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SUBJECT: Forwards "Verification of Fire Protection Provided for Auxiliary Feedwater Sys,Control Room Ventilation & Pressurization Sys,Safety-Related Portion of 4160-Volt Electrical Sys," Number 18,Revision 0. see rpt

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December 15, 1982
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Docket No. 50-275
Diablo Canyon Unit 1
License No. DPR-76

SWEC INTERIM TECHNICAL REPORT

Gentlemen:

Attached is Interim Technical Report, Number 18, Revision 0, entitled "Verification of the Fire Protection Provided for Auxiliary Feedwater System, Control Room Ventilation and Pressurization System, Safety-Related Portion of the 4160 V Electrical System".

Very truly yours,

John E. Krechting

J.E. Krechting
Project Engineer, Diablo Canyon Nuclear Power Plant

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PROGRAM MANAGER'S PREFACE

DIABLO CANYON NUCLEAR POWER PLANT - UNIT I

INDEPENDENT DESIGN VERIFICATION PROGRAM

INTERIM TECHNICAL REPORT

VERIFICATION OF THE FIRE PROTECTION
PROVIDED FOR
AUXILIARY FEEDWATER SYSTEM
CONTROL ROOM VENTILATION AND PRESSURIZATION SYSTEM
SAFETY-RELATED PORTION OF THE 4160 V ELECTRIC SYSTEM.

This is the eighteenth of a series of Interim Technical Reports prepared by the DCNPP-IDVP for the purpose of providing a conclusion of the program.

This report provides the analytical results, recommendations and conclusions of the IDVP with respect to the initial sample.

As IDVP Program Manager, Teledyne Engineering Services has approved this ITR including the conclusions and recommendations. The methodology followed by TES in performing this review and evaluation is described by Appendix C to this report.

ITR Reviewed and Approved
IDVP Program Manager
Teledyne Engineering Services

D.C. Stratouly

D. C. Stratouly
Assistant Project Manager

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APPENDIXES

1.0 INTRODUCTION

Stone & Webster Engineering Corporation (SWEC) has reviewed the fire protection provided for the selected sample systems in accordance with the SWEC scope of work defined in Appendix D (DCNPP-IDVP-PP-002) of the IDVP Phase II Program Management Plan issued by Teledyne Engineering Services (TES) as IDVP Program Manager. SWEC reviewed licensing commitments covering fire zone separation, detection systems, suppression systems, special fire hazards control, and power/control cable separation. The selected sample systems include the Auxiliary Feedwater System (AFW), Control Room Ventilation and Pressurization System (CRVP), and the safety-related portions of the 4160 V Electric System. The following describes the details of the review.

2.0 DEFINITION OF ITEMS REVIEWED

The fire protection attributes provided for the sample systems were identified and reviewed for conformance with Diablo Canyon Nuclear Power Plant Unit 1 (DCNPP-1) licensing commitments. These attributes include fire zone separation, detection systems, suppression systems, power/control cable separation, and special fire hazards control.

3.0 DESCRIPTION OF REVIEW

The Interim Technical Report (ITR) on the Design Chain for the SWEC sample was reviewed to determine the service-related contractors and internal Pacific Gas & Electric (PG&E) engineering groups involved in the design of the fire protection provided for the selected sample systems. The results of this review did not identify any service-related contractors. The PG&E Mechanical and Nuclear Engineering Group was responsible for the design.

3.1 Licensing Documents

SWEC reviewed licensing documents addressing fire protection commitments specific to the sample systems. These documents were selected from the Master Applicable Licensing Document Index. Appendix A references the documents containing the licensing commitments applicable to the fire protection attributes defined in Section 2.0.

3.2 Fire Protection Attributes

Fire zones that contain equipment required for operation of the selected sample systems were identified from Reference 1. Within each of these zones the following attributes committed to in the licensing documents referenced in Appendix A were identified and field inspected:

- Fire zone separation
- Detection system location
- Suppression system location
- Special hazards control

DCNPP-1 design documents including equipment location, ventilation duct arrangement, and structural drawings were reviewed for general information to assist in the field inspection.

3.3 Cable Separation

Routings for power/control circuits required for safe shutdown were tabulated by PG&E in "Supplementary Information for Fire Protection Review" (SIFPR), dated November 13, 1978 (Reference 4). A sampling of the circuit routings from the AFW and CRVP Systems was selected and field inspected for comparison with the SIFPR tabulation. In addition, an independent list of safe shutdown circuits was developed by SWEC from electrical and instrumentation/control drawings. This list was compared to the circuits identified in SIFPR.

4.0 SUMMARY OF REVIEW RESULTS

4.1 Results of Review of Fire Protection Attributes

The results of the review of fire protection attributes described in Section 3.2 are described below.

4.1.1 Fire Zone Separation

Zone separation for the motor driven AFW pump room is inconsistent with licensing commitments. A large grated opening is located in fire zone 3-Q-2 (containing the motor driven AFW pumps) which leads up to fire zone 3-R. This barrier is described on page 4-18 of Reference 1 as a 2-ft thick concrete ceiling.

A noncombustible barrier separating the motor driven AFW pumps (fire zone 3-Q-2) from the turbine driven AFW pump (fire zone 3-Q-1), described in Reference 3 (response to Q.16), contains a fire damper (FD-24) which has 5/16-in. gaps at each end of the damper blades when the damper is closed.

Zone barriers for the 4160 V cable spreading rooms are inconsistent with licensing commitments described in References 1 and 4. Each of the three rooms (fire zones 12A, 12B, and 12C) have large openings up to the 4160 V switchgear rooms (fire zones 13A, 13B, and 13C). Amendment 51, page 4-45 (Reference 1) describes these barriers as 1-ft thick concrete slabs with cable penetrations sealed for 3-hr ratings.

Other attributes for fire zone separation including fire rated doors, dampers, and cable penetrations were found to be in compliance with the DCNPP-1 licensing commitments described in References 1, 3, and 4.

4.1.2 Detection Systems

A smoke detector is not located in the CRVP normal ventilation intake duct as described on page 5-51 of Reference 1. Detection systems in the other zones reviewed were provided in accordance with the licensing commitments described in References 1 and 4.

4.1.3 Special Fire Hazards Control

Valve covers on the hydrogen line enclosures were loose and missing in the turbine driven AFW pump room (fire zone 3-Q-1). Licensing commitments described in Reference 4 require enclosure of these lines to minimize potential explosion hazards in case of a hydrogen leak.

Other attributes for fire hazards control including curbs for containment of oil spills, drainage for fire suppression water, and sealed beam lighting units were provided in accordance with the licensing commitments described in References 1, 2, 3, and 4.

4.1.4 Suppression Systems

The suppression systems provided are located in accordance with DCNPP-1 licensing commitments described in References 1, 3, and 4.

4.2 Results of Review of Cable Separation

Fire zone 3-Q-2 (el 100 ft-0 in. in the Auxiliary Building) contains both motor driven AFW pumps and control circuitry (in conduit CND K8317) for flow control valve FCV-95 which is required for operation of the turbine driven AFW pump.

Power/control circuitry required for operation of CRVP System components during safe shutdown is inadequately identified. The SIFPR licensing document did not identify all components associated with either Mode 1 or Mode 3 operation. In addition, the power circuit routing for the CRVP fan S-36 is not located in the fire zones described in the SIFPR licensing document.

The field inspection of approximately 50 percent of the AFW circuit routings identified fire zone location discrepancies in seven (7) power and control circuits that were tabulated in the SIFPR licensing document. In addition, four (4) circuits required for operation of the AFW System were identified in the field that were not addressed in SIFPR.

A commitment was made by PG&E in a revised response to NRC question Q.51 of Reference 4, to provide isolation of control room circuitry from the hot shutdown panel subsequent to transfer of control to "local" at the hot shutdown panel. The review of the schematic wiring diagram No. 437507 found that an "on-off" control switch and associated wiring essential to providing power to motors at LCVs 110, 111, 113, and 115 could be subject to loss during a control room fire.

4.3 EOI Reports Issued

Nine (9) EOI reports were issued as a result of the verification of the fire protection provided for the AFW System, CRVP System, and the safety-related portion of the 4160 V Electric System. The status at these files is summarized in Appendix B.

EOI File 8019 was issued because control circuitry for FCV-95 is located in the same fire zone as the motor driven AFW pumps. Thus, a fire could adversely affect all three AFW pumps. This file is presently an Open Item transferred to PG&E for additional information.

EOI File 8020 was issued because circuitry required for CRVP System operation during safe shutdown was incompletely identified. Thus, no evaluation could be made of the adequacy of the CRVP cable separation. This file is presently an Open Item transferred to PG&E for additional information.

EOI File 8021 was issued because discrepancies were identified in the AFW circuit locations. Thus, no evaluation could be made of the adequacy of the AFW cable separation. This file is presently an Error Class A or Class B.

EOI File 8032 was issued because the ability to isolate control room circuitry from the hot shutdown panel subsequent to transfer of control to "local" at the hot shutdown panel is subject to loss by a control room fire. This file is presently an Error Class A.

EOI File 8035 was issued because a smoke detector was not located in the CRVP ventilation intake duct as committed to in Reference 1. This file is presently an Error Class A.

EOI File 8036 was issued because two valve covers were missing and loose in the hydrogen line guard pipe. Thus, hydrogen could escape into fire zone 3-Q-1 (turbine driven AFW pump room) creating an explosion hazard. This file is presently an Error Class A.

EOI File 8037 was issued because a damper located in the noncombustible barrier separating the motor driven AFW pumps and the turbine driven AFW pumps had gaps of 5/16-in. at each end of each damper blade when in the closed position. This file is now a closed item.

EOI File 8038 was issued because the ceilings of the motor driven AFW pump rooms contain large openings which are inconsistent with the licensing commitment detailed in Reference 1. This file is presently an Error Class A or Class B.

EOI File 8039 was issued because the ceilings of the 4160 V cable spreading rooms have large openings which are inconsistent with the licensing commitment detailed in Reference 1. This file is presently an Error Class A or Class B.

5.0 EVALUATION OF REVIEW RESULTS

Evaluation of the results of the review indicate that the fire protection provided for the sample systems does not meet the licensing commitments in several instances. The specific discrepancies outlined in Section 4.0, and reported in the EOI Files indicate that generic concerns may exist for fire zone separation and cable separation.

6.0 CONCLUSION

It is concluded that due to the possible generic concerns described in Section 5.0, additional verification of fire zone separation and cable separation for safety-related systems is required.

APPENDIX A

FIRE PROTECTION LICENSING COMMITMENT REFERENCES

FIRE PROTECTION LICENSING COMMITMENT REFERENCES

REFERENCE NO.	DATE	DOCUMENT DESCRIPTION
1	July 27, 1977	Submittal of Ammendment 51 consisting of information on fire protection rereview.
2	February 6, 1978	PG&E letter to NRC providing responses to NRC Fire Protection Review questions.
3	August 3, 1978	PG&E letter to NRC providing revised responses to NRC Fire Protection Review questions.
4	November 13, 1978	PG&E letter to NRC providing revised responses to NRC Fire Protection Review questions including attachment entitled "Supplementary Information for Fire Protection Review."
5	July 20, 1979	PG&E letter to NRC defining plant modifications pertaining to fire protection.
6	December 1979	FSAR Section 9.4.1, Amendment 81

APPENDIX B

EOI FILES

DCNPP IDVP STATUS REPORT

FILE NO.	REV. 0 DATE	REV.	LATEST REV. DATE	BY	STATUS	SUBJECT
8019	821005	0	821005	SWEC	OIR	AFW FIRE PROTECTION
8019	821005	1	821014	SWEC	PPRR/OIP	AFW FIRE PROTECTION
8019	821005	2	821022	TES	PRR/OIP	AFW FIRE PROTECTION
8020	821004	0	821004	SWEC	OIR	CRVP SYS FIRE PROTECTION CABLE SEPARATION
8020	821004	1	821014	SWEC	PPRR/OIP	CRVP SYS FIRE PROTECTION CABLE SEPARATION
8020	821004	2	821029	TES	PRR/OIP	CRVP SYS FIRE PROTECTION CABLE SEPARATION
8021	821013	0	821013	SWEC	OIR	AFW FIRE PROTECTION
8021	821013	1	821014	SWEC	PPRR/OIP	AFW FIRE PROTECTION
8021	821013	2	821026	SWEC	PER/AB	AFW FIRE PROTECTION
8021	821013	3	821112	TES	ER/AB	AFW FIRE PROTECTION
8032	821013	0	821013	SWEC	OIR	AFW-LEVEL CONTROL VALUES LCV110,111,113, & 115
8032	821013	1	821013	SWEC	PER/AB	AFW-LEVEL CONTROL VALUES LCV110,111,113, & 115
8032	821013	2	821118	TES	ER/A	AFW-LEVEL CONTROL VALUES LCV110,111,113, & 115
8035	821014	0	821014	SWEC	OIR	CRVP FIRE PROTECTION
8035	821014	1	821014	SWEC	PER/A	CRVP FIRE PROTECTION
8035	821014	2	821029	TES	ER/A	CRVP FIRE PROTECTION
8036	821014	0	821014	SWEC	OIR	AFW FIRE PROTECTION-HYDROGEN LINES
8036	821014	1	821025	SWEC	PER/A	AFW FIRE PROTECTION-HYDROGEN LINES
8036	821014	2	821030	TES	ER/A	AFW FIRE PROTECTION-HYDROGEN LINES
8037	821014	0	821014	SWEC	OIR	AFW FIRE PROTECTION-NONCOMBUSTIBLE BARRIER
8037	821014	1	821025	SWEC	PPRR/OIP	AFW FIRE PROTECTION-NONCOMBUSTIBLE BARRIER
8037	821014	2	821118	TES	PRR/OIP	AFW FIRE PROTECTION-NONCOMBUSTIBLE BARRIER
8037	821014	3	821123	TES	OIR	AFW FIRE PROTECTION-NONCOMBUSTIBLE BARRIER
8038	821014	0	821014	SWEC	OIR	AFW FIRE PROTECTION-ZONE OPENING
8038	821014	1	821025	SWEC	PER/AB	AFW FIRE PROTECTION-ZONE OPENING
8038	821014	2	821029	TES	ER/AB	AFW FIRE PROTECTION-ZONE OPENING
8039	821014	0	821014	SWEC	OIR	4160V FIRE PROTECTION-ZONE BARRIERS
8039	821014	1	821025	SWEC	PER/AB	4160V FIRE PROTECTION-ZONE BARRIERS
8039	821014	2	821029	TES	ER/AB	4160V FIRE PROTECTION-ZONE BARRIERS

APPENDIX C

PROGRAM MANAGER'S ASSESSMENT

APPENDIX C

PROGRAM MANAGER'S ASSESSMENT

Independent review by TES of the tasks performed by SWEC to verify the Fire Protection provided for AFW System, CRVP System and Safety-Related Portion of the 4160 V Electric System was done in accordance with IDVP Phase II Program Management Plan dated June 18, 1982 and the Engineering Procedure EP-1-014.

The review involved several visits to the SWEC offices for detailed discussions and review, with SWEC personnel, of the work performed by SWEC including the methodology used in the evaluation of this task. The EOI Files used by SWEC were reviewed thoroughly and specific recommendations were made to the IDVP Manager delineating appropriate resolution.

As a result of the verification of initial sampling selected by SWEC and the assessment of the impact of SWEC findings, TES, as Program Manager, is of the opinion that the fire protection provided for the sample systems does not meet the licensing commitments in several instances, and that additional verification of fire zone separation and cable separation for safety-related systems is required.