

ENVIRONMENTAL QUALIFICATION OF SAFETY-RELATED

ELECTRICAL EQUIPMENT

IEB 79-01B

TECHNICAL EVALUATION REPORT

PEACH BOTTOM 3

DOCKET NO. 50-278

DATED: NOVEMBER 1980

Licensee: Philadelphia Electric Company

Type Reactor: BWR, General Electric Company

Size: 1065 MWe

Prepared by

Alan E. Finkel
Engineering Support Section
Reactor Construction and
Engineering Support Branch, RI

8106190012

Contents

	Page
1. Introduction	
1.1 General	
2. Background and Discussion	
2.1 General.....	
2.2 On-Site Verification Inspections	
2.3 Evaluation of Licensee's Report	
3. General Information	
3.1 Identification of Class IE Electrical Equipment	
3.2 Service Conditions	
3.3 Qualification Documentation	
4. Technical Evaluation	
4.1 Identification of Safety Related Equipment	
4.2 Master List	
4.3 Service Conditions	
4.3.1 Inside Containment LOCA	
4.3.1.1 Radiation	
4.3.1.2 Submergence	
4.3.1.3 Chemical Spray	
4.4 High Energy Line Breaks (HELB)	
4.4.1 HELB Inside Containment	
4.4.2 HELB Outside Containment	
4.4.3 Recirculated Fluids	
4.5 Margins	
4.6 Aging	
4.7 Documentation	
4.8 Site Verification Inspection	
4.9 Equipment Data Review	
4.10 Conclusions	

5. Licensee Event Reports (LERs)

6. References

 Appendix A, Test Reports and Analysis Lists

 Appendix B, Equipment Status Lists

 Appendix C, Licensee's Exceptions

 Appendix D, TMI Modifications

1. Introduction

1.1 General

The NRC Office of Inspection and Enforcement (I/E) issued Bulletin 79-01B, "Environmental Qualification of Class 1E Equipment" in January 1980. This bulletin required the licensee to perform a detailed evaluation of the environmental qualification on Class 1E electrical equipment required to function under postulated accident conditions and to submit a report on this action.

This document is a report on the evaluation of the licensee's response to this bulletin.

2. Background and Discussion

2.1 General

The evaluation of the licensee's response was accomplished by performing an on-site inspection of selected class 1E equipment and by examining the licensee's report for completeness and technical accuracy. The licensee's report used in this evaluation is dated October 31, 1980, and therefore, does not include the response to the bulletin supplement which was issued on 9/30/80 in the form of Generic Questions and Answers.

2.2 On-Site Verification Inspections

The on-site inspection, made on selected 1E equipment, verified proper installation of equipment, overall interface integrity, location with respect to flood level for equipment inside the containment, and manufacturers nameplate data. The manufacturer and model number from the nameplate data was compared to information given in the Component Evaluation Work Sheets (CES) of the licensee's report.

If any discrepancies were noted between the installed equipment and the correspondent equipment addressed in the licensee's report, they are discussed in Section 4.8 of this report. The site inspection is documented by report number 50-278/80-25.

2.3 Evaluation of Licensee's Report

Each component as addressed on the Component Evaluation Work Sheets (CES) of the licensee's report was examined for completeness and accuracy to the criteria given in the bulletin. This examination assumed qualification documents (analysis, test reports, etc.) referenced by the licensee in their submittal are acceptable.

The results of this examination are documented in Appendix B.

3. General Information

3.1 Identification of Class 1E Electrical Equipment

The licensee's list of systems was compared to the systems list issued by the Equipment Qualification Branch (EQB) and discussed in section 4.1 of this report.

It is recognized that there are differences in nomenclature of systems because of plant vintage and engineering design, therefore, many of these systems may not exist or have different titles. These differences will be addressed in the Safety Evaluation Report (SER) that will be prepared for this site.

3.2 Service Conditions

The service condition accident environment, HELB/LOCA inside containment and HELB outside containment are indicated or discussed in the licensee's report and are based on the FSAR accident analysis and section 4.3 of this report.

3.3 Qualification Documentation

Appendix A is a list of documents (test reports, analysis, letters, etc.) used by the licensee in determining the environmental qualification of plant equipment for Peach Bottom Atomic Power Station Units 2 and 3. These references have been tabulated by the licensee and are indicated on the applicable CES of their report.

4. Technical Evaluation

The basis for the technical evaluation is the information provided by the licensee, Philadelphia Electric Company, for the Peach Bottom 3 site³ and the inspection of the as-installed equipment of the High Pressure Coolant Injection System which is located outside of the containment, IE Inspection Report 50-278/80-25.

Utilizing the information identified in the inspection of Peach Bottom 2 (IE Inspection Report 50-277/80-17) and the licensee's submittal,³ the reviewer assessed its adequacy in relation to the DOR guidelines,⁶ NUREG70588, and the supplement⁴ to IEB 79-01B which provides the Commission's requirements and staff position.

The quality control measures utilized by the licensee included using experienced consultants to perform the tasks required by IEB 79-01B. Independent technical overview of each part of the effort was performed by the licensee's engineering staff. In addition, an extensive review of the final response and sign-off approvals by various levels of the licensee's engineering management was required.

4.1 Identification of Safety-Related Equipment

The licensee reviewed his documentation to establish the systems required to achieve a safe shutdown or provide isolation for the events identified in IEB 79-01B. These systems were then evaluated against the DOR guidelines. The systems identified and included in this evaluation are:

1. Main Steam and Feedwater
2. Automatic Depressurization
3. Reactor Protection
4. Control Rod Drive
5. High Pressure Coolant Injection
6. Residual Heat Removal
 - Low Pressure Coolant Injection Mode
 - Torus Cooling Mode
 - Shutdown Cooling Mode
7. Core Spray
8. Standby Gas Treatment
9. Containment Atmosphere Dilution
10. Steam Leak Detection
11. Radiation Monitoring
12. Emergency Service Water
13. Primary Containment Isolation
14. Electrical Power

The list of systems including those that were excluded was provided to the Equipment Qualification Branch (EQB). The EQB compared the list to a "Q" list developed by the staff and to the lists provided by similar facilities to determine the completeness of the licensee's response.

Based on the information provided by the licensee and the reviewers' comparison, it has been determined that the systems identified are within the guidance provided in Section 3.0 and Appendix A of the DOR Guidelines and are acceptable with this exception:

1. "Q" List

The acceptability of the licensee's list in paragraph 4.1 will be evaluated by the Equipment Qualification Branch (EQB) and addressed in the Safety Evaluation Report (SER) to be issued by February 1981.

4.2 Master List

The licensee developed a master list based on his system evaluation as required by IEB 79-01B. Attachment 1 of the licensee's 90 day response includes a list of references which provided the basis for including or excluding specific components/equipment from having a detailed data work sheet as required by IEB 79-01B.

We have reviewed the supporting basis for the inclusion or exclusion of equipment provided in the references and have concluded that the licensee's letters of March 3, 1980, April 15, 1980 and June 17, 1980 are acceptable.

4.3 Service Conditions

4.3.1 Inside Containment LOCA

The licensee provided temperature and pressure profiles for the Peach Bottom 2 containment resulting from a LOCA. These curves, FSAR Figures 14.6.11 and 14.6.10 are included in the licensee's 90 Day Response Report. The maximum environments identified are:

Temperature: 290oF
Pressure: 42 PSIG
Humidity: 100% R.H.
Chemical Spray: NA
Radiation: 1.8×10^7

The delay time from the event to the initiation of safety injection for the spectrum of breaks is indicated in FSAR profiles figures 14.6.11, 14.6.10, Q5.5.6a and Q5.5.6b and IEB 79-01B 90 day submittal. Depending on the system combination used, the service conditions in the containment will return to levels that existed prior to the event in less than 30 minutes.

4.3.1.1 Radiation

The 1.8×10^7 Radiation level identified by the licensee is less than the 2×10^7 radiation level identified as acceptable in the DOR guidelines, Section 4.1.2. The licensee data sheets indicate that for qualification testing radiation levels higher than the 1.8×10^7 level were used. Components that were tested for less than the required level of radiation will be listed in the Appendix B section of this report.

The reviewer has concluded that the above information is acceptable. The staff's position in relation to radiation analysis is provided in the second supplement to IEB 79-01B. In addition, the supplement expanded the scope to include the environmental effects on electrical equipment being evaluated in accordance to NUREG-0578.

4.3.1.2 Submergence

The licensee identified no equipment below the flood level in the IEB 79-01B response.

4.3.1.3 Chemical Sprays

The licensee stated that no chemical solutions are used in systems required for the accidents presently under consideration. The consideration of chemical sprays is included in Section 4.9 of this report.

4.4 High Energy Line Breaks (HELB)

4.4.1 HELB Inside Containment

The licensee has stated, in their letter of August 26, 1980, that each class IE equipment item located in primary containment was reviewed against the LOCA profiles which are provided in the FSAR and against a 340oF Main Steam Line Break (MSLB) temperature. FSAR question 5.5.6 identifies NEDO 10320 as the analytical model used to evaluate the Loss of Coolant Accident conditions. In the absence of a specific plant MSLB environmental analysis, the 340oF criteria of the Division of Operating Reactors guidelines was used in consideration of the specific equipment operating time requirements.

The acceptance of this approach by the licensee is considered unresolved and is classified as a category IV item.

4.4.2 HELB Outside Containment

The licensee in their August 19, 1980 IEB 79-01B update included the revised environmental equivalent room tabulations. The programs that were used to generate the data for the various areas outside containment are listed in Philadelphia Electric Company's References 62, 63, and 65, Appendix A.

We have concluded, based on the profiles representing the HELB conditions outside containment that the licensee meets the requirements of the DOR guidelines, Section 4.3.1. The acceptability of the licensee's basis for specific equipment subjected to HELBs outside of containment is included in Section 4.9 of this report.

4.4.3 Recirculated Fluids

The licensee indicated that the hostile environments, BLP 21544PBAPS Environmental Conditions Radiation Dose Study, in the various areas containing post LOCA recirculating flows have been reviewed and included as part of the above reference study.

The acceptability of the parameters identified and the basis for specific equipment qualifications are included in Section 4.9 of this report.

4.5 Margins

The DOR Guidelines indicate that special consideration was given to the time required to remain functional when establishing the criteria in Section 5.2 of the guidelines.

The normal operating temperature inside containment is approximately 120oF and the profiles indicate that the temperature returns to 120oF within 27 hours of the event. NUREG-0588, Section 3(4), requires that a type test be for a minimum of 1 hour in duration when the functional requirement is within the first seconds or minutes of an event and the DOR guidelines, Section 5.2, requires that the test duration be at least as long as the period from initiation until the service conditions return to the level that existed prior to the event.

Therefore, any type test that exceeds the functional operability time by 1 hour or longer meets the requirements defined in NUREG-0588 and the DOR guidelines for margin in relation to test duration for this facility.

The other consideration identified in the DOR guidelines in relation to the methods of qualification, other than identified specifically in this report will be addressed in the Safety Evaluation Report (SER) which will incorporate an audit of selected analysis and test reports identified in Appendix A.

4.6 Aging

The licensee indicated that a study of the components subjected to harsh environments is still an outstanding item. Details of the licensee's effort is included in their submittal³.

The licensee has identified the components which are still listed as requiring data.

The DOR guidelines, Section 7, does not require a qualified life to be established for all safety-related electrical equipment, however, the following actions are required:

1. Detailed comparison of existing equipment to the materials identified in Appendix C of the DOR guidelines. The first supplement⁴ to IEB 79-01B requires the licensees to utilize the table and identify any additional materials as the result of their effort.
2. Establish an ongoing program to review surveillance and maintenance records to identify potential age related degradations.
3. Establish component maintenance and replacement schedules which include considerations of aging characteristics of the installed components.

We, therefore, require that the licensee provide the details of a program which will include a continuing effort to obtain data on existing materials and address the actions identified above. In addition, we require the licensee provide a schedule for implementation of the program that identifies problem components.

4.7 Documentation

The second supplement⁴ to IEB 79-01B and the order,⁵ No. CLI-80-21, requires the licensee have the documentation and data identified in the detailed worksheets which supports the qualification of the safety related electrical equipment available for NRC audit. The second supplement⁴ identifies the type of information required and the location where the records are to be maintained.

The staff requests the licensee provide a response to the order and supplement which discusses their compliance and identifies any deviation Reference Appendix C of this report.

4.8 Site Verification Inspection

An inspection of the installed components associated with the High Pressure Coolant Injection System was conducted on October 28-30, 1980 at the Peach Bottom Atomic Power Station, Unit 3. The details of this inspection are documented in IE Inspection Report 50-278/80-25

The detailed identification of the components and the observations recorded will be addressed in the SER which will incorporate an audit of selected analysis and test reports referenced in Appendix A.

4.9 Equipment Data Review

The equipment listed in Appendix B is the status of the latest data submitted by the licensee in their response to IEB 79-01B. Appendix B identifies the licensee data in a format that allows the reviewer a quick look status of each listed component. The first four columns are self explanatory while the next three columns are defined as follows:

- . Environment - The listing in this column identifies the environment that appears to have some question as to whether or not its in compliance with the requirements of the licensee.
- . Category - As listed below a category I through V has been assigned to the environment for a specific component or group of components as listed.
- . Remarks - The remarks column was used to identify the environmental condition associated with the category number, or identify the system location when the licensee indicated that data was being looked for or an analysis was in progress. An example of this lack of data environment information in the licensee submittal is the requirement for aging.

The equipment has been listed and identified in one of the following categories:

- I Qualified for Plant Life
- II Qualified With Restrictions
- III Exempted From Qualification
- IV Qualification of Equipment Unresolved, and
- V Equipment Not Qualified

The number in the () in the component block on the table indicates the number of identical components listed, but may have a different title within the report.

Except for equipment being in different room locations, which is identified by the licensee, the equipment appears to be the same in both units 2 and 3.

4.10 Conclusion

This evaluation is based on the on-site inspection, the information supplied by the licensee in their submittal¹⁰, their FSAR, and the assumption that the Qualification Documentation (Test Reports, Analysis Letters, etc.) are acceptable.

The Region I reviewer using the guidance⁹ and instructions⁸ for the evaluation of licensee's data submittals and the site verification inspections that were performed to verify the IE Bulletin 79-01B, January 1980 data submittal information, finds the licensee to be in accordance with the NRC direction^{4,5} except as listed in Appendix B and C of this report.

The results of this evaluation does not necessarily imply that the equipment is unreliable, unsafe or represents a significant safety issue; it does imply that additional information is required and that the items in Appendix B and C will be evaluated by the Equipment Qualification Branch (EQB) and addressed in the Safety Evaluation Report (SER) to be written for this licensee by February 1981.

5. Licensee Event Reports (LERs)

5.1 The following LER was submitted and documented as follows:

Reference: Docket Nos. 50-277 and 50-278
Report No: LER 2-80-8/IT
Report Date: May 1, 1980
Occurrence Date: April 17, 1980
Reported: To Resident on April 17 and 22, 1980
Facility: Peach Bottom Atomic Power Station, RD1, Delta, PA 17314

Description of Event - Preliminary calculations associated with high energy line breaks as requested in IE Bulletin 79-01B indicated that guillotine failure of the HPCI steam supply piping in the outboard isolation valve room would result in a peak pressure (12 psig) within the room which is in excess of the capabilities of the concrete block wall (7.2 psig). Unit 2 and 3 are of similar design.

A more refined analysis shows that the calculated peak pressure in the outboard isolation valve room of 5.01 psig (4.97 psig if the steam line isolation valves are throttled to 75% closed). Since the ultimate wall pressure capability based on the type of anchor bolts used is approximately 7.2 psig, safety factor of 1.4 exists.

The inspection of the results of the licensee corrective action will be discussed in IEB 80-11.

6. References

1. IEB 79-01B, Memo to V. Thomas (NRC) from A. Finkel (NRC) dated May 2, 1980.
2. EQ Branch Comparison of systems and parameters. (Systems List GE BWR)
3. Philadelphia Electric Company, Revised and Updated Response to IEB 79-01B, dated August 19, 1980.
4. Supplement Information to IEB 79-01B, dated February 29, 1980, September 30, 1980, and October 24, 1980.
5. Order requiring licensees implement requirements of Commission Memorandum and Order of May 23, 1980 (CLI-80-21).
6. Division of Operating Reactors (DOR), "Guidelines for Evaluating Environmental Qualification of Class 1E Electrical Equipment in Operating Reactors", Enclosure 4 to IEB 79-01B.
7. NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety Related Electrical Equipment", dated December 1979.
8. Inspection Requirements for Verifying Reactor Licensee Responses to IE Bulletin No. 79-01B, dated April 25, 1980.
9. IE Support and Review of Environmental Qualification of Electrical Equipment at Operating Reactors, dated October 10, 1980.
10. Philadelphia Electric Company, Responses to IEB 79-01B, dated March 3, 1980, April 15, 1980, August 26, 1980, and October 31, 1980.

APPENDIX
A

TEST REPORTS AND ANALYSIS LISTS

1. Res 5-3 (Qualification Drywell Equipment)
2. G.E. Co. Cover letters G-HE-8-198 and G-HE-9-106
3. ASCO letter 8/17/78
4. Franklin Institute Test Report F-C5022-1
5. Franklin Institute Test Report F-C5022-2
6. Franklin Institute Test Report F-C2750
7. G.E. Co. Cover Letter G-HE-8-153
8. Vendor Print #6280-E106-113-1
9. G.E. Co. Cover Letter G-HE-8-54
10. Vendor Print #6280-E40-124-2
11.
 - a. Limitorque Test Report 600198
 - b. Limitorque Test Report 600376
 - c. Limitorque Test Report 600376A
 - d. Limitorque Test Report B0003
12. Franklin Institute Test Report for Pyle-National Co. F-C3451
13. G.E. Co. Cover Letter G-HE-7-154 (FDI-123)
14. Rosemount Test Summary #3768A
15. Rosemount Report #37327B
16. Burns Engineering Certified Drawing #10528
17. Deleted
18. Deleted
19. Deleted
20. Deleted
21. Deleted
22. Deleted
23. Deleted
24. Deleted
25. Deleted
26. FSAR Fig. 14.6.10 and Fig. Q.5.5.6a
27. FSAR Fig. 14.6.11 and Fig. Q.5.5.6b
28. Bechtel Power Corporation Study
29. FSAR Section 14.6.3. 2
30. Special Study-Operating Requirements for Safety-Related Equipment
31. G.E. Co. Environmental Qualification Test Summary-NSE79013
32. G.E. Co. Environmental Qualification Test Summary-NSE79019
33. G.E. Co. Environmental Qualification Test Summary-NSE79020
34. G.E. Co. Environmental Qualification Test Summary-NSE79022
35. G.E. Co. Environmental Qualification Test Summary-NSE79023
36. G.E. Co. Environmental Qualification Test Summary-NSE79024
37. G.E. Co. Environmental Qualification Test Summary-NSE80002
38. G.E. Co. Environmental Qualification Test Summary-NSE80003
39. G.E. Co. Environmental Qualification Test Summary-NSE80004
40. G.E. Co. Environmental Qualification Test Summary-NSE80005
41. G.E. Co. Environmental Qualification Test Summary-NSE80006
42. G.E. Co. Environmental Qualification Test Summary-NSE80008
43. G.E. Co. Environmental Qualification Test Summary-NSE80010
44. G.E. Co. Environmental Qualification Test Summary-NSE80011
45. G.E. Co. Environmental Qualification Test Summary-NSE80012

46. Amerace Corp. Test Report QTR-TR-2 Rev. A
47. G.E. Co. Cover Letter G-HE-9-146
48. Qualification of Firewall III Class IE Electrical Cable Report
July 7, 1977
49. Rockbestos Company letter from G. S. Buettner to J. J. Ferencsik
50. Franklin Institute Test Report F-C4033-3
51. FSAR Table 6.5.1
52. FSAR Section 14.6.5.1.2
53. FSAR Figures 6.5.1 through 6.5.23
54. FSAR Section 5.3.4
55. Amerace Letter to N. J. Wood (5/13/80)
56. Amerace Spec. EGP
57. GECO Licensing topical report-NEDO-21617-A
58. GECO data sheet 22A1378AB
59. ELMA letter to W. W. Bowers (3/15/77) and Telecon to Mr. Ryland of ELMA
(2/25/80).
60. Viking test report #30592 and Telecon to L. Hane of Topaz (6/7/76)
61. Limitorque letter to W. H. VanBuskirk 2/22/80
62. BLP 21568 PBAPS Environmental Conditions LOCA temperatures
BLP 21606 PBAPS Environmental Conditions HELB Temperatures
63. BLP 21544 PBAPS Environmental Conditions Radiation dose study
64. Appendix "C" NRC Bulletin 79-01B
65. PBAPS MAX LOCA/HELB pressures
66. ASCO letter to W. H. VanBuskirk 6-6-80
67. FSAR Table 7.3.1
68. Rosemount Test Report #12777D
69. ASCO Test Report #AQS-12678/TR, Rev. A
70. Qualification of NAMCO Controls Limit Switch Model EA-740 dated 2-22-79
71. Letter from S. L. Daltroff to B. H. Grier
72. HVAC Design Criteria for Reactor Building, 8/21/73.
73. BLP-21679, Equipment TID
74. FSAR Supplement 1, Section 7.1.7
75. QSR 002-A-01, 002-A-02.
76. Rosemount Analysis-DJT
77. ASCO Analysis (Thermal)-DJT, 10/20/80
78. ASCO Analysis (Humidity)-DJT, 10/20/80
79. GECO NEDO-10698
80. Physical Sciences Analysis-WJC, 10/20/80
81. GECO Specification 22A2928 Rev. 1.
82. SLD Analysis-DJT, 10/21/80
83. QSR-080-A-01
84. Target Rock Corporation Analysis-A. Spector, 10/22/80
85. Bechtel Specification 6280-M-242
86. Delphi Catalog 201-A
87. EPRI NP-1558 Project 890-1 Final Report, 9/80
88. QSR-027
89. QSR-037

90. QSR-029-A-01
91. QSR-032-A-01
92. UL-510
93. 3M Research Report-3410175001-003
94. 3M Report 54C3082
95. QSR-111
96. Agastat Analysis - AS, 10/27/80
97. Dwyer Bulletin E-50

APPENDIX

B

EQUIPMENT STATUS LISTS

Legend:

Notes

The notes referenced in the remarks column of the component evaluation work sheets (CES) reference the licensee's Notes Nos. 1 through 33.

References

The references identified in the remarks column are those listed in Appendix A Nos. 1 through 97.

Component	Manuf.	Part/ Serial No.	Containment		Environment	Category	Remarks
			IN	OUT			
Pressure Switch (2)	Barksdale	B2T-M-12-55		X	Aging Radiation	IV	Note 1 } Requires date of analysis from licensee. Note 3 }
Pressure Switch (8)	Barton	288		X		IV	
Level Indicating Switch (2)	Yarway	4418C		X	Aging	IV	Note 1 Require date of analysis from licensee.
Level Indicating Switch (7)	Rosemont	5100U		X	Time	V	Specification required 15 minutes. Qualification test was for 1 hour. Note licensee comments in Appendix C.
Pilot Solenoid Valve (11)	Automatic Valve Co.	AVC-C-5450	X		Aging	IV	Note 1 Require date of analysis from licensee.
Valve Actuator	Limitorque	SMB-000	X		Temperature	IV	Note 7
Air Manifold (4)	Automatic Valve Co.	-----		X	Aging	IV	Note 1 Require date of analysis from licensee.
Solenoid Valve (Air)(7)	ASCO	18300		X	Time	V	Specification requires 10 seconds operating. Qualification test was for 10 seconds. Did not meet 1 hour test time.

POOR ORIGINAL

Component	Manuf.	Part/ Serial No.	Containment		Environment	Category	Remarks
			IN	OUT			
Inverter (2)	TOPAZ	5006ZR		X	Aging	IV	Note 29
Power Supply (2)	ELMA	5965-3, 4		X	Time Aging	IV IV	Qualification time not specified. Note 29
Pressure Switch (12)	Static-O-Ring	12N-AA4		X	Time Pressure	IV IV	Note 1 } Require date of analysis from licensee. Note 4 }
Solenoid Valve (2)	GECO/ASCO	HVA-9040 5-2J		X	Time	V	Specification requires 80 seconds of qualification test was for 80 seconds. Did not meet 1 hour requirement.
Pressure Switch (4)	Barksdale	PIH-M340 SS-V		X	Radiation Aging	IV	Note 3 } Require date of analysis from licensee. Note 1 }
Pressure Switch (14)	Static-O-Ring	5N-AA3		X	Radiation Aging	IV IV	Note 3 } Require date of analysis from licensee. Note 1 }
Flow Switch (3)	Barton	289		X	Radiation Aging	IV IV	Note 3 } Require date of analysis from licensee. Note 1 }
Flow Transmitters	GECO	553122		X	All	IV	Note 13
Level Switch (2)	Robertshaw	R3035-A2		X	Radiation Aging	IV IV	Note 3 } Require date of analysis from licensee. Note 1 }

12/10/00 80009

POOR ORIGINAL

Component	Manuf.	Part/ Serial NO.	Containment		Environment	Category	Remarks
			IN	OUT			
HPCI Pump/Turbine (2)	GECO	--		X	All	IV	Note 13
Diff. Press. Ind. Switch (6)	Barton	288A		X	Radiation	IV	Note 3) Require date of analysis from licensee. Note 13
					Time	IV	Specification required test time of 101 days. Qualification time was 2 hours.
Pump Motor (4)	GECO	5K6348		X	Radiation	IV	Note 3 Require date of analysis from licensee.
Valve Actuator (6)	Limatorque	SMB-2-40		X	All	IV	Note 7
Valve Actuator	Limatorque	SMB-4-200		X	Radiation	IV	Note 3 Require date of analysis from licensee.
Valve Actuator	Limatorque	SMB-4	X		Temperature	IV	Note 20 Require date of inspection from licensee.
Valve Actuator (2)	Limatorque	SMB-4-150		X	All	IV	Note 7
Valve Actuator (2)	Limatorque	SMB-5T-350		X	All	IV	Note 7

POOR ORIGINAL

Component	Manuf.	Part/ Serial No.	Containment		Environment	Category	Remarks
			IN	OUT			
Valve Actuator (2)	Lim'orque	SMB-3-80		X	All	IV	Note 7
Diff. Press. Switch (20)	Dwyer	1627-1		X	Time Temp Pressure RH Radiation Aging	IV IV IV IV IV IV	Note 6, 23, 30 Note 23, 30 Note 23, 30 Note 23, 30 Note 3, 23, 30 Notes 1, 23, 30 Require schedule from licensee.
Pneumatic-Elect Switch (2)	Johnson	P-7230		X			Note 9 Require schedule from licensee.
Heater	American Air Filter	--		X	Time Temperature Pressure RH Radiation Aging	IV IV IV IV IV IV	Note 22 Note 22 Note 22 Note 22 Notes 3, 22 Notes 1, 22
Fan Motor (2)	GECO	5K326		X	Time Temp Pressure RH Radiation Aging	IV IV IV IV IV IV	Note 13 Note 13 Note 13 Note 13 Note 13 Notes 1, 13

POOR ORIGINAL

Component	Manuf.	Part/ Serial No.	Containment		Environment	Category	Remarks
			IN	OUT			
Solenoid Valve (19)	ASCO	8316		X	Time	V	Specification for time was 15 minutes. The qualification time was 15 minutes.
Solenoid Valve (4)	ASCO	8329		X			
Solenoid Valve (19)	ASCO	830064-3 8300651		X	Time	V	Specification for time was 1 minute. The qualification test time was 1 minute.
				X	Time	V	
Analyzer Rack (4)	Comsfp/ Delphi	K1		X	Aging	IV	Note 1 Require date of analysis from licensee.
Temperature Element (28)	Burns Engineering	PIA1-S ₂ 2A-DUAL		X	All	IV	Qualification was performed using the analysis method for all environments. Reference licensee nos. 62 and 82.
Radiation Element (8)	GECO	194Y927		X	Time	IV	Notes 6, 13
					Temp	IV	Note 13
					Pressure	IV	Note 13
					RH	IV	Note 13
					Radiation	IV	Note 13
					Aging	IV	Note 13
Area Cooler (18)	Joy, H.K. Porter	1000		X	All	IV	Notes 3 ² , 16. Require schedule from licensee.

10009
 10009

POOR ORIGINAL

Component	Manuf.	Part/ Serial No.	Containment		Environment	Category	Remarks
			IN	OUT			
Control Station Switch	GECO	CR-2940 UB203W		X	Radiation	IV	Note 3 Require date of analysis from licensee.
Time Delay Relay (4)	Apastat	--		X	All	IV	Note 30 Require schedule from licensee.
AUX Relay (63X System)(4)	GECO	CR120		X	Radiation Aging	IV	Note 31 Require schedule from licensee. Note 31
Valve Actuator	Limatorque	SMB-000	X		Temperature	V	Note 18 Require schedule from licensee. Plant ID No. MO-2-13-15.
Air Operated Solenoid Valve	Atkomatic	DYNO-15- 644		X	All	IV	Note 9 Require schedule from licensee Total of (15) Valves.
	Atkomatic	DYNO-15- 644B		X	All	IV	
	Atkomatic	DYNO-15- 633C		X	All	IV	
Low Voltage Power - (8) Control Penetration	GECO	100		X	Aging	IV	Note 1 Require schedule from licensee.

POOR ORIGINAL

207 data sheet

11/11/90 10009

Component	Manuf.	Part/ Serial No.	Containment		Environ- ment	Category	Remarks
			IN	OUT			
Load Center (4)	ITE	--		X	Time Temp Pressure RH Radiation Aging	IV IV IV IV IV IV	Note 6 Note 14 Note 14 Note 14 Note 14 Note 1 Require schedule from licensee.
Motor Control Center (8)	Cutler/Ham- mer	Unitrol Type B		X	Time Temp Pressure RH Radiation Aging	IV IV IV IV IV	Note 6 Note 14 Note 14 Note 14 Note 14 Note 1 Require schedule from licensee.
Terminal Blocks	Marathon	1600	X	X	Aging	IV	Note 1
Sealant	Scotch	Scotch/Kot	X	X	Aging	IV	Note 1 Require schedule from licensee.
Tape	Scotch	70	X	X	Aging	IV	Note 1
Terminal Blocks	GECO	CR-151	X	X	Radiation Aging	IV IV	Note 3 Note 1 Require schedule from licensee.

POOR ORIGINAL

Notes

1. Aging was not previously considered, however, an analysis will be performed.
2. An environmental analysis for outside primary containment HELB accidents is being conducted and is scheduled for completion by April 10, 1980.
3. Radiation was not included in original qualification tests, however an analysis will be performed. Radiation TL_d at the device will be determined.
4. Pressure was not included in original qualification tests, however, an analysis will be performed.
5. Relative humidity was not included in original qualification tests, however, an analysis will be performed.
6. Operating Time Specification will be identified later.
7. Limitorque is researching qualification of actuator.
8. These limit switches will be replaced with NAMCO EA-740 limit switches.
9. This equipment will be replaced.
10. ASCO will be requested to supply applicable documentation.
11. This equipment will be relocated.
- 12.
13. GECO has been requested to provide documentation or perform an analysis for this equipment.
14. Letter has been sent to Cutler Hammer requesting documentation.
15. Comsip Delphi has been requested to supply documentation (10/4/79).
16. An analysis will be performed.
17. ASCO solenoid valve will be replaced.
18. Limitorque actuator motor will be replaced. The environmental qualification values listed for this actuator do not apply to the drive motor.

19. Limitorque actuator will be inspected to verify that components are nuclear In-Containment grade.
20. Limitorque actuator will be inspected to determine if intermittent gear frame is bronze. Zinc or aluminum gear frame assemblies will be replaced with bronze gear frame assemblies.
21. Johnson Controls will be requested to supply applicable documentation.
22. American Air Filter will be requested to supply applicable documentation.
23. Dwyer will be requested to supply applicable documentation.
24. H. K. Portor will be requested to supply applicable documentation.
25. Target Rock Corp. will be requested to supply applicable documentation.
26. See specification documentation reference.
27. Table C-1 of the DOR Guidelines indicates there is no known radiation degradation below $1.0E4$ rads.
28. A comparison of the materials used in this device with those listed in Table C-1 of the DOR Guidelines indicates there is no thermal degradation for the conditions to which this equipment is subjected.
29. The equipment has been relocated to a benign environment area and no additional review will be included under the scope of IE Bulletin 79-01B.
30. A modification will be initiated to eliminate the ESW differential pressure switches (Dwyer 1627-1) and the Agastat time delay relays.
31. The application of the G.E. CR 120 relays will be modified to fail safe operation.
32. This device contains no pressure sensitive components.
33. Reliance Electric has been requested to supply applicable documentation. Purchase order has been issued 10/9/80.

APPENDIX

C

LICENSEE EXCEPTIONS

The following is a direct quote from the licensee's letter of October 31, 1980.

The conditions considered in our review are steam line break (SLB) or loss of coolant accident (LOCA) in primary containment and high energy line break (HELB) in secondary containment.

All Class 1E equipment located in primary containment has been reviewed, and the results show that this equipment is environmentally qualified for a SLB or LOCA. The Class 1E equipment inside primary containment has been qualified to 340oF for the time period required to mitigate the effects of the postulated accidents. Although all this equipment is required for only a short time, it has been qualified for a minimum of one hour.

All Class 1E equipment located in secondary containment has been reviewed and documentation is available to support the environmental qualification for most of this equipment.

In addition to the systems which have a majority of equipment located in secondary containment, several additional systems with equipment that is located primarily outside containment is available to mitigate the effects of the postulated accidents. Those systems include Condensate/Feedwater High Pressure Service Water and Control Rod Drive. These systems could be used in conjunction with the Safety Relief Valves to achieve safe shutdown during post accident conditions.

The LOCA and HELB temperature analyses used to generate the temperature profiles for our review are based on assumptions which include loss of normal ventilation, a three hour linear decay of heat rejection from all normally operating plant equipment, continuous heat rejection from all safety related equipment, and an initial 95oF outside air temperature coincident with the postulated accident.

The HELB accidents considered in our review are listed below:

1. Main Steam Line Break
2. HPCI Steam Line Break
3. RCIC Steam Line Break
4. Feedwater Line Break
5. Reactor Water Cleanup Break

A review of the LOCA and HELB temperature profiles for the HPCI, RCIC, RHR, Core Spray and Standby Gas Treatment System equipment rooms indicates that the room temperatures are substantially below the normal operating design temperature limits. Exception to this would occur when a SLB is postulated in the RCIC or HPCI equipment rooms because a steam line break would prevent the operation of the turbine driven pumps causing the respective systems to be inoperable. Therefore, it can be concluded that the equipment in these rooms would be available under the postulated accidents except for the conditions stated above for the HPCI and RCIC rooms.

The LOCA and HELB temperature profiles are based upon very conservative assumptions. The HELB temperature profiles for the secondary containment equipment rooms represent the worst case conditions which result from a particular HELB accident. The HELB profiles are not the environmental effect of a single postulated accident, but rather, they are the effect of the spectrum of each of the postulated system line breaks. This spectrum includes several break locations for each of the system line breaks.

The environmental specifications listed on the component evaluation work sheets for secondary containment are conservative because they represent the composite bounding conditions for the reviewed accidents. The HELB accident temperatures and pressures for a given room are not necessarily the result of the same accident and the radiation dose reflects the post-LOCA total integrated dose. This basis for establishing environmental specifications results in further conservatism in our evaluation.

The effect of the peak HELB temperatures on equipment is mitigated by the short duration of the peak and by the heat transfer characteristics of the construction materials resulting in lower effective peak temperatures. A study is available to demonstrate that equipment temperatures due to HELB transients will not exceed the area saturation temperature. Since HELB pressure transients exist for only a few seconds, equipment temperatures would not exceed 212°F which corresponds to the saturation temperature at atmospheric pressure.

Also it should be noted that our review indicates that equipment located in secondary containment need not maintain its pressure integrity with respect to ambient pressures and therefore qualification of secondary containment equipment for the HELB pressure conditions is not significant.

A review of the installed PBAPS Class 1E equipment application indicates that the equipment is of high industrial quality. The design and purchase specifications for this equipment were in accordance with applicable NEMA and IEEE industry standards which existed at the time of purchase.

Even considering the conservatism of the HELB analyses, it is estimated that Class 1E equipment inaccessibility due to the postulated accidents would be approximately 3 hours or less. Therefore, we believe the ability to perform maintenance in a reasonable amount of time is an important factor in assessing the operability of equipment during post-accident conditions.

In conclusion, a failure-modes-and-effects analysis of the Class 1E equipment required to mitigate the postulated accidents has been conducted in concert with the considerations identified above, and it is our judgment that the remaining items do not constitute undue risk to the public health and safety. Philadelphia Electric Company has work which is actively in progress to resolve the outstanding items as expeditiously as possible.

APPENDIX

D

TMI MODIFICATIONS

JAN 19 1970

The TMI modifications for Peach Bottom 2 are listed in this Appendix but the component data sheets were not supplied by the licensee. Reference Appendix C for licensee status on the TMI modifications effort.

POOR ORIGINAL

Peach Bottom Atomic Power Station
Unit # 3
Class 1E Equipment List

System: TMI Modifications

Item No.	Equip. ID No.	Generic Name	Location	
			Inside Pri.Cont.	Outside Pri.Cont. Room #
M575-1	PoAm-2-70A	Acoustic monitor pre-amp	-	257
M575-1	PoAm-2-70B	"	-	257
M575-2	PoAm-2-71A	"	-	257
M575-2	PoAm-2-71B	"	-	257
M575-2	PoAm-2-71C	"	-	257
M575-2	PoAm-2-71D	"	-	257
M575-2	PoAm-2-71E	"	-	257
M575-2	PoAm-2-71F	"	-	257
M575-2	PoAm-2-71G	"	-	257
M575-2	PoAm-2-71H	"	-	257
M575-2	PoAm-2-71J	"	-	257
M575-2	PoAm-2-71K	"	-	257
M575-2	PoAm-2-71L	"	-	257
M575-3	PoT-2-70A	Acoustic monitor sensor	X	-
M575-3	PoT-2-70B	"	X	-
M575-4	PoT-2-71A	"	X	-
M575-4	PoT-2-71B	"	X	-
M575-4	PoT-2-71C	"	X	-
M575-4	PoT-2-71D	"	X	-
M575-4	PoT-2-71E	"	X	-
M575-4	PoT-2-71F	"	X	-
M575-4	PoT-2-71G	"	X	-
M575-4	PoT-2-71H	"	X	-
M575-4	PoT-2-71J	"	X	-