophy and must maintain sufficient safety margins. The change may be implemented following completion of the change evaluation.

(b) Other Changes that May Be Made Without Prior NRC Approval

1. Changes to NFPA 805, Chapter 3, Fundamental Fire Protection Program:

   Prior NRC review and approval are not required for changes to the NFPA 805, Chapter 3, fundamental fire protection program elements and design requirements for which an engineering evaluation demonstrates that the alternative to the Chapter 3 element is functionally equivalent or adequate for the hazard. The licensee may use an engineering evaluation to demonstrate that a change to NFPA 805, Chapter 3, element is functionally equivalent to the corresponding technical requirement. A qualified fire protection engineer shall perform the engineering evaluation and conclude that the change has not affected the functionality of the component, system, procedure, or physical arrangement, using a relevant technical requirement or standard.

   The licensee may use an engineering evaluation to demonstrate that changes to certain NFPA 805, Chapter 3, elements are acceptable because the alternative is "adequate for the hazard." Prior NRC review and approval would not be required for alternatives to four specific sections of NFPA 805, Chapter 3, for which an engineering evaluation demonstrates that the alternative to the Chapter 3 element is adequate for the hazard. A qualified fire protection engineer shall perform the engineering evaluation and conclude that the change has not affected the functionality of the component, system, procedure, or physical arrangement using a relevant technical requirement or standard.

   The four specific sections of NFPA 805, Chapter 3, are as follows:

   - Fire Alarm and Detection Systems (Section 3.8)
   - Automatic and Manual Water-Based Fire Suppression Systems (Section 3.9)
   - Gaseous Fire Suppression Systems (Section 3.10)
   - Passive Fire Protection Features (Section 3.11)

2. Fire Protection Program Changes that Have No More than Minimal Risk Impact:

   Prior NRC review and approval are not required for changes to the licensee's fire protection program that have been demonstrated to have no more than a minimal risk impact. The licensee may use its screening process as described in NEI 04-02, Section 5.3.3 and Appendix I to determine that certain fire protection program changes meet the minimal criterion. The licensee shall ensure that fire protection defense-in-depth

and safety margins are maintained when changes are made to the fire protection program.

(c) Transition License Conditions

1. Before achieving full compliance with 10 CFR 50.48(c), as specified by (2) below, risk-informed changes to the licensee's fire protection program may not be made without prior NRC review and approval unless the change has been demonstrated to have no more than a minimal risk impact, as described in (2) above.

2. The licensee shall implement the Unit 1 modifications to its facility, as described in Attachment S, Table S-2, "Plant Modifications Committed," in FENOC letter ____________, dated ____________, to complete the transition to full compliance with 10 CFR 50.48(c), by the completion of the second Unit 1 refueling outage after {date of approval of the safety evaluation report}. The licensee shall maintain appropriate compensatory measures in place until completion of these modifications.

3. The Licensee shall implement the items listed in Attachment S, Table S-3, "Implementation Items" of FENOC Letter ____________, dated ____________, by 180 days after {date of approval of the safety evaluation report}.

BVPS-2 Markup

(2) The facility requires an exemption from the requirements of 10 CFR 50, Appendix J, Section III.D.2 (b)(ii). The justification of this exemption is contained in Section 6.2.6 of Supplement 5 to the Safety Evaluation Report and modified by a letter dated July 26, 1995. The staff's environmental assessment was published on May 12, 1987 (52 FR 17651) and on June 9, 1995 (60 FR 30611). Therefore, pursuant to 10 CFR 50.12(a)(1) and 10 CFR 50.12(a)(2)(ii) and (iii), Beaver Valley Power Station, Unit 2 is exempt from the quoted requirements and instead, is required to perform the overall air lock leak test at pressure P_a before establishing containment integrity if air lock maintenance has been performed that could affect the air lock sealing capability. Local leak rate testing at a pressure of not less than P_a may be substituted for an overall air lock test where the design permits.

E. Physical Security

FENOC shall fully implement and maintain in effect all provisions of the Commission-approved physical security, training and qualification, and safeguards contingency plans including amendments made pursuant to provisions of the Miscellaneous Amendments and Search Requirements revisions to 10 CFR 73.55 (51 FR 27817 and 27822) and to the authority 10 CFR 50.90 and 10 CFR 50.54(p). The combined set of plans, which contains Safeguards Information protected under 10 CFR 73.21 is entitled: "Beaver Valley Power Station (BVPS) Physical Security Plan" submitted by letter September 9, 2004, and supplemented September 30, 2004, October 14, 2004, and May 12, 2006.

FENOC shall fully implement and maintain in effect all provisions of the Commission-approved cyber security plan (CSP), including changes made pursuant to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The Beaver Valley Power Station CSP was approved by License Amendment No. 174.

F. Fire Protection Program ~~(Section 9.5.1 of SER Supplement 3)~~

~~FENOC shall implement and maintain in effect all provisions of the approved fire protection program as described in the Final Safety Analysis Report through Amendment No. 17, and submittals dated May 18, May 20, May 21, June 24 and July 6, 1987, and as described in the Safety Evaluation Report dated October 1985, and Supplements 1 through 6, subject to the following provision:~~

~~FENOC may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.~~

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Revised BVPS-2 NPF-73 Operating License Pages

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(2) The facility requires an exemption from the requirements of 10 CFR 50, Appendix J, Section III.D.2 (b)(ii). The justification of this exemption is contained in Section 6.2.6 of Supplement 5 to the Safety Evaluation Report and modified by a letter dated July 26, 1995. The staff's environmental assessment was published on May 12, 1987 (52 FR 17651) and on June 9, 1995 (60 FR 30611). Therefore, pursuant to 10 CFR 50.12(a)(1) and 10 CFR 50.12(a)(2)(ii) and (iii), Beaver Valley Power Station, Unit 2 is exempt from the quoted requirements and instead, is required to perform the overall air lock leak test at pressure Pa before establishing containment integrity if air lock maintenance has been performed that could affect the air lock sealing capability. Local leak rate testing at a pressure of not less than P_a may be substituted for an overall air lock test where the design permits.

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F. Fire Protection Program ~~(Section 9.5.1 of SER Supplement 3)~~

FENOC shall implement and maintain in effect all provisions of the approved fire protection program that comply with 10 CFR 50.48(a) and 10 CFR 50.48(c) as *specified in the license amendment request dated (__________) and as approved in* the safety evaluation report dated (__________) except where NRC approval for changes or deviations is required by 10 CFR 50.48(c), and provided no other regulation, technical specification, license condition or requirement would require prior NRC approval, the licensee may make changes to the fire protection program without prior approval of the Commission if those changes satisfy the provisions set forth in 10 CFR 50.48(a) and 10 CFR 50.48(c), the change does not require a change to a technical specification or a license condition, and the criteria listed below are satisfied.

(a) Risk-Informed Changes that May Be Made Without Prior NRC Approval

A risk assessment of the change must demonstrate that the acceptance criteria below are met. The risk assessment approach, methods and data shall be acceptable to the NRC and shall be appropriate for the nature and scope of the change being evaluated; be based on the as-built, as operated, and maintained plant; and reflect the operating experience at the plant. Acceptable methods to assess the risk of the change may include methods that have been used in the peer reviewed fire PRA model, methods that have been approved by NRC through a plant-specific license amendment or NRC approval of generic methods specifically for use in NFPA 805 risk assessments, or methods that have been demonstrated to bound the risk impact.

1. Prior NRC review and approval is not required for a change that results in a net decrease in risk. The proposed change must also be consistent with the defense-in-depth philosophy and must maintain sufficient safety margins. The change may be implemented following completion of the change evaluation.
2. Prior NRC review and approval is not required if the change results in a risk increase less than 1E-7/yr for CDF and less than 1E-8/yr for LERF. The proposed change must also be consistent with the defense in-depth philosophy and must maintain sufficient safety margins. The change may be implemented following completion of the change evaluation.

(b) Other Changes that May Be Made Without Prior NRC Approval

1. Changes to NFPA 805, Chapter 3, Fundamental Fire Protection Program:

   Prior NRC review and approval are not required for changes to the NFPA 805, Chapter 3, fundamental fire protection program elements and design requirements for which an engineering evaluation demonstrates that the alternative to the Chapter 3 element is functionally equivalent or adequate for the hazard. The licensee may use an engineering evaluation to demonstrate that a change to NFPA 805, Chapter 3, element is functionally equivalent to the corresponding technical requirement. A qualified fire protection engineer shall perform the engineering evaluation and conclude that the change has not affected the functionality of the component, system, procedure, or physical arrangement, using a relevant technical requirement or standard.

   The licensee may use an engineering evaluation to demonstrate that changes to certain NFPA 805, Chapter 3, elements are acceptable because the alternative is "adequate for the hazard." Prior NRC review and approval would not be required for alternatives to four specific sections of NFPA 805, Chapter 3, for which an engineering evaluation demonstrates that the alternative to the Chapter 3 element is adequate for the hazard. A qualified fire protection engineer shall perform the engineering evaluation and conclude that the change has not affected the functionality of the component, system, procedure, or physical arrangement using a relevant technical requirement or standard.

The four specific sections of NFPA 805, Chapter 3, are as follows:

- Fire Alarm and Detection Systems (Section 3.8)
- Automatic and Manual Water-Based Fire Suppression Systems (Section 3.9)
- Gaseous Fire Suppression Systems (Section 3.10)
- Passive Fire Protection Features (Section 3.11)

2. Fire Protection Program Changes that Have No More than Minimal Risk Impact:

   Prior NRC review and approval are not required for changes to the licensee's fire protection program that have been demonstrated to have no more than a minimal risk impact. The licensee may use its screening process as described in NEI 04-02, Section 5.3.3 and Appendix I to determine that certain fire protection program changes meet the minimal criterion. The licensee shall ensure that fire protection defense-in-depth and safety margins are maintained when changes are made to the fire protection program.

(c) Transition License Conditions

1. Before achieving full compliance with 10 CFR 50.48(c), as specified by (2) below, risk-informed changes to the licensee's fire protection program may not be made without prior NRC review and approval unless the change has been demonstrated to have no more than a minimal risk impact, as described in (2) above.

2. The licensee shall implement the Unit 2 modifications to its facility, as described in Attachment S, Table S-2, "Plant Modifications Committed," in FENOC letter ____________, dated ____________, to complete the transition to full compliance with 10 CFR 50.48(c), by the completion of the second Unit 2 refueling outage after {date of approval of the safety evaluation report}. The licensee shall maintain appropriate compensatory measures in place until completion of these modifications.

3. The Licensee shall implement the items listed in Attachment S, Table S-3, "Implementation Items" of FENOC Letter ____________, dated ____________, by 180 days after {date of approval of the safety evaluation report}.

N. Technical Specification Changes

1 Page

None Required.

O. Orders and Exemptions

2 Pages Attached

Exemptions

As described in Section 4.2.3, previously approved exemptions from the requirements of 10 CFR 50, Appendix R have been determined to be either compliant with 10 CFR 50.48(c) or are no longer needed. Therefore, Beaver Valley requests that the following exemptions granted against 10 CFR 50, Appendix R be rescinded:

- LA 11.01 - March 14, 1983: Control Room (1-CR-1) - Lack of Automatic Fire Suppression (III.G.3 criteria)
- LA 11.02 - March 14, 1983: Reactor Containment (1-RC-1) - Lack of 20 ft. Separation (III.G.2 criteria)
- LA 11.03 - March 14, 1983: Blender Room (1-PA-1G) - Lack of 20 foot Separation and Automatic Suppression and Detection (III.G.2 criteria)
- LA 11.04 - March 14, 1983: Pipe Tunnel (1-PT-1) - Lack of 20 foot Separation and Automatic Suppression and Detection (III.G.2 criteria)
- LA 11.05 - March 14, 1983: Cable Tunnel (1-CV-3) - Lack of 20 ft. Separation and Automatic Suppression (III.G.2 criteria)
- LA 11.06 - March 14, 1983: Primary Auxiliary Building (1-PA-1G) - Lack of 20 foot Separation and Automatic Suppression and Detection (III.G.2 criteria)
- LA 11.07 - March 14, 1983 and August 30, 1984: Primary Auxiliary Building (1-PA-1A) - Lack of Automatic Suppression and Detection (III.G.3 criteria)
- LA 11.08 - August 30, 1984: Control Room HVAC Equipment Room (1-CR-2) - Lack Automatic Suppression (III.G.3 criteria)
- LA 11.09 - March 14, 1983 and August 30, 1984: Emergency Switchgear Rooms (1-ES-1 and 1-ES-2) - Lack of Automatic Suppression (III.G.3 criteria) and Lack of 3-hour Fire Barriers (III.G.2 criteria)
- LA 11.10 - August 30, 1984: Process Instrument Room (1-CR-4) - Lack of Automatic Suppression (III.G.3 criteria) and Lack of 3-hour Fire Barriers (III.G.2 criteria)
- LA 11.11 - August 30, 1984: Communication Equipment and Relay Panel Room (1-CR-3) - Lack of Automatic Suppression (III.G.3 criteria) and Lack of 3-hour Fire Barriers (III.G.2 criteria)
- LA 11.12 - August 30, 1984: Normal Switchgear Room (1-NS-1) - Lack of Automatic Suppression (III.G.3 criteria) and Lack of 3-hour Fire Barriers (III.G.2 criteria)
- LA 11.14 - August 30, 1984: Carbon Dioxide Storage/PG Pump Room (1-CO-2) - Lack of Automatic Suppression and Detection (III.G.3 criteria)
- LA 11.15 - August 30, 1984: Pipe Tunnel (Subarea 1-QP-1) - Lack of Automatic Suppression (III.G.3 criteria)
- LA 11.16 - August 30, 1984: Reactor Containment (1-RC-1) - Lack of 20 ft. Separation of Redundant Trains of Circuits Associated with Source Range Monitoring Within Containment (III.G.2 criteria)
- LA 11.17 - August 30, 1984: Cable Spreading Room (1-CS-1) - Lack of 3-hour Fire Barriers (III.G.2 criteria)
- LA 11.18 - December 4, 1986: Fire Doors - Lack of 3-Hr Fire Barriers (III.G.2 criteria)

- LA 11.19 - June 29, 1990: Fire Dampers - Lack of 3-Hour Fire Barriers (III.G.2 criteria)
- LA 11.20 - December 4, 1986: Primary Auxiliary Building/Charging Pump Cubicles (1-PA-1G and 1-PA-1GA, 1-PA-1GB, and 1PA-1GC) - Lack of 20 foot Separation (III.G.2 criteria)
- LA 11.21 - December 4, 1986: Control Room (1-CR-1/1-CR-2) - Lack of 20 foot Separation (III.G.2 criteria)
- LA 11.22 - December 4, 1986: Main Steam Valve Room (1-MS-1) - Lack of 3-Hour Fire Barriers (III.G.2 criteria)
- LA 11.23 - March 14, 1983: Control Room (1-CR-1) - 72-Hour Cold Shutdown Requirement (III.L criteria)
- LA 11.24 - January 5, 1983: Process Instrumentation - Alternative Shutdown Capability (III.G.3 criteria and III.L criteria)
- LA 11.25 - July 27, 1987: Emergency Lighting - Lack of 8-Hour Battery Powered Emergency Lighting Units (III.J criteria)

Specific details regarding these exemptions are contained in Attachment K.

BVPS-2 was licensed to operate after January 1, 1979, and therefore, licensing actions associated with 10 CFR 50 Appendix R were not issued as exemptions to the regulation. Thus, no exemptions are rescinded for BVPS-2.

Orders

No Orders are superseded or revised.

BVPS-1 and BVPS-2 implemented the following process for making this determination:

- A review of the Beaver Valley docketed correspondence was performed with electronic searches of the Beaver Valley FileNet System and the NRC's ADAMs document system.

The Beaver Valley FileNet System contains the Beaver Valley licensing documents, NRC correspondence, and regulatory and guidance materials, including those documents pertaining to the operating license, the Technical Specifications, the fire protection program, and the UFSAR. The correspondence sent to the NRC includes any outstanding license amendment request submittals. A specific review was performed of the license amendment (Ref. Attachment M) that incorporated the mitigation strategies required by Section B.5.b of Commission Order EA-02-026
(TAC Nos. MD4496 and MD4497) to safeguard that any changes made to ensure compliance with 10 CFR 50.48(c) do not invalidate existing commitments applicable to the plant. The review of this order confirmed that changes to the fire protection program will not affect measures required by B.5.b.

P. RI-PB Alternatives to NFPA 805 10 CFR 50.48(c)(4)

No risk-informed or performance-based alternatives to compliance with NFPA 805 (per 10 CFR 50.48(c)(4)) were utilized by Beaver Valley Power Station Units 1 and 2 (BVPS-1 and BVPS-2).

Q. No Significant Hazards Evaluations

3 Pages Attached

Pursuant to 10 CFR 50.91, the NFPA 805 Project will provide analyses supporting the determination that this amendment request involves "No Significant Hazards Consideration" by applying the standards established by the NRC regulations in 10 CFR 50.92. This amendment does not involve a significant hazards consideration for the following reasons:

1) **Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?**

   Response: No

   Operation of BVPS-1 and BVPS-2 in accordance with the proposed amendment does not increase the probability or consequences of accidents previously evaluated. Engineering analyses, which may include engineering evaluations, probabilistic safety assessments, and fire modeling calculations, have been performed to demonstrate that the performance-based requirements of NFPA 805 have been satisfied. The Updated Final Safety Analysis Report (UFSAR) documents the analyses of design basis accidents (DBA) at BVPS-1 and BVPS-2. The proposed amendment does not adversely affect accident initiators nor alters design assumptions, conditions, or configurations of the facility and does not adversely affect the ability of structures, systems, or components (SSCs) to perform their design functions. SSCs required to safely shut down the reactor and to maintain it in a safe shutdown condition will remain capable of performing their design functions.

   The purpose of the proposed amendment is to permit BVPS-1 and BVPS-2 to adopt a new fire protection licensing basis, which complies with the requirements of 10 CFR 50.48(c) and the guidance in Regulatory Guide 1.205, Revision 1. The NRC considers that NFPA 805 provides an acceptable methodology and performance criteria for licensees to identify fire protection requirements that are an acceptable alternative to the 10 CFR 50, Appendix R-required fire protection features (69 Fed. Reg. 33536, June 16, 2004).

   Engineering analyses, which may include engineering evaluations, probabilistic safety assessments, and fire modeling calculations, have been performed to demonstrate that the performance-based requirements of NFPA 805 have been met. NFPA 805, taken as a whole, provides an acceptable alternative for satisfying General Design Criterion 3 (GDC 3) of Appendix A to 10 CFR 50 and meets the underlying intent of the NRC's existing fire protection regulations and guidance. It also achieves defense in depth and the goals, performance objectives, and performance criteria specified in Chapter 1 of the standard and, if there are any increases in core damage frequency (CDF) or risk the increase will be small and consistent with the intent of the Commission's Safety Goal Policy.

   Based on this, the implementation of the proposed amendment does not increase the probability of any accident previously evaluated. Equipment required to mitigate an accident remains capable of performing the assumed function. The proposed amendment will not affect the source term, containment isolation, or radiological release assumptions used in evaluating the radiological consequences of any accident previously evaluated. The applicable radiological dose criteria will continue to be met. Therefore, the consequences of any accident previously evaluated are not increased with the implementation of the proposed amendment.

2) Does the proposed amendment create the possibility of a new or different kind of accident from any kind of accident previously evaluated?

Response: No

Operation of BVPS-1 and BVPS-2 in accordance with the proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated. Any scenario or previously analyzed accident with off-site dose was included in the evaluation of DBAs documented in the UFSAR. The proposed change does not alter the requirements or function for systems required during accident conditions. Implementation of the new fire protection licensing basis which complies with the requirements of 10 CFR 50.48(a) and 10 CFR 50.58(c) and the guidance in Regulatory Guide 1.205, Revision 1 will not result in new or different accidents.

The proposed amendment does not adversely affect accident initiators or alter design assumptions, conditions, or configurations of the facility. The proposed amendment does not adversely affect the ability of SSCs to perform their design function. SSCs required to safely shut down the reactor and maintain it in a safe shutdown condition remain capable of performing their design functions.

The purpose of the proposed amendment is to permit BVPS-1 and BVPS-2 to adopt a new fire protection licensing basis which complies with the requirements of 10 CFR 50.48(a) and 10 CFR 50.48(c) and the guidance in Regulatory Guide 1.205, Revision 1. The NRC considers that NFPA 805 provides an acceptable methodology and performance criteria for licensees to identify fire protection requirements that are an acceptable alternative to the 10 CFR 50, Appendix R-required fire protection features (69 Fed. Reg. 33536, June 16, 2004). Engineering analyses, which may include engineering evaluations, probabilistic safety assessments, and fire modeling calculations, have been performed to demonstrate that the performance-based requirements of NFPA 805 have been met.

The requirements of NFPA 805 address only fire protection and the impacts of fire on the plant that have previously been evaluated. Based on this, the implementation of the proposed amendment does not create the possibility of a new or different kind of accident from any kind of accident previously evaluated. No new accident scenarios, transient precursors, failure mechanisms, or limiting single failures will be introduced as a result of this amendment. There will be no adverse effect or challenges imposed on any safety-related system as a result of this amendment. Therefore, the possibility of a new or different kind of accident from any kind of accident previously evaluated is not created with the implementation of this amendment.

3) Does the proposed amendment involve a significant reduction in the margin of safety?

Response: No

Operation of BVPS-1 and BVPS-2 in accordance with the proposed amendment does not involve a significant reduction in the margin of safety. The risk evaluation of plant changes, as appropriate, were measured quantitatively for acceptability using the delta CDF and delta LERF criteria from Section 5.3.5 of NEI 04-02 and of Regulatory Guide 1.205, Revision 1. The proposed amendment does not alter the manner in which safety limits, limiting safety system settings, or limiting conditions for operation are determined. The safety analysis acceptance criteria are not affected by this change. The proposed amendment does not adversely affect existing plant safety margins or the reliability of equipment assumed to mitigate accidents in the UFSAR. This amendment does not adversely affect the ability of SSCs to perform their design function. SSCs required to safely shut down the reactor and to maintain it in a safe shutdown condition remain capable of performing their design functions.

The purpose of the proposed amendment is to permit BVPS-1 and BVPS-2 to adopt a new fire protection licensing basis, which complies with the requirements in 10 CFR 50.48(c) and the guidance in Regulatory Guide 1.205, Revision 1. The NRC considers that NFPA 805 provides an acceptable methodology and performance criteria for licensees to identify fire protection requirements that are an acceptable alternative to the 10 CFR 50, Appendix R-required fire protection features (69 Fed Reg. 33536, June 16, 2004). Engineering analyses, which may include engineering evaluations, probabilistic safety assessments and fire modeling calculations, have been performed to demonstrate that the performance-based requirements of NFPA 805 have been met.

The proposed changes are evaluated to ensure that risk and safety margins are kept within acceptable limits. Therefore, the transition to NFPA 805 does not involve a significant reduction in the margin of safety. The requirements of NFPA 805 are structured to implement the NRC's mission of the protection of public health and safety, promote the common defense and security, and protect the environment. NFPA 805 is also consistent with the key principles for evaluating license basis changes as described in Regulatory Guide 1.174 and is consistent with the defense in depth philosophy while maintaining sufficient safety margins.

Based on the evaluations noted in Items 1, 2, and 3 above, it is concluded that the proposed amendment presents no significant hazards consideration per the requirements set forth in 10 CFR 50.92(c), and a finding of "no significant hazards consideration" is justified.

R. Environmental Considerations Evaluation

1 Page Attached

FENOC has evaluated this proposed amendment against the criteria for identification of licensing and regulatory actions requiring environmental assessment in accordance with 10 CFR 51.21. FENOC has determined that this proposed amendment meets the criteria for a categorical exclusion set forth in 10 CFR 51.22(c)(9). This determination is based on the fact that this change is being proposed as an amendment to a license issued pursuant to 10 CFR 50.

The purpose of the proposed amendment is to permit BVPS-1 and BVPS-2 to adopt a new fire protection licensing basis that complies with the requirements of 10 CFR 50.48(a) and (c) and the guidance in Regulatory Guide 1.205, Revision 1. The NRC considers that NFPA 805 provides an acceptable methodology and performance criteria for licensees to identify fire protection requirements that are an acceptable alternative to the 10 CFR 50, Appendix R-required fire protection features (69 FR 33536, June 16, 2004).

The requirements in NFPA 805 address only fire protection, and the impacts of fire on the plant have previously been evaluated as part of compliance with 10 CFR 50.48(a) and (b).

This amendment meets the following specific criteria:

1. As stated in Section 5.3.1 and Attachment Q, the proposed amendment does not involve a significant hazards consideration.
2. There are no significant changes in the types of effluent or significant increase in the amounts of any effluent that may be released offsite.

   Transition to the NFPA 805 FP requirements does not impact effluents. Therefore, there will be no significant change in the types or significant increase in the amounts of any effluents released offsite.
3. There is no significant increase in individual or cumulative occupational radiation exposure.

   Compliance with NFPA 805 requirements concerning radioactive release due to suppression effects during a fire is documented in Attachment E. There will be no significant increase in individual or cumulative occupational radiation exposure resulting from this change.

Therefore, FENOC has determined that the amendment involves no significant increase in the amounts, and no significant change in the types of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

T. Clarification of Prior NRC Approvals

41 Pages Attached

Introduction

The elements of the pre-transition fire protection program licensing basis for which specific NRC previous approval requires clarification are included in this attachment. Also included is sufficient detail to demonstrate how those elements of the pre-transition fire protection program licensing basis meet the requirements in 10 CFR 50.48(c) (RG 1.205, Revision 1, Regulatory Position 2.2.1).

Prior Approval Clarification Request 1 for BVPS-1

Pre-transition Fire Protection Program Licensing Basis:

NRC SER dated June 06, 1979, states in Section 4.8:

All safety-related cables installed in trays were constructed to pass the vertical cable tray flame test with oil/burlap flame source which was in effect at that time. The flame tests indicated that extensive propagation of fire does not occur.

We find that retest of cables to IEEE-383 Standard would not provide information that would change our recommendation or conclusions. Accordingly, we find the safety-related electrical cables used at Beaver Valley Power Station, Unit 1, acceptable.

Background/Basis:

The original justifications in the letter to the NRC dated October 27, 1976 include all cable types used in the cable trays throughout BVPS-1. No explanation is provided in the SER dated June 06, 1979, as to why only safety-related cables were approved. The use of the term "safety-related" in the SER was assumed to be inadvertent since the regulatory requirement applies to all cable types.

It is requested that clarification of the exemption extend to all cables at BVPS-1 based on the following:

Cable insulation material can be classified into two main types: thermoset and thermoplastic. Thermoset materials char and retain their shape when heated, limiting fire growth along the material. Thermoplastic materials melt and burn when heated, and have lower failure temperatures than thermoset materials (NUREG-6850). Typically, the IEEE-383 qualified cables are thermoset material, while the unqualified cables are constructed of thermoplastic material (NUREG-1805, Ch. 7). However, thermoplastic material may also be qualified by tests acceptable to the NRC in FAQ 06-0022. Test standard UL 83 is an example of such a qualification for thermoplastic-insulated wires and cables.

The thermoplastic cables in the Plant Database Management System (PDMS) at Beaver Valley are identified in report 8700-01.062-0005, "NFPA 805 - Thermoset and Thermoplastic Cable Types at BVPS-1 and BVPS-2." This report conservatively includes cables of unknown insulation material together with thermoplastic cables in the thermoplastic/unknown category, and does not include them in the thermoset category. Based on the results of this report, some cable trays in certain compartments at BVPS-1 contain cables that were categorized as thermoplastic/unknown for analysis purposes. Overall, the percentage of cables in cabletrays that are categorized as thermoplastic/unknown is relatively low.

The cable trays at BVPS-1 containing thermoplastic/unknown cables are used exclusively for control and data/instrumentation/communication cable (Service Designations C and X; 1/2-PIP-E07, Section 2.0 and 1DBD-E-011, Section 2.2 for raceway identification conventions). Cable trays with C and X designations are not permitted to include cables of higher power service designations per BVS-0368, "Criteria for Installation and Identification of Electrical Cables." These thermoplastic cables are low energy cables and will not self-ignite (NUREG-1805, Ch. 7). The majority of thermoplastic insulated cables are included with thermoset insulated cable in trays, such that upon ignition from an external source, it is

not likely for the tray to become fully engulfed in flame propagation due to the lack of multiple thermoplastic cables in a single tray.

Cables that are not in trays are required to be enclosed in conduit or sleeves used exclusively for cable, with the exception of communication wiring (BVS-0368). Due to the protection of the enclosure from external ignition sources and limited oxygen within the enclosure, cables enclosed in conduit and sleeves are not a concern. Communication wiring, although not always enclosed in conduit or in trays, is low energy and not typically susceptible to electrical shorts causing a self-ignited fire. Furthermore, communication wiring accounts for a small portion of the cable throughout the plant and is not expected to contribute significantly to a fire in the event of an external ignition.

Of the cables classified as thermoplastic/unknown, many of these are qualified by tests deemed acceptable by the NRC in FAQ 06-0022, Revision 3, "Acceptable Electrical Cable Construction Tests." These include thermoplastic cables that passed flame tests FT-4 and VW-1, and cables that are qualified by UL 83 (8700-01.062-0005, Attachments 4-12).

The thermoplastic and unknown cable types identified in report 8700-01.062-0005 have been incorporated into the detailed fire model and subsequently used as input to the plant's Fire PRA. Hence, the postulated effects of a fire in areas that contain thermoplastic cables are analyzed in the risk model. For the unknown cable types, worst case (thermoplastic) flame propagation and fire damage criteria was assumed in fire modeling analysis and in the Fire PRA model. The results of these analyses for each fire area were satisfactory with regard to the overall safety goals for protecting the reactor core and maintaining radioactive releases within regulatory limits.

Request

As part of this LAR submittal and transition to NFPA 805, it is requested that the NRC document an exemption for all non-qualified cable throughout BVPS-1. This exemption was previously requested for all cables in trays, but approval was granted only for safety-related cables with no explanation as to why non-safety related cables were not covered by the exemption. The analysis above provides justification for approval and clarification of an existing exemption to include all cable currently installed within the plant.

Prior Approval Clarification Request 2 for BVPS-1

Pre-transition Fire Protection Program Licensing Basis:

The NRC SER dated March 14, 1983, approved an exemption for lack of 20 foot separation in the BVPS-1 Reactor Containment Building (1-RC-1) per 10 CFR 50, Appendix R, Section III.G.2 criteria (Licensing Action 11.02 and 11.16). The approval requires clarification as it indicated all cables inside containment are routed in conduit and are qualified to a test comparable to IEEE Standard 383.

Background/Basis:

The exemption request transmitted by BVPS-1 letter dated June 30, 1982, and supplemented by letters dated October 22, 1982, October 28, 1982, December 10, 1982, and December 21, 1982, provided the justification for lack of 20 foot separation required by Appendix R, Section III.G.2 criteria for the Reactor Containment Building (1-RC-1). The exemption approval was provided by the NRC in SER dated March 14, 1983, and stated that for redundant trains of safe shutdown cables inside the reactor containment building, "all" cables in 1-RC-1 are routed in conduit.

In NRC Letter dated March 14, 1983, from Mr. Steven A. Varga to Mr. J.J. Carey (FENOC), et al, the NRC states:

> *3. Reactor Containment*
>
> *The protection for redundant trains of safe shutdown equipment inside containment does not meet the technical requirements of Section III.G.2.b because there is not 20 feet of separation between redundant power cables free of intervening combustibles. Due to their configuration and location within the containment and to the restricted access of these sub-areas during plant operations, an exposure fire involving the accumulation of significant quantities of transient combustible materials is unlikely. Because there are only a few cables in these sub-areas and all cables inside containment are qualified to a test comparable to that of IEEE Standard 383 and routed in conduit, a fire of sufficient magnitude to damage redundant cables or components is also unlikely. This exemption is granted.*

The licensee submittals associated with this exemption request did not state that "all" cables are routed in conduit but stated that redundant trains of safe shutdown cables are routed in conduit or routed in trays that are of a covered design in 1-RC-1. The intent of this exemption request was met because tray covers are installed when required to separate redundant trains and channels inside containment. The actual plant installation specifications only required tray covers on horizontal trays. Vertical tray covers are installed when required for train separation. The SER did not take credit for this statement regarding all trays being covered. The covered trays offer equivalent protection for redundant trains of safe shutdown cables routed inside the reactor containment building.

The SER stated that the protection for redundant trains of safe shutdown equipment inside containment does not meet the technical requirements of Section III.G.2 because the cable separation does not meet the 20 foot separation requirement between redundant power cables with no intervening combustibles or fire hazards. However, due to the configuration and location within the containment and the restricted access of these sub-areas during plant operations, an exposure fire involving the accumulation of significant quantities of transient combustible materials is unlikely.

This discrepancy has been addressed previously in the Beaver Valley corrective action program, CR 99-1098 dated April 30, 1999, CR 99-3176 dated November 15, 1999, and CR 00-2698 dated August 17, 2000. The incorrect information was properly dispositioned using the corrective action program process which resulted in an update to the UFPARR, Updated Fire Protection Appendix R Review Report - BVPS-1 (Reference 1-01-08 dated April 06, 2001, and OSC Meeting BV-OSC-15-01 dated April 10, 2001).

Request

The NRC SER dated March 14, 1983, approving the exemption is worded such that it could be interpreted that all safety-related cables in containment are in conduit. A clarification of the prior approval is warranted since the exemption request did not make this statement.

As part of this LAR submittal and transition to NFPA 805, it is requested that the NRC document as a "prior approval" that the protection for redundant trains of safe shutdown equipment inside containment does not meet the technical requirements of Section III.G.2 because the cable separation does not meet the 20 foot separation requirement between redundant power cables with no intervening combustibles or fire hazards. Due to their configuration and location within the containment and to the restricted access of these sub-areas during plant operations, an exposure fire involving the accumulation of significant quantities of transient combustible materials is unlikely. Since there are only a few cables in these sub-areas and all are routed in conduit or covered horizontal cable trays or covered vertical trays when spaced less than 16 inches apart, a fire of sufficient magnitude to damage redundant cables or components is unlikely.

Prior Approval Clarification Request 3 for BVPS-1

Pre-transition Fire Protection Program Licensing Basis:

The NRC SER dated March 14, 1983, and August 30, 1984, approved an exemption for lack of 20 foot separation in the BVPS-1 Reactor Containment Building (1-RC-1) per 10 CFR 50, Appendix R, Section III.G.2 criteria (Licensing Action 11.02). BVPS-1 containment currently has installed a pre-action water suppression system consisting of two deluge systems in the electrical cable penetration area protecting the "orange" and "purple" system trains respectively and the residual heat removal (RHR) pumps/motors. The containment water-based suppression systems are not fully automatic, but they require remote manual initiation to open the containment isolation valves that supply the water to containment in order for flow to occur. The approval requires clarification as manual activation of these water-based fire system was recognized in the SER dated June 6, 1979.

Background/Basis:

NRC SER dated June 6, 1979 provides the NRC recognition for the manual actuation of the fire suppression system for BVPS-1:

> *"3.3-1 Reactor Containment Cable Penetration Area*
>
> *A remotely operated, manually activated open head water spray system will be provided for each redundant cable penetration area.*

NRC SER dated March 14, 1983, LA 11.02, details the safe shutdown equipment and the combustible loading inside containment. The SER states:

> *The redundant trains of safe shutdown components in this area include the containment ventilation, pressurizer pressure controls, pressurizer power operated relief valves, pressurizer relief blocking valves, pressurizer heaters, steam generator level transmitters, pressurizer level transmitters, reactor coolant hot and cold leg temperature instrumentation, pressurizer and reactor vessel vents, and associated cables.*

The NRC SER dated March 14, 1983 also states:

> *All cable insulation is qualified to a test comparable to IEEE Standard 383. The reactor coolant pumps are fitted with an oil collection system.*
>
> *Smoke detection systems and water deluge systems are provided only in the cable penetration area and in the residual heat removal pump area. Portable fire extinguishers and manual hose stations are provided throughout the fire area.*

The NRC SER continues with descriptions of the location and separation of redundant cables of equipment as follows:

(1) Pressurizer Power Operated Relief Valves

(2) Pressurizer Relief Blocking Valves

(3) Pressurizer Heaters

(4) Steam Generator Level

(5) Pressurizer Level Transmitters

(6) Reactor Coolant Hot and Cold Leg Temperature

NRC SER dated March 14, 1983 further states:

> *The protection for redundant trains of safe shutdown equipment inside containment does not meet the technical requirements of Section III.G because there is not twenty feet of separation between redundant power cables free of intervening combustibles. Due to their configuration and location within the containment and to the restricted access of these sub-areas during plant operations, an exposure fire involving the accumulation of significant quantities of transient combustible materials is unlikely. Because there are only a few cables in these sub-areas and all cables inside containment are qualified to a test comparable to that of IEEE Standard 383 and routed in conduit, a fire of sufficient magnitude to damage redundant cables or components is also unlikely.*
>
> *Based on the above evaluation, the existing protection for the containment area provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R. Therefore, the exemption should be granted.*

To initiate system operation to the east or west cable penetration area, the control room operator remotely opens [DV-1FP-14] (8700-RM-0433-2 and 8700-RM-0433-7), and the east or west deluge valve [DV-1FP-19 or DV-1FP-20] (8700-RM-0433-8). This action opens both the required area deluge valve and the system master, or common deluge valve. The control room operator will also remotely open the associated containment isolation valve [TV-1FP-105] (if Containment Isolation Phase A (CIA) not present (8700- RM-0433-2)), and flow will be initiated from the station fire main supply up to the open directional spray nozzles in the applicable penetration area. The RHR area pre-action deluge water spray system includes a gate valve [1FP-798] and a deluge valve [DV-1FP-13], located outside Containment in the Safeguards area, elevation 722'. The system also includes a normally-closed air operated valve [TV-1FP-106] for the outside containment isolation valve (8700-RM-0433-002). To prevent inadvertent actuation and flooding, confirmation is required before manual activation to discharge water. The alarm procedure to initiate these actions is 1OM-33.4.ADM.

Request

As part of this LAR submittal and transition to NFPA 805, it is requested that the NRC document as "prior approval" the manual initiating operating characteristics of the containment suppression systems.

Prior Approval Clarification Request 4 for BVPS-1

Pre-transition Fire Protection Program Licensing Basis:

The NRC SER dated March 14, 1983, and August 30, 1984, approved an exemption for lack of 20 foot separation in the BVPS-1 Reactor Containment Building (1-RC-1) per 10 CFR 50, Appendix R, Section III.G.2 criteria (Licensing Action 11.02). BVPS-1 containment currently has installed a pre-action water suppression system consisting of two deluge systems in the electrical cable penetration area protecting the "orange" and "purple" system trains respectively and the residual heat removal (RHR) pumps/motors. The approval requires clarification for the deluge system spray pattern distribution and design spray density.

Background/Basis:

NRC SER dated June 6, 1979, provides the NRC recognition for the manual actuation of the fire suppression system for BVPS-1:

> **3.3-1 Reactor Containment Cable Penetration Area*
>
> *A remotely operated, manually activated open head water spray system will be provided for each redundant cable penetration area.*

NRC SER dated March 14, 1983, LA 11.02, details the safe shutdown equipment and the combustible loading inside containment. The SER states:

> *The redundant trains of safe shutdown components in this area include the containment ventilation, pressurizer pressure controls, pressurizer power operated relief valves, pressurizer relief blocking valves, pressurizer heaters, steam generator level transmitters, pressurizer level transmitters, reactor coolant hot and cold leg temperature instrumentation, pressurizer and reactor vessel vents, and associated cables.*

The NRC SER date March 14, 1983, also states:

> *All cable insulation is qualified to a test comparable to IEEE Standard 383. The reactor coolant pumps are fitted with an oil collection system.*
>
> *Smoke detection systems and water deluge systems are provided only in the cable penetration area and in the residual heat removal pump area. Portable fire extinguishers and manual hose stations are provided throughout the fire area.*

The NRC SER continues with descriptions of the location and separation of redundant cables of equipment as follows:

(1) Pressurizer Power Operated Relief Valves

(2) Pressurizer Relief Blocking Valves

(3) Pressurizer Heaters

(4) Steam Generator Level

(5) Pressurizer Level Transmitters

(6) Reactor Coolant Hot and Cold Leg Temperature

NRC SER dated March 14, 1983, further states:

> *The protection for redundant trains of safe shutdown equipment inside containment does not meet the technical requirements of Section III.G because there is not twenty feet of separation between redundant power cables free of intervening combustibles. Due to their configuration and location within the containment and to the restricted access of these sub-areas during plant operations, an exposure fire involving the accumulation of significant quantities of transient combustible materials is unlikely. Because there are only a few cables in these sub-areas and all cables inside containment are qualified to a test comparable to that of IEEE Standard 383 and routed in conduit, a fire of sufficient magnitude to damage redundant cables or components is also unlikely.*
>
> *Based on the above evaluation, the existing protection for the containment area provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R. Therefore, the exemption should be granted.*

The first two vertical sets of electrical cable penetrations on either side of the firewall are nuclear and incore instrumentation. The voltage level of these electrical cables (8700-RE-0035A,-Penetration Table) is typically low voltage and current. These cables meet the requirements of IEEE-383 or equivalent construction. Separating the trains is a 12- inch thick fire wall that goes from the inner containment annulus wall to within approximately six inches of the steel liner plate, with no transient combustibles (8700-RE-0035B, 8700-RC-0016D, 8700-RC-0016H, 8700-RS-0016B, 8700-06.024-3708, 8700-06.024-3709, and 8700-RV-0001E).

The two cable penetration deluge systems are arranged east and west symmetrical to the fire wall located at Column 10 ¼ in the annulus of BVPS-1 Containment. Two risers serve each of the two deluge spray systems, protecting the "orange" and "purple" trains separated by the wall. The riser nearest to the wall has six levels of spray nozzles at two foot intervals that provide coverage for the array of 49 sleeve canister openings that project from and penetrate the containment wall, as well as the cables routed from the penetration to the adjacent electrical cabinets. A second riser, which is located 14 to 15 feet away from the first riser, supplies spray coverage in two directions.

The first direction consists of three levels of spray nozzles at four foot intervals which are oriented in the same direction as the first riser spray nozzles (away from the dividing wall). These three spray nozzles provide coverage for an array of six penetrations that define the maximum horizontal coverage area of the deluge system. The second direction of coverage provided from the second riser consists of six levels of spray nozzles at two foot intervals oriented in opposition to the six spray nozzles of the first riser. In combination, these two sets of spray nozzles provide coverage between the two risers and beyond.

Therefore, the two sets of six spray nozzles (12 total) create an overlapping cross flow spray pattern. Overlap coverage is provided beyond the two risers as the expanding cone of droplets travel beyond the risers to cover both the area to the wall located at Column 10 ¼ and to the limits of the 49 penetration sleeve array. Given the limited wall area [approximately 304 square feet] that these spray nozzles operate, and a discharge flow of approximately 14 gpm per nozzle; each nozzle provides an adequate margin [15 nozzles X14 gpm/304 square feet = 0.69 gpm/foot squared]; therefore, as long as 35% of the water spray impinges the wall surface, the required density of 0.25 gpm per

square foot is exceeded. Based on the drawing reviews, an adequate deluge spray pattern over the entire surface develops. LAR Attachment S includes a field verification, without actually flowing water, that the deluge system spray pattern would develop as required and that the fire detectors are positioned as required.

The distance between the cable penetration "orange" and "purple" trains is approximately five feet. Between the "orange" and "purple" divisions (8700-RE-0035A) there is a fire wall with a door opening (8700-RE-0034G). There is a deluge system for each train that is activated by heat detectors, providing overall sprinkler coverage at the electrical penetration area. Also, in each area there are ionization and photoelectric early warning fire detectors (1OST-33.21, 8700-RE-0051J, and 8700-01.080-0051). Therefore, the electrical cable penetration deluge systems provide adequate separation between the "orange" and "purple" divisions.

Request

As part of this LAR submittal and transition to NFPA 805, it is requested that the NRC formally document as "prior approval" in the area of electrical cable penetrations, that the two deluge suppression systems have spray pattern distributions that provide adequate separation and design spray density between the "orange" and "purple" electrical trains.

Prior Approval Clarification Request 5 for BVPS-1

Pre-transition Fire Protection Program Licensing Basis:

The NRC SER dated August 30, 1984, approved an exemption for lack of automatic suppression and lack of 3-hour fire barriers in the BVPS-1 Process Instrument Room (1-CR- 4) per 10 CFR 50, Appendix R, Section III.G.2 and III.G.3 criteria (Licensing Action 11.10). The NRC SER, dated December 4, 1986, approved that the 1.5-hour fire doors in 1-CR-4 provided an acceptable level of protection in accordance with the guidelines of Section D.1(j) of Appendix A to BTP APCSB 9.5-1 (Licensing Action 11.18). The approval requires clarification because, although fire loading is still less than the fire barrier rating, it is greater than originally described in the exemption requests.

Background/Basis:

Background for Licensing Action 11.10 regarding the lack of 3-hour fire barriers and a lack of automatic suppression is as follows:

Exemption request transmitted by BVPS-1 letter dated December 16, 1983, and supplemented by letters dated May 30, 1984, provided the justification for lack of automatic suppression required by Appendix R, Section III.G.3 criteria and lack of 3-hour fire barriers required by Appendix R, Section III.G.2 for the Process Instrument Room (1-CR-4). The exemption approval for the III.G.3 criteria was provided by the NRC in SER dated August 30, 1984, and stated:

For the following area, an exemption is requested from Section III.G.3 to the extent it requires fixed suppression and detection to be provided throughout a fire area for which alternative shutdown has been provided:

Process Instrument Room (CR-4), Elev. 713

All of the fire areas for which exemptions have been requested represent a similar configuration, i.e., combustible loading is light, there is alternate shutdown capability, detection (except CO2 storage area) and manual fire suppression equipment is available.... The low combustible loading in these areas ensures that safety-related equipment in adjacent areas will not be threatened. The installation of a fixed fire suppression system would not significantly increase the level of fire protection in these areas.

Based on our evaluation, we find that the existing fire protection in conjunction with alternate shutdown capability in the eight areas for which an exemption has been requested provides a level of fire protection equivalent to the technical requirements of Section III.G.3 of Appendix R and, therefore, the exemptions should be granted.

The NRC SER dated August 30, 1984, further states the following exemption approval for the III.G.2 criteria:

4. Process Instrument Room (CR-4), Elev. 713

An exemption is requested from Section III.G.2 to the extent it requires the separation of adjacent fire areas by 3-hour rated fire barriers.

The process instrument room is located on the 713 elev. The process instrument room is located on the 713 elev. beneath the cable spreading room. The ceiling which forms a barrier between the process instrument room and the cable spreading room is a 1 1/2-hour rated fire barrier. In addition, three doors which communicate

to the adjacent relay room (CR-3) are 1 1/2-hour rated fire doors. All other boundaries are 3-hour rated.

The combustible loading in the area, if totally consumed, would correspond to an equivalent fire severity of approximately 45 minutes on the ASTM E-119 Standard Time-Temperature Curve. Smoke detection and manual fire suppression equipment are provided in the area. Alternate shutdown capability independent of the area is also provided.

The 1 1/2-hour rated fire doors which lead to the relay room and 1 1/2-hour rated ceiling exceed the combustible loading in both the process instrument room and the relay room with considerable margin. In the event a fire occurred in either room, there is reasonable assurance that the installed smoke detection system would alarm and alert the fire brigade before the door's or ceiling's integrity is challenged. Replacing the existing doors and ceiling with 3-hour rated assemblies would not significantly enhance fire protection safety.

Based on our evaluation, we conclude that the protection provided for the process instrument room provides a level of fire protection equivalent to the technical requirements of Section III.G. The exemption should, therefore, be granted.

NRC Letter dated August 30, 1984, provided the approval of the exemption request noted above. The following conditions were cited in the NRC SER as the basis for approval of the exemption relative to the Process Instrument Room (1-CR-4) Elevation 713:

- Combustible loading is light.
- Alternate shutdown capability is provided independent of the fire area.
- Detection and manual fire suppression equipment is available.
- The doors and ceiling exceed the combustible loading in the process rack room and relay room with conservative margin.

Among the conditions cited in the NRC SER dated August 30, 1984, that requires clarification relative to the Process Instrument Room (1-CR-4) is that the combustible loading for the area was originally identified in the exemption request as 45 minutes on the time-temperature curve. The combustible loading was updated to 1.38 hours based on additional loading identified in the area. The difference from the original fire hazard analysis is due to improvements in the calculation which now account for the cabling in the subfloor area within 1-CR-4 that was not accounted for in the original analysis. The basis for the exemption was that the fire barriers and the fire protection capability would prevent the spread of fire between areas. This is still valid since the fire loading is less than the barrier ratings (less than 1.5 hours).

Background for Licensing Action 11.18 regarding the fire doors is as follows:

The NRC SER dated December 4, 1986, Section 2.2 states the following in the discussion of the exemption from the guidelines of Section D.1(j) of Appendix A to BTP APCSB 9.5-1:

The combustible loading in 17 of these fire areas is 80,000 Btu per square foot or less, which is equivalent to a fire severity of up to 60 minutes based on the ASTM E-119 time-temperature curve. Fire protection in these areas consists of portable extinguishers and manual hose stations. In addition, smoke detectors are installed in the following fire areas: the Intake structure (Fire Areas IS-1 through IS-3), the control room complex (Fire Zones CR-1, -2, and -4), the emergency switchgear room

(Fire Area ES-2), the motor generator room (Fire Area MG-1), and the normal switchgear room (Fire Area NS-1).

The combustible loading in five of the 24 fire areas is between 80,000 and 120,000 Btu per square foot, which corresponds to a fire severity of 60 to 90 minutes. Fire protection in these fire areas consists of portable extinguishers and manual hose stations. In addition, sprinkler systems are installed in the PCA shop and the clean shop. Detectors are installed in the intake structure and detectors and a total flooding carbon dioxide system are installed in the cable spreading room.

The NRC SER dated December 4, 1986 continues in Section 2.3:

...Several locations contain multiple deviations.

However, the equivalent fire severity in each of the affected fire areas is less than 120 minutes and generally less than 60 minutes. The staff has reviewed the licensee's evaluation and concurs with the licensee's assessment that the existing fire door assemblies with the corrective modifications provide an adequate margin of fire resistance compared to the combustible loading in the affected fire areas, with one exception.

The exception to the fire resistance discussed above is the doors located in the intake structure.

The combustible loading was updated to 1.38 hours based on additional loading identified in the compartment. The difference from the original fire hazard analysis is mainly due to improvements in the calculation which now account for the cabling in the subfloor area within 1-CR-4 that was not accounted for in the original analysis. With the increase in accuracy for the combustible loading reported for the Process Instrument Room (1-CR-4), there is margin available for the fire resistance rating of the fire doors. Fire protection in this compartment consists of portable extinguishers and manual hose stations. Smoke detectors are installed in this compartment.

A minor additional clarification is that there are two doors to the adjacent relay room (1-CR-3) instead of three as described in the NRC SER dated August 30, 1984. Clarification relative to this exemption for the Process Instrument Room (1-CR-4) is being identified as part of this LAR submittal and transition to NFPA 805.

Changes to combustible fire loading for 1-CR-4 were evaluated in TER-12006 and determined acceptable. A limit of less than 1.5 hours was established for the Process Instrument Room (1-CR-4) which meets the intent of maintaining combustible loading below the fire barrier rating of the room. In addition it should be noted that 1-CR-4 will be provided with an incipient detection system as part of the NFPA 805 modifications.

Request

As part of this LAR submittal and transition to NFPA 805, it is requested that the NRC document as a "prior approval" recognition that, even though the combustible loading is more than the originally identified 45 minutes, the existing condition is still acceptable based on alternate shutdown capability provided for the 1-CR-4 area and the combustible loading is within the 1.5-hour fire barrier rating. The basis for the exemptions were that the fire barriers and the fire protection capability would prevent the spread of fire between areas. This remains valid since the fire loading is less than the barrier ratings.

Prior Approval Clarification Request 6 for BVPS-1

Pre-transition Fire Protection Program Licensing Basis:

The NRC SER dated August 30, 1984, approved an exemption for lack of 3-hour fire barrier for the floor of the BVPS-1 Cable Spreading Room (1-CS-1) per 10 CFR 50, Appendix R, Section III.G.2 criteria (Licensing Action 11.17). The NRC also approved exemptions for lack of 3-hour fire barrier for the ceilings of the BVPS-1 Emergency Switchgear Rooms (1-ES-1 and 1-ES-2, Licensing Action 11.09), BVPS-1 Process Instrumentation Room (1-CR-4, Licensing Action 11.10), and BVPS-1 Communication Equipment and Relay Panel Room (1-CR-3). The approvals require clarification because although the NRC accepted the structural condition for the ceilings of the fire areas on the other side of the 1.5-hour fire barrier floor in 1-CS-1, the DLC letter dated December 16, 1983, did not give a detailed description of its request. It simply referenced the attachment for the floor of 1-CS-1, which includes other fire compartment ceilings beside 1-ES-1 and 1-ES-2. That exemption request (Licensing Action 11.17) should have included the complete list of fire compartments below 1-CS-1.

Background/Basis:

Regarding the Cable Spreading Area (725'-6"), 1-CS-1, the NRC SER dated August 30, 1984, states:

> *An exemption is requested from Section III.G.2 to the extent it requires the separation of adjacent fire areas by complete 3-hour rated barriers.*
>
> *The cable spreading room is located on the 725' 6" elev. of the service building. The walls and ceiling constitute 3-hour rated barriers. The floor is a 1 1/2-hour rated floor. Ductwork is provided with 3-hour rated dampers except those ducts which penetrate the floor and the west wall which separates the cable spreading room from the normal switchgear room. These ducts are provided with 1 1/2-hour rated dampers. All cables and equipment needed for safe-shutdown will be removed from the normal switchgear room and relocated at the next refueling outage. The cable spreading room doors are 3-hour rated except for the 1 1/2-hour rated door that opens in the east stairtower.*
>
> *The combustible loading in the cable spreading room, if totally consumed, would correspond to an equivalent fire severity of approximately 1-hour and twenty minutes on the ASTM E-119 Standard Time-Temperature Curve.*
>
> *To approve fire area boundaries of less than a 3-hour rating, we need reasonable assurance that the proposed boundaries will exceed the in-situ fuel load with margin. In the cable spreading room, the margin proposed is not considered adequate for the general case. However, in the three specific cases cited, we have evaluated the location and configuration of the 1 1/2-hour rated components and consider them acceptable for the following reasons:*
>
> - *1 1/2-hour rated stairtower door - Section C.5.a of our guidelines recommends the use of 2-hour rated concrete stairtower enclosures with self-closing Class B (1 1/2- hour) fire doors. The licensee has provided this level of protection. We, therefore, find the 1 1/2-hour rated fire doors acceptable.*
> - *1 1/2-hour rated floor and 1 1/2-hour rated fire dampers in the floor. In the event of a fire in the cable spreading room, the heat from the fire would rise*

and challenge the ceiling and upper wall areas of the cable spreading room. Only after a considerable time period will the heat transfer down through the floor become significant. With the added benefit of the installed smoke detection system, automatic suppression system and response of the fire brigade, there is reasonable assurance that the 1 1/2-hour rated floor and dampers will remain functional.

- *1 1/2-hour rated dampers penetrating the wall to the normal switchgear room. The licensee has committed to remove all cables and equipment from the normal switchgear room needed for safe-shutdown. Therefore, if a fire propagated to this area, by the failure of the 1 1/2-hour rated damper, no safe-shutdown equipment would be damaged. The walls of the normal switchgear room that separate it from the remainder of the plant are 3-hour rated barriers. Therefore, a cable spreading room fire which spreads to the switchgear room by failure of the 1 1/2-hour rated dampers will not spread beyond the normal switchgear room.*

Based on our evaluation, we conclude that the protection provided for the cable spreading room provides a level of fire protection equivalent to the technical requirements of Section III.G. The exemption should, therefore, be granted.

This exemption was granted based on Duquesne Light Company's (DLC) letter dated December 16, 1983. That letter separated the exemption requests out by fire area, and provided a description of the design of the floor of 1-CS-1 in Attachment XI:

3. Floor (Ref. Drawing 11700-RC-7G)

5 1/2" reinforced concrete on 1 1/2" corrugated metal decking. (See Figure 11.17-3)

For fire areas on the other side of the 1.5-hour fire barrier floor in 1-CS-1, the DLC letter did not give a detailed description, but simply referenced the discussion in Attachment XI. Those fire areas that referenced Attachment XI in that letter correspond to these NFPA 805 fire compartments:

1-ES-1, 1-ES-2, 1-CR-3, and 1-CR-4

The NRC indicated acceptance of this structural condition for the ceilings of these four areas in the SER dated August 30, 1984.

In the same DLC letter dated December 16, 1983, in Attachment VII for Structural Steel below the Cable Spreading Room, five fire areas were listed. Note that Licensing Action 11.17 as approved in the above NRC SER did not approve the exemption for structural steel below the cable spreading room, and the correspondence on that issue is not otherwise related to this discussion. But five fire areas were listed as below the Cable Spreading Room (1-CS-1) and they correspond to these five NFPA 805 fire compartments:

1-CR-3, 1-CR-4, 1-ES-1, 1-ES-2, and 1-MG-1

This clarification is issued to identify that in the original plant design and construction, there are more than these five fire compartments below the floor of 1-CS-1. The list in attachments to the DLC letter dated December 16, 1983, was not intended to be the complete list of fire compartments below 1-CS-1.

Request

As part of this LAR submittal and transition to NFPA 805, it is requested that the NRC document as a "prior approval" recognition that the 1.5-hour fire barrier for the floor of 1-CS- 1 is applied to all the fire compartments on the other side of the fire barrier. As depicted in drawings (8700-RA-0001F and 8700-RA-0001G), the NFPA 805 fire compartments on the other side of 1-CS-1 are:

1-CR-2, 1-CR-3, 1-CR-4, 1-ES-1, 1-ES-2, and 1-MG-1

Therefore BVPS-1 Licensing Action 11.17 is carried forward and applied to 1-CS-1 as well as these six fire compartments. The 1.5-hour fire barrier between the floor of 1-CS-1 and the ceilings of the compartments below it are included in the modeling for the NFPA 805 fire PRA and the current risk analyses.

Prior Approval Clarification Request 7 for BVPS-2

Pre-transition Fire Protection Program Licensing Basis:

NRC SSER - NUREG-1057, Supplement 3, dated November 1986, approved a BVPS-2 deviation from Section C.5.a(4) of BTP CMEB 9.5-1 (NUREG-0800) for two 1.5-hour fire dampers in series instead of one 3-hour fire damper (Licensing Action 04). NUREG-1057, Supplement 5, dated May 1987, also approved a BVPS-2 deviation from Section C.5.a(4) of BTP CMEB 9.5-1 for 1-hour fire wraps adequate to the fire ratings of the duct penetrations through the barriers (Licensing Action 05).

The current licensing documentation states that either two 1.5-hour fire dampers in series and/or 1-hour fire wrap are adequate measures to maintain the fire rating of duct penetrations through barriers. The approval requires clarification because although the original deviation requests were for specific fire areas with less than 1-hour fire loading and detection, additional fire areas with similar configurations (less than 1-hour fire loading and detection) also have two 1.5-hour fire dampers in series and 1-hour fire wraps.

Background/Basis:

NRC SSER - NUREG-1057, Supplement 3, dated November 1986, Section 9.5.1.4, "General Plant Guidelines," reports:

> *In the SER, the staff stated that 3-hour fire-rated damper assemblies are provided in all ventilation ducts that penetrate 3-hour fire-rated barriers and that the damper assemblies are Underwriters Laboratories, Inc. (UL) labeled. By letter dated March 27, 1985, the applicant informed the staff that the 1 1/2-hour-rated fire damper assemblies are installed in series in each duct penetrating a 3-hour fire-rated barrier. Moreover, because the applicant redefined the fire area boundaries, some damper assemblies had to be installed within completed heating, ventilation, and air conditioning (HAVC) systems. These damper assemblies are located close to, but not within, the fire barrier penetration. To compensate for the damper location, the applicant enclosed the ductwork from the fire barrier to the damper assembly with 3- hour fire-rated barrier material.*
>
> *In the March 27, 1985, letter, the applicant also informed the staff that although all of the fire damper assemblies were purchased as UL-labeled units, the manufacturer had removed the UL label from the assemblies because they were not tested in the series configuration, and because they were not tested with carbon dioxide fire-suppression-system-actuated release devices.*
>
> *For a fire to spread between fire areas through an HVAC system duct, it would have to burn through the duct in one fire area, through two 1 1/2-hour fire-rated dampers, and finally, through the duct in the adjoining area. In the staff's opinion, the two 1 1/2-hour fire-rated dampers will provide the equivalent fire resistance of one 3-hour fire-rated damper. The 3-hour fire-rated wrap around the ducts constitutes continuous fire-rated construction which will prevent fire spread through the ductwork between the fire barrier and the fire dampers. The release device is a plunger-operated pin that is in addition to the fusible link for damper actuation. The device is UL-listed for this service and, in the staff's opinion, will not reduce the effectiveness of the dampers actuated by the devices. The staff concludes that the fire dampers, as installed, will prevent fire spread from one fire area to another. The damper*

installation is, therefore, an acceptable deviation from Section C.5.a(4) of BTP CMEB 9.5-1.

NRC SSER - NUREG-1057, Supplement 5 dated May 1987, Section 9.5.1.4, "General Plant Guidelines," states:

In SSER 3, the staff stated that some fire damper assemblies were located outside of the fire barrier because of a redefining of certain fire areas and that where this took place, the ductwork from the barrier to the fire damper assembly would be wrapped with 3-hour fire-rated material. Section C.5.a(4) of BTP CMEB 9.5-1 states that, 'penetration openings for ventilation systems should be protected by fire dampers having a rating equivalent to that required of the barrier.' In a meeting on November 5, 1986, the applicant stated that 3-hour wrap material could not be used because of weight limitations of the structural supports and stated that the ductwork would be wrapped with 1-hour rated material. This deviation was included in Amendment 14 to the FSAR following the meeting. Fire dampers requiring 1-hour wrap are used as fire barriers between Fire Areas PA-3 and PA-5, PA-4 and PA-5, SB-3 and SB-4, SB-4 and SB-5, and PT-1 and SG-1S. The fire loading is less than ½ hour on either side of the subject dampers. Smoke detection is provided in all areas where the 1-hour wrap will be installed and hose racks are provided for fire brigade use. It is expected that a fire would be detected in its incipient stage and the plant fire brigade would extinguish it using the installed hose racks. Providing additional structural support to the ductwork to accommodate 3-hour wrap would not significantly increase the level of fire safety. Therefore, wrapping ductwork from the barrier to the damper with 1-hour material is an acceptable deviation to Section C.5.a(4) of BTP CMEB 9.5-1.

The applicant also identified one damper in Fire Area SB-4 in which a 2-inch portion of the ductwork could not be wrapped because of interferences and therefore constituted an additional deviation from Section C.5.a(4) of BTP CMEB 9.5-1. The fire loading in this area is less than 1/2 hour and detection is provided. The 2-inch portion of the ductwork is above one of the 1-1/2 hour dampers that are in series. Lack of wrap on this 2-inch ductwork section does not adversely affect plant fire safety and therefore, is an acceptable deviation from Section C.5.a(4) of BTP CMEB 9.5-1."

"The applicant stated in Amendment 14 to the FSAR that ventilation ductwork for the battery room exhaust system and the emergency switchgear ventilation system pass through areas not serviced by the two systems. To ensure the operability of these systems in the event of a fire in an area not using these systems, the ductwork was wrapped with 1-hour material in areas not serviced by the ventilation systems. Battery room exhaust ducts run through Fire Areas SB-1, SB-2, and SB-4. Each of these areas has a fire loading of less than 1 hour and detection is provided. In the event of a fire in these areas, it is expected that the fire would be detected in its incipient stage and that the plant fire brigade would respond and extinguish the fire. Both the battery room exhaust ductwork and the emergency switchgear ventilation ductwork run through Fire Areas CV-1, CV-3, and SB-3. These fire areas have a combustible loading of less than 2 hours and are provided with detection and automatic suppression. It would be expected that a fire in these areas would be detected in its incipient stage and that the plant fire brigade would respond and control it. The automatic suppression provides added assurance that a fire would

not jeopardize the integrity of the 1-hour wrapped ventilation ducts. On the basis of this evaluation, this method of ensuring continuous ventilation to the battery room and emergency switchgear is acceptable.

The specific technical justifications for fire damper deviations were not adequately documented. The technical justification of the licensing actions is applied conservatively for the affected ductwork at BVPS-2 having either two 1.5-hour fire dampers in series or 1-hour fire wrap.

In the licensing actions, the fire damper arrangement is justified by the fire compartment combustible loading and the presence of one or more fire protection features [i.e., fire suppression or early warning fire detection] on either side of the fire barrier at the specific locations. Clarification is needed to establish an applicable combustible loading, the necessary supporting fire protection features and the additional scope of locations with 3-hour or two 1.5-hour dampers not contained within the plane of the fire barrier.

Fire dampers in HVAC ductwork connecting adjacent fire compartments with low combustible loading (less than 1 hour) are provided with fire detection. These compartments include 2-ASP, 2-CV-2, 2-SB-1, 2-SB-2, 2-SB-6, 2-SB-7, 2-SB-8, 2-SB-9, and 2-SG-1N. The low combustible loading and presence of early warning detection ensures prompt manual suppression to minimize the likelihood of fire propagation through the ductwork.

Request

It is requested that the NRC document as a clarification for the "prior approval" deviation to include the installation of two 1.5-hour fire dampers in series and 1-hour fire wrap of ventilation ductwork for fire compartments 2-ASP, 2-CV-2, 2-SB-1, 2-SB-2, 2-SB-6, 2-SB-7, 2-SB-8, 2-SB-9, and 2-SG-1N with less than 1-hour fire loading with early warning detection.

Prior Approval Clarification Request 8 for BVPS-2

Pre-transition Fire Protection Program Licensing Basis:

NRC SSER - NUREG-1057, Supplement 3, dated November 1986, approved a BVPS-2 deviation from Section C.5.a(4) of BTP CMEB 9.5-1 (NUREG-0800) for two 1.5-hour fire dampers in series instead of one 3-hour fire damper (Licensing Action 04). NUREG-1057, Supplement 5, dated May 1987, also approved a BVPS-2 deviation from Section C.5.a(4) of BTP CMEB 9.5-1 for 1-hour fire wraps adequate to the fire ratings of the duct penetrations through the barriers (Licensing Action 05).

The current licensing documentation states that either two 1.5-hour fire dampers in series and/or 1-hour fire wrap in compartments with greater than 1-hour fire loading are adequate measures to maintain the fire rating of duct penetrations through barriers. The approval requires clarification because although the original deviation requests were for specific fire areas with less than 1-hour fire loading and detection, additional fire areas with greater than 1-hour fire loading with detection and suppression also have two 1.5-hour fire dampers in series or 1-hour fire wraps.

Background/Basis:

NRC SSER - NUREG-1057, Supplement 3, dated November 1986, Section 9.5.1.4, "General Plant Guidelines," reports:

> *In the SER, the staff stated that 3-hour fire-rated damper assemblies are provided in all ventilation ducts that penetrate 3-hour fire-rated barriers and that the damper assemblies are Underwriters Laboratories, Inc. (UL) labeled. By letter dated March 27, 1985, the applicant informed the staff that the 1 1/2-hour-rated fire damper assemblies are installed in series in each duct penetrating a 3-hour fire-rated barrier. Moreover, because the applicant redefined the fire area boundaries, some damper assemblies had to be installed within completed heating, ventilation, and air conditioning (HAVC) systems. These damper assemblies are located close to, but not within, the fire barrier penetration. To compensate for the damper location, the applicant enclosed the ductwork from the fire barrier to the damper assembly with 3- hour fire-rated barrier material.*
>
> *In the March 27, 1985, letter, the applicant also informed the staff that although all of the fire damper assemblies were purchased as UL-labeled units, the manufacturer had removed the UL label from the assemblies because they were not tested in the series configuration, and because they were not tested with carbon dioxide fire-suppression-system-actuated release devices.*
>
> *For a fire to spread between fire areas through an HVAC system duct, it would have to burn through the duct in one fire area, through two 1 1/2-hour fire-rated dampers, and finally, through the duct in the adjoining area. In the staff's opinion, the two 1 1/2-hour fire-rated dampers will provide the equivalent fire resistance of one 3-hour fire-rated damper. The 3-hour fire-rated wrap around the ducts constitutes continuous fire-rated construction which will prevent fire spread through the ductwork between the fire barrier and the fire dampers. The release device is a plunger-operated pin that is in addition to the fusible link for damper actuation. The device is UL-listed for this service and, in the staff's opinion, will not reduce the effectiveness of the dampers actuated by the devices. The staff concludes that the fire dampers, as installed, will prevent fire spread from one fire area to another. The damper*

installation is, therefore, an acceptable deviation from Section C.5.a(4) of BTP CMEB 9.5-1.

NRC SSER - NUREG-1057, Supplement 5 dated May 1987, Section 9.5.1.4, "General Plant Guidelines," states:

In SSER 3, the staff stated that some fire damper assemblies were located outside of the fire barrier because of a redefining of certain fire areas and that where this took place, the ductwork from the barrier to the fire damper assembly would be wrapped with 3-hour fire-rated material. Section C.5.a(4) of BTP CMEB 9.5-1 states that, 'penetration openings for ventilation systems should be protected by fire dampers having a rating equivalent to that required of the barrier.' In a meeting on November 5, 1986, the applicant stated that 3-hour wrap material could not be used because of weight limitations of the structural supports and stated that the ductwork would be wrapped with 1-hour rated material. This deviation was included in Amendment 14 to the FSAR following the meeting. Fire dampers requiring 1-hour wrap are used as fire barriers between Fire Areas PA-3 and PA-5, PA-4 and PA-5, SB-3 and SB-4, SB-4 and SB-5, and PT-1 and SG-1S. The fire loading is less than ½ hour on either side of the subject dampers. Smoke detection is provided in all areas where the 1-hour wrap will be installed and hose racks are provided for fire brigade use. It is expected that a fire would be detected in its incipient stage and the plant fire brigade would extinguish it using the installed hose racks. Providing additional structural support to the ductwork to accommodate 3-hour wrap would not significantly increase the level of fire safety. Therefore, wrapping ductwork from the barrier to the damper with 1-hour material is an acceptable deviation to Section C.5.a(4) of BTP CMEB 9.5-1.

The applicant also identified one damper in Fire Area SB-4 in which a 2-inch portion of the ductwork could not be wrapped because of interferences and therefore constituted an additional deviation from Section C.5.a(4) of BTP CMEB 9.5-1. The fire loading in this area is less than 1/2 hour and detection is provided. The 2-inch portion of the ductwork is above one of the 1-1/2 hour dampers that are in series. Lack of wrap on this 2-inch ductwork section does not adversely affect plant fire safety and therefore, is an acceptable deviation from Section C.5.a(4) of BTP CMEB 9.5-1.

The applicant stated in Amendment 14 to the FSAR that ventilation ductwork for the battery room exhaust system and the emergency switchgear ventilation system pass through areas not serviced by the two systems. To ensure the operability of these systems in the event of a fire in an area not using these systems, the ductwork was wrapped with 1-hour material in areas not serviced by the ventilation systems. Battery room exhaust ducts run through Fire Areas SB-1, SB-2, and SB-4. Each of these areas has a fire loading of less than 1 hour and detection is provided. In the event of a fire in these areas, it is expected that the fire would be detected in its incipient stage and that the plant fire brigade would respond and extinguish the fire. Both the battery room exhaust ductwork and the emergency switchgear ventilation ductwork run through Fire Areas CV-1, CV-3, and SB-3. These fire areas have a combustible loading of less than 2 hours and are provided with detection and automatic suppression. It would be expected that a fire in these areas would be detected in its incipient stage and that the plant fire brigade would respond and control it. The automatic suppression provides added assurance that a fire would

not jeopardize the integrity of the 1-hour wrapped ventilation ducts. On the basis of this evaluation, this method of ensuring continuous ventilation to the battery room and emergency switchgear is acceptable.

The specific technical justifications for ventilation duct deviations were not adequately documented. The technical justification of the licensing actions is applied conservatively for applicable ventilation ductwork at BVPS-2 having either two 1.5-hour fire dampers in series or 1-hour fire wrap in compartments with greater than 1-hour fire loading.

In the licensing actions, the ventilation ductwork arrangement is justified by the fire compartment combustible loading and the presence of one or more supporting fire protection features on the barrier side where the fire wrap is installed for specific locations. Clarification is needed to establish an applicable combustible loading, the necessary supporting fire protection features and the additional scope of locations with fire dampers not within the plane of the fire barrier and ventilation duct passing through to adjacent fire compartments.

Fire dampers outside the plane of the fire barrier occurring in fire compartments with combustible loading greater than 1-hour are provided with both fire detection and suppression. These compartments include 2-CB-1, 2-CV-1, 2-CV-3, and 2-CV-6. The presence of detection ensures prompt manual suppression. In addition, fixed automatic suppression ensures that the growth of postulated fires will be controlled prior to achieving an intensity likely to propagate fire through the ductwork.

Request

It is requested that the NRC document as a clarification for the "prior approval" deviation to include the installation of two 1.5-hour fire dampers in series and 1-hour fire wrap of ventilation ductwork for fire compartments 2-CB-1, 2-CV-1, 2-CV-3, and 2-CV-6 with greater than 1-hour fire loading with early warning detection and automatic suppression.

Prior Approval Clarification Request 9 for BVPS-2

Pre-transition Fire Protection Program Licensing Basis:

NRC SSER - NUREG-1057, Supplement 3, dated November 1986, approved a BVPS-2 deviation from Section C.5.a(4) of BTP CMEB 9.5-1 (NUREG-0800) for two 1.5-hour fire dampers in series instead of one 3-hour fire damper (Licensing Action 04). NUREG-1057, Supplement 5, dated May 1987 also approved a BVPS-2 deviation from Section C.5.a(4) of BTP CMEB 9.5-1 for 1-hour fire wraps adequate to the fire ratings of the duct penetrations through the barriers (Licensing Action 05).

The current licensing documentation states that either two 1.5-hour fire dampers in series and/or 1-hour fire wrap in compartments with less than 1-hour fire loading are adequate measures to maintain the fire rating of duct penetrations through barriers. The approval requires clarification because although the original deviation requests were for specific fire areas with less than 1-hour fire loading and detection, additional fire areas with less than 1-hour fire loading without detection or suppression also have two 1.5-hour fire dampers in series or 1-hour fire wraps.

Background/Basis:

NRC SSER - NUREG-1057, Supplement 3, dated November 1986, Section 9.5.1.4, "General Plant Guidelines," reports:

> *In the SER, the staff stated that 3-hour fire-rated damper assemblies are provided in all ventilation ducts that penetrate 3-hour fire-rated barriers and that the damper assemblies are Underwriters Laboratories, Inc. (UL) labeled. By letter dated March 27, 1985, the applicant informed the staff that the 1 1/2-hour-rated fire damper assemblies are installed in series in each duct penetrating a 3-hour fire-rated barrier. Moreover, because the applicant redefined the fire area boundaries, some damper assemblies had to be installed within completed heating, ventilation, and air conditioning (HAVC) systems. These damper assemblies are located close to, but not within, the fire barrier penetration. To compensate for the damper location, the applicant enclosed the ductwork from the fire barrier to the damper assembly with 3- hour fire-rated barrier material.*
>
> *In the March 27, 1985, letter, the applicant also informed the staff that although all of the fire damper assemblies were purchased as UL-labeled units, the manufacturer had removed the UL label from the assemblies because they were not tested in the series configuration, and because they were not tested with carbon dioxide fire-suppression-system-actuated release devices.*
>
> *For a fire to spread between fire areas through an HVAC system duct, it would have to burn through the duct in one fire area, through two 1 1/2-hour fire-rated dampers, and finally, through the duct in the adjoining area. In the staff's opinion, the two 1 1/2-hour fire-rated dampers will provide the equivalent fire resistance of one 3-hour fire-rated damper. The 3-hour fire-rated wrap around the ducts constitutes continuous fire-rated construction which will prevent fire spread through the ductwork between the fire barrier and the fire dampers. The release device is a plunger-operated pin that is in addition to the fusible link for damper actuation. The device is UL-listed for this service and, in the staff's opinion, will not reduce the effectiveness of the dampers actuated by the devices. The staff concludes that the fire dampers,*

installation is, therefore, an acceptable deviation from Section C.5.a(4) of BTP CMEB 9.5-1.

NRC SSER - NUREG-1057, Supplement 5 dated May 1987, Section 9.5.1.4, "General Plant Guidelines," states:

In SSER 3, the staff stated that some fire damper assemblies were located outside of the fire barrier because of a redefining of certain fire areas and that where this took place, the ductwork from the barrier to the fire damper assembly would be wrapped with 3-hour fire-rated material. Section C.5.a(4) of BTP CMEB 9.5-1 states that, 'penetration openings for ventilation systems should be protected by fire dampers having a rating equivalent to that required of the barrier.' In a meeting on November 5, 1986, the applicant stated that 3-hour wrap material could not be used because of weight limitations of the structural supports and stated that the ductwork would be wrapped with 1-hour rated material. This deviation was included in Amendment 14 to the FSAR following the meeting. Fire dampers requiring 1-hour wrap are used as fire barriers between Fire Areas PA-3 and PA-5, PA-4 and PA-5, SB-3 and SB-4, SB-4 and SB-5, and PT-1 and SG-1S. The fire loading is less than ½ hour on either side of the subject dampers. Smoke detection is provided in all areas where the 1-hour wrap will be installed and hose racks are provided for fire brigade use. It is expected that a fire would be detected in its incipient stage and the plant fire brigade would extinguish it using the installed hose racks. Providing additional structural support to the ductwork to accommodate 3-hour wrap would not significantly increase the level of fire safety. Therefore, wrapping ductwork from the barrier to the damper with 1-hour material is an acceptable deviation to Section C.5.a(4) of BTP CMEB 9.5-1.

The applicant also identified one damper in Fire Area SB-4 in which a 2-inch portion of the ductwork could not be wrapped because of interferences and therefore constituted an additional deviation from Section C.5.a(4) of BTP CMEB 9.5-1. The fire loading in this area is less than 1/2 hour and detection is provided. The 2-inch portion of the ductwork is above one of the 1-1/2 hour dampers that are in series. Lack of wrap on this 2-inch ductwork section does not adversely affect plant fire safety and therefore, is an acceptable deviation from Section C.5.a(4) of BTP CMEB 9.5-1.

The applicant stated in Amendment 14 to the FSAR that ventilation ductwork for the battery room exhaust system and the emergency switchgear ventilation system pass through areas not serviced by the two systems. To ensure the operability of these systems in the event of a fire in an area not using these systems, the ductwork was wrapped with 1-hour material in areas not serviced by the ventilation systems. Battery room exhaust ducts run through Fire Areas SB-1, SB-2, and SB-4. Each of these areas has a fire loading of less than 1 hour and detection is provided. In the event of a fire in these areas, it is expected that the fire would be detected in its incipient stage and that the plant fire brigade would respond and extinguish the fire. Both the battery room exhaust ductwork and the emergency switchgear ventilation ductwork run through Fire Areas CV-1, CV-3, and SB-3. These fire areas have a combustible loading of less than 2 hours and are provided with detection and automatic suppression. It would be expected that a fire in these areas would be detected in its incipient stage and that the plant fire brigade would respond and control it. The automatic suppression provides added assurance that a fire would

not jeopardize the integrity of the 1-hour wrapped ventilation ducts. On the basis of this evaluation, this method of ensuring continuous ventilation to the battery room and emergency switchgear is acceptable.

The specific technical justifications for ventilation duct deviations were not adequately documented. The technical justification of the licensing actions is applied conservatively for applicable ductwork at BVPS-2 having either two 1.5-hour fire dampers in series or 1-hour fire wrap in compartments with less than 1-hour fire loading.

In the licensing actions, the ductwork arrangement is justified by the low combustible loading and the presence of one or more fire protection features for specific locations. Clarification is needed for fire compartments of low combustible loading (less than 1-hour) to establish the additional scope of locations with ventilation ductwork passing through to adjacent fire compartments. These compartments include 2-CB-5, 2-CP-1, 2-CV-4, 2-CV-5, 2-FB-1 and 2-WH-1. Early warning fire detection and fixed suppression are not present in these areas.

Given the low combustible loading in these locations, an unmitigated fire would not challenge the fire rating provided by the ventilation ductwork. Ductwork of steel construction penetrating a fire barrier without a fire damper has been tested and shown to remain intact during exposure to a 1-hour fire duration on the ASTM E-119 time-temperature curve. The robust construction of the steel ductwork provides adequate fire rating (1-hour) to prevent the propagation of fire through the ductwork. Therefore, fire detection is not required to maintain the integrity of the fire barrier.

Request

It is requested that the NRC document as a clarification for the "prior approval" deviation to include the installation of two 1.5-hour fire dampers in series and 1-hour fire wrap of ventilation ductwork for fire compartments 2-CB-5, 2-CP-1, 2-CV-4, 2-CV-5, 2-FB-1, and 2- WH-1 with less than 1-hour fire loading.

Prior Approval Clarification Request 10 for BVPS-2

Pre-transition Fire Protection Program Licensing Basis:

NRC SSER - NUREG-1057, Supplement 3, dated November 1986, approved a BVPS-2 deviation from Section C.5.a(4) of BTP CMEB 9.5-1 (NUREG-0800) for two 1.5-hour fire dampers in series instead of one 3-hour fire damper (Licensing Action 04). NUREG-1057, Supplement 5, dated May 1987 also approved a BVPS-2 deviation from Section C.5.a(4) of BTP CMEB 9.5-1 for 1-hour fire wraps adequate to the fire ratings of the duct penetrations through the barriers (Licensing Action 05).

The current licensing documentation states that either two 1.5-hour fire dampers in series and/or 1-hour fire wrap in compartments with less than 1.5-hour fire loading are adequate measures to maintain the fire rating of duct penetrations through barriers. The approval requires clarification because although the original deviation requests were for specific fire areas with less than 1-hour fire loading and detection, additional fire areas with less than 1.5-hour fire loading with detection also have two 1.5-hour fire dampers in series or 1-hour fire wraps.

Background/Basis:

NRC SSER - NUREG-1057, Supplement 3, dated November 1986, Section 9.5.1.4, "General Plant Guidelines," reports:

> *In the SER, the staff stated that 3-hour fire-rated damper assemblies are provided in all ventilation ducts that penetrate 3-hour fire-rated barriers and that the damper assemblies are Underwriters Laboratories, Inc. (UL) labeled. By letter dated March 27, 1985, the applicant informed the staff that the 1 1/2-hour-rated fire damper assemblies are installed in series in each duct penetrating a 3-hour fire-rated barrier. Moreover, because the applicant redefined the fire area boundaries, some damper assemblies had to be installed within completed heating, ventilation, and air conditioning (HAVC) systems. These damper assemblies are located close to, but not within, the fire barrier penetration. To compensate for the damper location, the applicant enclosed the ductwork from the fire barrier to the damper assembly with 3- hour fire-rated barrier material.*
>
> *In the March 27, 1985, letter, the applicant also informed the staff that although all of the fire damper assemblies were purchased as UL-labeled units, the manufacturer had removed the UL label from the assemblies because they were not tested in the series configuration, and because they were not tested with carbon dioxide fire-suppression-system-actuated release devices.*
>
> *For a fire to spread between fire areas through an HVAC system duct, it would have to burn through the duct in one fire area, through two 1 1/2-hour fire-rated dampers, and finally, through the duct in the adjoining area. In the staff's opinion, the two 1 1/2-hour fire-rated dampers will provide the equivalent fire resistance of one 3-hour fire-rated damper. The 3-hour fire-rated wrap around the ducts constitutes continuous fire-rated construction which will prevent fire spread through the ductwork between the fire barrier and the fire dampers. The release device is a plunger-operated pin that is in addition to the fusible link for damper actuation. The device is UL-listed for this service and, in the staff's opinion, will not reduce the effectiveness of the dampers actuated by the devices. The staff concludes that the fire dampers, as installed, will prevent fire spread from one fire area to another. The damper*

installation is, therefore, an acceptable deviation from Section C.5.a(4) of BTP CMEB 9.5-1.

NRC SSER - NUREG-1057, Supplement 5 dated May 1987, Section 9.5.1.4, "General Plant Guidelines," states:

In SSER 3, the staff stated that some fire damper assemblies were located outside of the fire barrier because of a redefining of certain fire areas and that where this took place, the ductwork from the barrier to the fire damper assembly would be wrapped with 3-hour fire-rated material. Section C.5.a(4) of BTP CMEB 9.5-1 states that, 'penetration openings for ventilation systems should be protected by fire dampers having a rating equivalent to that required of the barrier.' In a meeting on November 5, 1986, the applicant stated that 3-hour wrap material could not be used because of weight limitations of the structural supports and stated that the ductwork would be wrapped with 1-hour rated material. This deviation was included in Amendment 14 to the FSAR following the meeting. Fire dampers requiring 1-hour wrap are used as fire barriers between Fire Areas PA-3 and PA-5, PA-4 and PA-5, SB-3 and SB-4, SB-4 and SB-5, and PT-1 and SG-1S. The fire loading is less than ½ hour on either side of the subject dampers. Smoke detection is provided in all areas where the 1-hour wrap will be installed and hose racks are provided for fire brigade use. It is expected that a fire would be detected in its incipient stage and the plant fire brigade would extinguish it using the installed hose racks. Providing additional structural support to the ductwork to accommodate 3-hour wrap would not significantly increase the level of fire safety. Therefore, wrapping ductwork from the barrier to the damper with 1-hour material is an acceptable deviation to Section C.5.a(4) of BTP CMEB 9.5-1.

The applicant also identified one damper in Fire Area SB-4 in which a 2-inch portion of the ductwork could not be wrapped because of interferences and therefore constituted an additional deviation from Section C.5.a(4) of BTP CMEB 9.5-1. The fire loading in this area is less than 1/2 hour and detection is provided. The 2-inch portion of the ductwork is above one of the 1-1/2 hour dampers that are in series. Lack of wrap on this 2-inch ductwork section does not adversely affect plant fire safety and therefore, is an acceptable deviation from Section C.5.a(4) of BTP CMEB 9.5-1.

The applicant stated in Amendment 14 to the FSAR that ventilation ductwork for the battery room exhaust system and the emergency switchgear ventilation system pass through areas not serviced by the two systems. To ensure the operability of these systems in the event of a fire in an area not using these systems, the ductwork was wrapped with 1-hour material in areas not serviced by the ventilation systems. Battery room exhaust ducts run through Fire Areas SB-1, SB-2, and SB-4. Each of these areas has a fire loading of less than 1 hour and detection is provided. In the event of a fire in these areas, it is expected that the fire would be detected in its incipient stage and that the plant fire brigade would respond and extinguish the fire. Both the battery room exhaust ductwork and the emergency switchgear ventilation ductwork run through Fire Areas CV-1, CV-3, and SB-3. These fire areas have a combustible loading of less than 2 hours and are provided with detection and automatic suppression. It would be expected that a fire in these areas would be detected in its incipient stage and that the plant fire brigade would respond and control it. The automatic suppression provides added assurance that a fire would

not jeopardize the integrity of the 1-hour wrapped ventilation ducts. On the basis of this evaluation, this method of ensuring continuous ventilation to the battery room and emergency switchgear is acceptable.

The specific technical justifications for ventilation duct deviations were not adequately documented. Technical justification is applied conservatively to fire compartments based on combustible loading and the presence of detection and or suppression. In fire compartments with combustible loading less than 1.5 hours, detection is provided to minimize the likelihood of fire propagation through the ductwork.

Fire compartment 2-CB-6, West Communications Room, has a fire loading of 1.4 hours. Early warning fire detection is available in the compartment. Given the proximity of 2-CB-6 to the continuously occupied Control Room, a fire in this area would likely be promptly detected. In the event of a fire, manual suppression with portable fire extinguishers and hose racks are available and the fire brigade would be mobilized to suppress the fire. Therefore, fire dampers in series and 1-hour fire wrap would provide adequate fire resistance to maintain the integrity of fire barriers in 2-CB-6.

Request

It is requested that the NRC document as a clarification for the "prior approval" deviation to include the installation of two 1.5-hour fire dampers in series and 1-hour fire wrap of ventilation ductwork for fire compartment 2-CB-6 with less than 1.5-hour fire loading and early warning detection only.

Prior Approval Clarification Request 11 for BVPS-2

Pre-transition Fire Protection Program Licensing Basis:

NRC SSER - NUREG-1057, Supplement 5, dated May 1987, approved a BVPS-2 deviation from Section C.5.b of BTP CMEB 9.5-1 (NUREG-0800) for lack of separation in safe shutdown components (Licensing Action 08). BVPS-2 containment currently has installed a pre-action water suppression system consisting of two deluge systems in the electrical cable penetration area protecting the "orange" and "purple" system trains respectively and the residual heat removal (RHR) pumps/motors. The approval requires clarification because the detection and water-based suppression systems for the charcoal filters inside containment are no longer necessary.

Background/Basis:

NRC SSER - NUREG-1057, Supplement 5, dated May 1987, in Section 9.5.1.4, "General Plant Guidelines," states:

> *Reactor Containment*
>
> *Equipment inside containment is not in compliance with Section C.5.b of BTP CMEB*
>
> *9.5-1 because redundant trains of safe shutdown components and circuitry are not separated by 3-hour walls or are not separated by 20 feet with no intervening combustibles. Generally, redundant cables inside the containment are run on opposite sides of the interior wall. Although this does not provide 3-hour separation, the wall is a significant barrier to fire and heat. Cables inside the containment are either qualified to IEEE Standard 383 or are run inside conduit. The only significant combustible loading other than cable is the oil inside the reactor coolant pumps, RHR pumps, and the charcoal filters. The reactor coolant pumps are provided with an oil collection system in compliance with the SRP, which reduces the potential for spread of combustible oil. Both the RHR pumps and the charcoal filters are provided with detection and suppression systems. The penetration area, where redundant divisions are separated by at least 18 feet, is provided with detection and automatic suppression. Because of the low in situ combustibles and the containment's large volume, it is expected that any fire would develop slowly with the heat dissipated to the large air space. In addition, because access to the area is tightly controlled, it is not expected that transient combustibles would contribute to the fire loading. Therefore, there is reasonable assurance that a fire inside the containment would not jeopardize both trains of redundant safe shutdown equipment, and lack of complete separation of redundant trains of safe shutdown components inside containment is an acceptable deviation from Section C.5.b of BTP CMEB 9.5-1.*

The engineering change package modification ECP 08-0168 removed the combustible charcoal from the Containment Iodine Filtration System; therefore, the fire protection protecting this equipment is no longer required. ECP 08-0711 mechanically and electrically isolated and abandoned-in-place (10080-RM-0433-001D) the portion of the fire suppression system located downstream of zone isolation valves [2FPW-390 & 2FPW-377] (10080-RM- 0433-001A) that once protected the Containment Iodine Filtration System.

Request

It is requested that the NRC document as a "prior approval" recognition that the charcoal combustible hazard is no longer in the fire compartment and does not present a fire hazard.

The fire detection and fire suppression is removed from the basis for the licensing action approval.

Prior Approval Clarification Request 12 for BVPS-2

Pre-transition Fire Protection Program Licensing Basis:

NRC SSER - NUREG-1057, Supplement 5, dated May 1987, approved a BVPS-2 deviation from Section C.5.b of BTP CMEB 9.5-1 (NUREG-0800) for lack of separation in safe shutdown components (Licensing Action 08). BVPS-2 containment currently has installed a pre-action water suppression system consisting of two deluge systems in the electrical cable penetration area protecting the "orange" and "purple" system trains respectively and the residual heat removal (RHR) pumps/motors. The approval requires clarification because the water-based suppression systems inside containment are not fully automatic, since they require remote manual initiation to open the containment isolation valves. This process is used to prevent inadvertent actuation and flooding, and the potential damage and transients that could be created.

Background/Basis:

NRC SSER - NUREG-1057, Supplement 5, dated May 1987, in Section 9.5.1.4, "General Plant Guidelines," states:

> *Reactor Containment*
>
> *Equipment inside containment is not in compliance with Section C.5.b of BTP CMEB*
>
> *9.5-1 because redundant trains of safe shutdown components and circuitry are not separated by 3-hour walls or are not separated by 20 feet with no intervening combustibles. Generally, redundant cables inside the containment are run on opposite sides of the interior wall. Although this does not provide 3-hour separation, the wall is a significant barrier to fire and heat. Cables inside the containment are either qualified to IEEE Standard 383 or are run inside conduit. The only significant combustible loading other than cable is the oil inside the reactor coolant pumps, RHR pumps, and the charcoal filters. The reactor coolant pumps are provided with an oil collection system in compliance with the SRP, which reduces the potential for spread of combustible oil. Both the RHR pumps and the charcoal filters are provided with detection and suppression systems. The penetration area, where redundant divisions are separated by at least 18 feet, is provided with detection and automatic suppression. Because of the low in situ combustibles and the containment's large volume, it is expected that any fire would develop slowly with the heat dissipated to the large air space. In addition, because access to the area is tightly controlled, it is not expected that transient combustibles would contribute to the fire loading. Therefore, there is reasonable assurance that a fire inside the containment would not jeopardize both trains of redundant safe shutdown equipment, and lack of complete separation of redundant trains of safe shutdown components inside containment is an acceptable deviation from Section C.5.b of BTP CMEB 9.5-1.*

The NRC recognized and stated in SER NUREG-1057, dated October 1985, in Section 9.5.1.6, Containment:

> *Manually operated deluge systems are provided for the protection of the cable penetration area and the charcoal filters.*

This arrangement has not changed and is acceptable for transition.

To initiate system operation to the east or west cable penetration area or the RHR pumps, the control room operator remotely opens [2FPW-STV231], and the east or west deluge valve [2FPW-STV255 or 2-FPW-STV256] or 2FPW-STV252 (for the RHR pump 'B') or 2FDWSTV253 (for the RHR pump 'A')(10080-RM-0433-001D). This action opens both the required area deluge valve and the system master, or common, deluge valve. The control room operator will also remotely open the associated containment isolation valve [2FPWAOV205] (if Containment Isolation Phase A (CIA) not present), and flow will be initiated from the station fire main supply up to the open directional spray nozzles in the applicable penetration area. This process only creates a slight delay in water discharge and is used to prevent inadvertent actuation and flooding. The alarm procedure to initiate these actions is 2OM-33.4.AAI.

Request

It is requested that the NRC document as a "prior approval" recognition that the original design for the containment suppression systems includes manual activation.

Prior Approval Clarification Request 13 for BVPS-2

Pre-transition Fire Protection Program Licensing Basis:

NRC SSER - NUREG-1057, Supplement 5, dated May 1987, approved a BVPS-2 deviation from Section C.5.b of BTP CMEB 9.5-1 (NUREG-0800) for lack of separation in safe shutdown components (Licensing Action 08). BVPS-2 containment currently has installed a pre-action water suppression system consisting of two deluge systems in the electrical cable penetration area protecting the "orange" and "purple" system trains respectively and the residual heat removal (RHR) pumps/motors. The NRC recognized and approved that there are two water-based fire suppression deluge systems protecting the electrical penetration area inside containment. The approval requires clarification because the two deluge systems that provide separation of the "orange" and "purple" trains do not have a robustly designed overlapping spray pattern.

Background/Basis:

NRC SSER - NUREG-1057, Supplement 5, dated May 1987, in Section 9.5.1.4, "General Plant Guidelines," states:

> *Reactor Containment*
>
> *Equipment inside containment is not in compliance with Section C.5.b of BTP CMEB 9.5-1 because redundant trains of safe shutdown components and circuitry are not separated by 3-hour walls or are not separated by 20 feet with no intervening combustibles. Generally, redundant cables inside the containment are run on opposite sides of the interior wall. Although this does not provide 3-hour separation, the wall is a significant barrier to fire and heat. Cables inside the containment are either qualified to IEEE Standard 383 or are run inside conduit. The only significant combustible loading other than cable is the oil inside the reactor coolant pumps, RHR pumps, and the charcoal filters. The reactor coolant pumps are provided with an oil collection system in compliance with the SRP, which reduces the potential for spread of combustible oil. Both the RHR pumps and the charcoal filters are provided with detection and suppression systems. The penetration area, where redundant divisions are separated by at least 18 feet, is provided with detection and automatic suppression. Because of the low in situ combustibles and the containment's large volume, it is expected that any fire would develop slowly with the heat dissipated to the large air space. In addition, because access to the area is tightly controlled, it is not expected that transient combustibles would contribute to the fire loading. Therefore, there is reasonable assurance that a fire inside the containment would not jeopardize both trains of redundant safe shutdown equipment, and lack of complete separation of redundant trains of safe shutdown components inside containment is an acceptable deviation from Section C.5.b of BTP CMEB 9.5-1.*

BVPS-2 has two (2) electrical cable penetration containment deluge systems (10080-RM-0433-001D). There is one water-based NFPA 15 deluge system installed to protect each division, for a total of two independent spray systems. Each system uses a set of heat detectors for actuation. Both areas are also protected by early warning fire detectors.

BVPS-2 documented on June 4, 2013, the location and spacing compliance of the electrical penetration deluge systems (2OST-33.21). The observations noted that the actuation devices are appropriately spaced, and there is at least one from each system nearest the

adjacent divisions. In addition, it was noted that the deluge system spray nozzle's orientation is such that it will provide adequate separation between the "orange" and "purple" trains because at their face of separation (approximately 16 to 20 feet) there are at least two deluge nozzles at each end of the system that are angled/directed towards the opposing electrical division. If either or both systems were to activate, a sufficient water spray to prevent a fire from communicating across the space between the electrical divisions will be created. Through the combination of field observation, additional reviews of the installation drawings, and based on engineering experience and judgment of the observation team, it was concluded that the remaining deluge nozzles develop an adequate spray pattern to protect or suppress a fire in the remaining "orange" or "purple" electrical penetration coverage areas. The spray pattern either envelopes the electrical penetrations and/or termination cabinets, or satisfactorily provides a sufficient cooling water fog pattern, due to impingements from surfaces close to some of the nozzle ends.

Request

It is requested that the NRC document as a "prior approval" recognition that, for areas of electrical cable penetrations, the original design of the two deluge suppression systems provides adequate spray pattern distributions and design spray density between the "orange" and "purple" electrical trains.

Prior Approval Clarification Request 14 for BVPS-2

Pre-transition Fire Protection Program Licensing Basis:

NRC SSER - NUREG-1057, dated October 1985, approved a BVPS-2 deviation from Section C.6.a of BTP CMEB 9.5-1 (NUREG-0800) for the Fire Detection System Secondary Power Supplies - Use of Plant Emergency Power Supply (Licensing Action 26). The fire detection system does not comply with the literal interpretation of NFPA 72D because a 4-hour battery secondary power in addition to the diesel generator backup does not exist. BVPS-1 fire detection system is of a similar configuration, although an exemption does not exist for the secondary power supply. Therefore, a clarification is required to apply the BVPS-2 deviation to the secondary power supply arrangement for BVPS-1.

Background/Basis:

The NFPA 805 transition for BVPS-1 requires the power supply for the early warning fire detection system and the fire detection and water suppression systems to conform to either the current revision of NFPA 72 or the code of record revision of NFPA 72D, since an exemption does not exist. The code of record for BVPS-1 is NFPA 72D-1973 as specified in 1/2-ADM-1903. The NRC SER dated June 6, 1979, Section 4.2 states:

> *The licensee has stated that the installed system is in conformance with NFPA 72D and all circuits are supervised to indicate loss of power, undervoltage, short circuits, open circuits or ground faults.*

The Duquesne Light letter dated Oct. 27, 1976 indicates that the ionization fire detection system is connected to the emergency power supply as described in Section IV, D2 response. The actuation and detection systems for the CO2 systems and water sprinkling systems are all powered from station batteries. It further states:

> *Fire detection in the control room, cabinets, and consoles should be provided by smoke and heat detectors in each fire area. Alarm and annunciation should be provided in the control room. Fire alarms in other parts of the plant should also be alarmed and annunciated in the control room.*

The referenced letter listed several additional areas in the plant that were provided with area ionization coverage and alarmed fire displays.

However, NFPA 72D, 1973 Edition, Section 220 includes requirements for primary and secondary power sources for the fire detection and alarm system, and also specifies several combinations of acceptable methods. The code requires that the secondary or emergency power supply include a 4-hour standby battery in addition to the engine driven generator, unless two or more engine driven generators are provided. These secondary or emergency power supply requirements are required for the central supervising station, as well as all control units, transmitters, or other equipment, essential to system operation, located remote from the central supervising station.

From NRC SSER NUREG-1057 (Applicable to BVPS-2):

> *By letter dated May 23, 1984, the applicant committed to provide a reliable power supply for the fire detection system as follows:*
>
> *(1) The primary supply for the fire detection system and suppression systems is the normal offsite power supply system.*

(2) The secondary supply for the fire detection systems is a non-safety diesel generator. The switchover capability is an automatic function. The diesel generator supplies the 120-V ac uninterruptible power supply system required for the detection system and the 125-V dc panels for the fire detection and suppression systems.

(3) A battery backup system with a 2-hour rated capability is provided as a backup to the 125-V dc systems.

A battery backup system with a 30-minute capability is provided as a backup to the 120-V ac systems. This is to provide electrical power continuity for the 10 seconds required to start the diesel and achieve rated voltage and frequency. The staff finds this an acceptable primary and secondary source of power.

On the basis of its evaluation, the staff concludes that the fire detection system will meet Section C.6.a of BTP CMEB 9.5-1 and is, therefore, acceptable.

BVPS-1:

BVPS-1 is provided with reliable power for the early warning fire detection system in a similar manner as BVPS-2 in that the primary supply is provided from the normal offsite power supply system and secondary (back-up) power is supplied from the emergency bus. Upon loss of normal offsite power the emergency bus is supplied from an emergency diesel generator (EDG).

The primary power supply source and the EDG-backed secondary power supply sources to the early warning smoke detection and alarm system are considered highly reliable and diverse, although they do not include four hours of backup battery capability, or possess two or more EDGs capable of meeting demand within 30 seconds. Therefore, the current secondary power supply does not meet the literal requirements of NFPA 72D-1973 and later editions. There is a high degree of assurance from the diverse and independent reliable power sources that there will be a secondary power source available. The BVPS-1 EDGs are rigorously maintained to achieve a reliability greater than that of normal commercial installations.

The BVPS-2 licensing exemption, Licensing Action 26 discussed in LAR Attachment K, is being transitioned to the NFPA 805 licensing basis. The above clarification supports that BVPS-1 has a similar primary and secondary power supply arrangement for the early warning fire detection system, which was accepted by the NRC from the NUREG-1057 SSER for BVPS-2 in October 1985. Since a specific license condition or exemption was not previously issued for BVPS-1, FENOC requests a clarification of the BVPS-2 exemption to extend to BVPS-1 due to their similar design.

Request

It is requested that the NRC document as "prior approval" recognition that BVPS-1 has a similar primary and secondary power supply arrangement for the early warning fire detection system that was accepted by the NRC for BVPS-2 from the NRC NUREG-1057 SSER, dated October 1985.

Prior Approval Clarification Request 15 for BVPS-2

Pre-transition Fire Protection Program Licensing Basis:

The NRC SER dated June 6, 1979 approved a deviation for sprinklers in the Intake Structure common to both BVPS-1 and BVPS-2 from Section C.6.c of BTP CMEB 9.5-1 (NUREG-0800) for Intake Structure - Detection and Three-Hour Barriers versus Sprinklers (Licensing Action No. 30). The approval requires clarification because the Intake Structure Compartment (Cubicle 3-IS-4) contains the diesel fire pump. Diesel fire pumps are required per BTP CMEB 9.5-1 and NFPA 805 Section 3.9.4 to have automatic sprinkler protection. This clarification is required because the existing approved exemption for the Intake Structure did not specifically mention the fire pump area or the sections of the regulations applicable to fire pump sprinkler protection.

Background/Basis:

BVPS-2 UFSAR, Section 9.5A, provided the justification for lack of sprinklers in the Intake Structure. The exemption approval was provided by the NRC in SER dated June 6, 1979, and stated:

> *The licensee will remove all unnecessary combustibles from the intake structure and will allow only fire retardant treated lumber to be used within the building. The licensee will also provide automatic fire detectors in the safety-related pump compartments IS-1, IS-2 and IS-3 arranged to alarm in the control room.*
>
> *We find that, upon implementation of the above described modifications, the Intake Structure fire protection satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable.*

Among the conditions cited in the NRC SER dated June 6, 1979, one that requires clarification relative to the BVPS-1 and BVPS-2 common fire pumps is that the Intake Structure Compartment (3-IS-4) houses the diesel fire pump, which is required to have automatic sprinkler protection per Appendix A to BTP APCSB 9.5-1 and NFPA 805 Section 3.9.4. The NRC approved the entire Intake Structure without sprinkler protection.

Request

As part of this LAR submittal and transition to NFPA 805, it is requested that the NRC document as a "prior approval" recognition that the absence of sprinkler protection in the Intake Structure compartment (3-IS-4) that houses the diesel fire pump, is acceptable. This clarification is necessary because the existing approved exemption for the Intake Structure did not specifically discuss the fire pump area or the sections of the regulations applicable to fire pump sprinkler protection. This is considered a clarification because the existing exemption is applicable to the entire Intake Structure.

Prior Approval Clarification Request 16 for BVPS-2

Pre-transition Fire Protection Program Licensing Basis:

NRC SSER - NUREG-1057, Supplement 5, dated May 1987, approved a BVPS-2 deviation from Section C.5.a(5) of BTP CMEB 9.5-1 (NUREG-0800) for modification of fire door assemblies (Licensing Action 06). The approval requires clarification because 2-WH-1 and 2-CP-1 contain automatic sprinkler systems which are no longer necessary.

Background/Basis:

NRC SSER - NUREG-1057, Supplement 5, dated May 1987, in Section 9.5.1.4, "General Plant Guidelines," states:

> *In the SER, the staff stated that with the exception of two rolling fire doors, door openings are in compliance with Section C.5.a(5) of BTP CMEB 9.5-1, which states that 'door openings in fire barriers should be protected with equivalently rated doors, frames, and hardware that have been tested and approved by a nationally recognized laboratory.' The applicant stated in Amendment 14 to the FSAR that certain doors have been modified by the installation of security hardware and are no longer approved fire doors. The applicant also stated that there are 'special purpose' doors that are not approved by Underwriters Laboratories (UL). During the site audit of January 27-30, 1987, the applicant identified 40 doors that were modified for security purposes. The applicant demonstrated that all modifications were made in accordance with recommendations supplied by UL. Although the applicant stated that all doors were originally purchased as UL-approved, it was noticed during the site visit that some UL labels were missing from doors. The applicant committed to have the doors relabeled by the manufacturer or to maintain on file documentation that individual doors are UL approved. This commitment will be implemented by fuel load. It was also observed that the security modifications consisted primarily of the addition of electric contact switches with a single conduit penetrating the frame. Installations appeared to be in accordance with design drawings, which were based on UL recommendations. Therefore, with the exception of the doors missing labels, the security-modified fire doors are an acceptable deviation from Section C.5.a(5) of BTP CMEB 9.5-1.*

This deviation was granted based on Duquesne Light Company's (DLC) letter dated February 11, 1987. That letter provided a list in Table 1 of the fire doors with security modifications and the fire severities and methods of fire suppression for the areas separated by these fire doors. According to BVPS-2 "Updated Final Safety Analysis Report," (BVPS-2 UFSAR), these modified fire doors assemblies differ from the SRP by having been modified from their tested configuration with the addition of security hardware and alarm equipment as required by NRC regulation. However, these modifications are justified for the following reasons:

- The doors were modified following the guidelines suggested by Underwriters Laboratories
- The door areas have either automatic detection and suppression or manual fire fighting equipment available in the areas.

- The security alarmed doors also have remote monitoring capability via the security system video monitors and the alarm function in the event the door is left open, which would alert personnel of an abnormal condition in these areas.
- The adequacy of the fire door assemblies will be justified by either (a) bearing a UL label denoting a required fire rating, (b) have a certification from the Vendor identifying the fire rating, or (c) an engineering analysis.

Table 1 included doors (W-22-1, W-35-1, W-35-2, W-44-1, and C-74-7) which separate 2-WH-1 or 2-CP-1 from other areas. 2-WH-1 and 2-CP-1 have automatic sprinklers listed as the primary type of fire suppression. These automatic sprinklers were required to satisfy the deviation from Section C.5.a(5) of BTP CMEB 9.5-1. However, 2-WH-1 and 2-CP-1 were evaluated using the performance-based approach, NFPA 805, and these automatic sprinklers are no longer necessary.

Request

As part of this LAR submittal and transition to NFPA 805, it is requested that the NRC document as a "prior approval" recognition that the modified fire doors separating 2-WH-1 and 2-CP-1 from other compartments are still adequate without the automatic sprinklers. The automatic sprinklers for 2-WH-1 and 2-CP-1 are removed from the basis for the licensing action approval.

Prior Approval Clarification Request 17 for BVPS-1

Pre-transition Fire Protection Program Licensing Basis:

The NRC SER dated March 14, 1983, approved an exemption for lack of 20 foot separation and automatic suppression in the BVPS-1 Cable Tunnel (1-CV-3) per 10 CFR 50, Appendix R, Section III.G.2 criteria (Licensing Action 11.05). Among the conditions cited in the NRC SER that requires clarification is that there are low in-situ combustibles in the fire compartment.

Background/Basis:

The exemption request transmitted by BVPS-1 letter dated June 30, 1982, and supplemented by letters dated October 22, 1982, October 28, 1982, and December 21, 1982, provided the justification for lack of 20 foot separation with no automatic suppression system as required by Appendix R, Section III.G.2 for fire compartment 1-CV-3. The exemption approval was provided by the NRC in SER dated March 14, 1983, which states:

> *All cables are qualified to a test comparable to IEEE Standard 383. Each redundant function has at least one train of cables installed in conduit. Access to the area is restricted via a metal hatch and vertical ladder. A smoke detection system is provided in the cable tunnel.*
>
> *The licensee proposes to install a total flooding Halon 1301 system.*
>
> *The licensee states that restricted access to the area minimizes the potential for the accumulation of transient combustible materials, and that one train of cables for each redundant function is routed in conduit, therefore, the probability of both trains sustaining fire damage from an exposure fire is reduced to a level equivalent to that provided by the protective features of Section III.G.*
>
> *This fire area with the proposed modifications does not comply with the technical requirement of Section III.G.*
>
> *The 1-hour rated fire barrier or twenty feet of separation free of intervening combustibles required by Section III.G provides the benefit of a protective feature to prevent cable damage until the automatic suppression system extinguishes the fire. In this fire area, the restricted access minimizes the probability of a severe exposure fire due to accumulated transient combustibles. In addition, the metal conduit will delay the onset of cable damage for a limited time period for small exposure fires. The proposed Halon 1301 system should promptly extinguish a fire in this area. Because of the restricted access, low in-situ combustibles and automatic suppression, there is reasonable assurance that one train of cables will remain free of fire damage.*
>
> *Based on our evaluation, the level of existing protection in cable tunnel CV-3 in conjunction with the proposed Halon 1301 system provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R. Therefore, the exemption should be granted.*

It further states:

> *Subsection III.G.2.b requires 20 feet of separation free of intervening combustibles between cables. Based on our evaluation, the level of existing protection in cable tunnel CV-3 in conjunction with the proposed Halon 1301 system provides a level of fire*

protection equivalent to the technical requirements of Section III.G of Appendix R. Therefore, the exemption is granted.

Technical Evaluation Report TER-13757, Revision 0, assessed the fire protection adequacy of certain cable tray enclosures (i.e., tray covers, tray bottoms and cable wraps) provided within Cable Tunnel 1-CV-3. The cable tray enclosures were installed after it was discovered that, contrary to statements within the exemption request, some of the nonsafety related trays within 1-CV-3 contain various polyvinyl-chloride (PVC) jacketed communications and switchyard cables which are not fire retardant (i.e., not capable of passing the vertical cable tray flame test with an oil and burlap flame source comparable to IEEE-383 test).

A fire protection engineering evaluation (FPPCE 11-027, Revision 0) performed in accordance with the guidelines of NRC Generic Letter 86-10, concluded that the referenced cable tray enclosures in 1-CV-3 provide a level of protection equivalent to a conduit. Furthermore, a modification was performed to install steel tray covers on both the tops and bottoms of the subject trays, and to wrap exposed portions of cables that enter or exit the trays. The cable tray enclosures are not relied upon to provide integrity of the enclosed circuits in the event of a fire in 1-CV-3. Rather, the cable tray enclosures prevent the nonfire-retardant cables from being considered as an intervening combustible material. The modification was not intended to provide a rated fire barrier, but does remove the enclosed cables from the calculation of combustible materials in the area.

Request

As part of this LAR submittal and transition to NFPA 805, it is requested that the NRC document as a "prior approval" recognition that, although the non-safety-related cables in 1-CV-3 are not fire retardant, the existing condition is still acceptable based on the modification to install steel tray covers and to wrap exposed portions of cables. The basis for the exemption was that there are low in-situ combustibles in the Cable Tunnel. This remains valid since the enclosed cables do not present an intervening combustible and it is unlikely for the cables to become ignited in the event of a fire in 1-CV-3.