YANKEE ATOMIC ELECTRIC COMPANY

Telephone 617 872-8100

1671 Worcester Road, Framingham, Massachusetts 01701

2.C.2.1
FYR 81-132

September 8, 1981

United States Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Mr. Darrell G. Eisenhut, Director
Division of Licensing

References: (a) License No. DPR-3 (Docket No. 50-29)
(b) USNRC Letter to YAEC dated May 29, 1981
(c) YAEC Letter to USNRC dated October 31, 1980 (WYR 80-119)

Subject: Environmental Qualification of Safety-Related Electrical Equipment

Dear Sir:

Your letter, Reference (b), transmitted the Safety Evaluation Report (SER) for the environmental qualification of safety-related electrical equipment at Yankee Rowe, and requested that we provide information identified in sections 3 and 4 of the SER. This letter forwards the requested information and the responses below are keyed to the corresponding sections of the safety evaluation.

Section 3.1 Completeness of Safety-Related Equipment

It should be noted that information associated with cold shutdown equipment and TMI lessons-learned modifications (discussed in Section 5 of the SER) was submitted in our report, Reference (c).

With regard to the concern identified by Franklin Research Center (FRC) in Appendix D of the Technical Evaluation Report (TER) relative to exposed cables in containment, it should be noted that there are no exposed cables in the Yankee Rowe containment with the insulation materials of concern. All cables are either mineral insulated cables or are in conduits.

Section 3.2 Service Conditions

No response required.

Section 3.3 Temperature, Pressure, and Humidity Conditions Inside Containment

A saturation temperature profile has been plotted corresponding to the containment pressure profile. This profile has been added to Figure III.1-1 and has been labeled T_{sat}. This curve was generated in response to Reference (b) to account for higher than average temperatures in the upper regions of the containment because of potential stratification.

A046
S. 1/11

Due to the unique spherical shape of the YR containment, none of the components are located in the upper regions, and most components are outside the shield wall. The components within the shield wall are located at very low elevations or operate very quickly for protective functions. Therefore, we consider the use of T_{sat} for equipment qualification to be inappropriate at YR. However, we have compared T_{sat} profiles to the test profiles of equipment in containment and find that equipment tests generally envelope the T_{sat} profile.

Section 3.4 Temperature, Pressure, and Humidity Conditions Outside Containment

Appendix III.2 of Reference (c) establishes the service conditions for equipment outside of containment. As discussed in Appendix III.2, all areas outside of containment where high energy line breaks (HELB) could be postulated were evaluated to determine what safety-related equipment in those areas would be subjected to the resulting harsh environment. It was determined that for all HELB outside containment, the safety related electrical or instrumentation equipment subjected to the resulting hostile environment was not required to mitigate the consequences of the pipe break. All of the electrical and instrumentation equipment required to mitigate the consequences of each pipe break is located in areas where the environment is not affected by the pipe break. Therefore, all of the areas outside of containment were considered to be mild areas.

A summary of the various HELB and the equipment in the area from the Master List of Reference (c), Appendix I affected by the resultant harsh environment is compiled as Attachment (A). Based on the information contained in Attachment (A), none of this equipment is required to mitigate the consequences of the various HELB considered.

Section 3.5 Submergence

No response required.

Section 3.6 Chemical Spray

No response required.

Section 3.7 Aging

The aging aspects of equipment in harsh environments have been addressed by reviewing the documentation references and determining (1) if the thermal aging parameters chosen and used in the tests are supported by adequate documentation or references, (2) if radiation aging was addressed, (3) if humidity aging was addressed, (4) if ambient vibration aging was addressed, (5) if a qualified life is explicitly stated, (6) if the aging tests and/or analysis results support the conclusion as to qualified life and if the conclusion is adequately documented, and (7) if maintenance requirements or component replacement intervals are specified. When all of the aging aspects which are required by the DOR

Guidelines and applicable to the specific components have been addressed, the qualified life is entered on the component worksheet and any special requirements for maintenance or replacement are entered on the qualification document review form for use in the equipment maintenance and replacement program.

In cases where any of the above review items have not been addressed in the qualification documentation references, each applicable item (as evaluated on the document reference checklist) is addressed individually by use of materials evaluation using Appendix C of the DOR guidelines, available literature on materials properties, or results of testing on similar materials. If aging test results do not provide adequate justification for qualified life, an Arrhenius evaluation is performed to demonstrate or confirm that the required test time at elevated temperature to achieve qualfied life exposure is exceeded by the actual test time. When pre-aging tests have not been performed, a thermal aging analysis is performed using manufacturer's material data and activation energy data from reports and reference library data. When these analyses indicate a qualified life that is less than the required, any special maintenance, surveillance, or replacement requirements are noted on the review form.

As a result of the aging qualification reviews, as described above, it is evident that two situations relative to qualified life will evolve. In the first case, equipment has been tested, including pre-aging, and/or analyzed, and a qualified life of 40 years has been established. For the remaining equipment, testing, analysis, or manufacturers' recommendations have determined that the qualified life is less than 40 years.

To assure timely replacement of those components or materials which have a qualified life of less than 40 years, plant maintenance programs will include provisions for replacement scheduling. When parts are replaced, assurance of maintaining the accepted level of qualification of the affected equipment is provided by use of the procurement policies endorsed by the AIF's position paper on replacement parts and by the plant's approved quality assurance program.

For components which have a relativley long qualified life (greater than 10 years), the accuracy of the predicted life will be verified by including provisions in plant maintenance and surveillance programs to determine the presence of advanced age related degradation. Depending on the equipment involved (complexity, amount of age sensitive materials involved, normal operating environment, etc.), the program will include those features of the following which are considered necessary to track aging conditions of that type of equipment.

- Periodic visual inspection of materials in the equipment which are subject to aging degradation.

- Periodic review of maintenance records by engineering personnel to detect trends of failures caused by material degradation.

- Periodic testing of insulation integrity on representative samples of categories of equipment (motors, solenoid, etc.).

- Periodic review of operating and maintenance records not related to failures (operating temperatures, calibration records, etc.)

The intervals for the periodic actions will be selected by giving consideration to the predicted qualified life, operating mode of the equipment, accessibility, and existing maintenance and surveillance schedules. It is anticipated that this program will be incorporated by modifications to existing programs, and the program will be in effect before the deadline for equipment qualification.

Section 3.8 Radiation (Inside and Outside Containment)

Figure 1 in Attachment B shows, by comparison, that the Yankee Gamma Dose Model is more conservative than the DOR Guidelines by 20%.

The Yankee model for both Beta and Gamma dose is a target at the center of a spherical cloud having the volume of the containment. The guidance developed by Yankee for post-LOCA radiation dose specifications (Table 1 of Attachment B) includes a margin of safety. Table 1 (Attachment B) includes credit for shielding and equipment location. The lowest 1 year dose in the containment is 2.4×10^6 R (against the inside wall of the steam generator cubicle) which assumes the airborne source term in the cubicle is the major contributor.

Section 4 Qualification of Equipment

Appendix B of the SER identifies equipment requiring additional information and/or corrective action. Attachment C provides the resolution of these items, including updated worksheets and proposed corrective actions for outstanding items. For items which are located in mild environments except for their radiation service environment, items related to TMI and shutdown cooling, and some new items in both of these categories; YR has continued their review of these items as suggested by FRC in the TER, and has included updated or new worksheets in Attachment C. These items are listed on pages E-1 and E-2 of the item-by-item resolution sheets.

Appendix C of the SER identifies equipment which is considered to be conditionally acceptable, subject to the staff concern identified in Section 3.7 of the SER relative to an aging program. The resolution of this concern is provided by the program described previously in the response to Section 3.7.

Several items were installed during the recent refueling outage for which qualification documentation is being assembled. These items include the reactor head and pressurizer vent motor operated valves, a new pressurizer wide range level transmitter, and pressure switches on the NRV actuation system. The new worksheets will be submitted upon completion.

Quality Assurance

The quality assurance for the calculations, analyses, and design changes necessary to resolve the environmental qualification of safety-related electrical equipment was in accordance with the requirements of the YAEC Operational Quality Assurance Program (YOQAP-1-A).

We trust this information is satisfactory; however, if you have any questions, please contact us.

Very truly yours,

YANKEE ATOMIC ELECTRIC COMPANY

J. A. Kay

James A. Kay
Senior Engineer - Licensing

JAK:dad

ATTACHMENT A

High Energy Line Breaks Outside Containment

1. Feedwater Line Breaks

a) Feedline break outside the turbine building--

A feedline break in this area will not produce a harsh environment as this piping is outside and not in an enclosed area. Also, none of the equipment on the Master List of Reference (c), Appendix I is located in this area.

This break can be isolated by valves located in the turbine building. All of the normal and emergency feedwater equipment will be available to supply feedwater to the intact feedlines.

b) Feedline break inside the turbine building--

The following equipment from the Master List of Reference (c), Appendix I is located inside the turbine building:

1. containment isolation system solenoid operated valves

2. emergency feedwater flow indication flow elements and transmitters

3. emergency radiation monitors

None of this equipment is required to mitigate the consequences of this feedline break. Containment isolation is not initiated nor required for this transient. If any of the affected solenoid operated valves cause a valve isolation, the plant emergency systems will still function since they are designed to function with a complete containment isolation. Emergency feedwater flow indication is backed-up by steam generator level indication, the equipment for which is not located in the turbine building. Emergency radiation monitors are not required for this line break.

This break can be terminated by securing the normal feed pumps. Emergency feedwater can be supplied by the emergency feed pumps through the alternate feed path, all of which is located in the primary auxiliary building.

2. Steamline Breaks

a) Steamline break outside the turbine building, upstream of the non-return valves--

A steamline break in this area will not produce a harsh environment as this piping is outside and not enclosed. This break will result in the blowdown of one steam generator, leaving the other three available for decay heat removal. Also, all emergency equipment will be available since none of the equipment from the Master List Reference (c), Appendix I is located in this area.

b) Steamline break outside the turbine building, downstream of the Non-return valves--

The same discussion as above in 2(a) applies here. However, the non-return valves will function automatically to isolate all four steam generators, terminating the break and leaving them all available for decay heat removal.

c) Steamline break inside the turbine building--

The discussion for the feedline break inside the turbine building, 1.(b), also applies here. The break will be isolated automatically by the non-return valves, leaving all four steam generators available for decay heat removal.

3. Steam Generator Blowdown Line Break

A break in a steam generator blowdown line will result in the slow blowdown of one steam generator into the upper level of the primary auxiliary buidling; the size of this line is only 2 inches. This break will cause temperature actuated quick acting dampers to open and vent the upper level of the primary auxiliary buidling, preventing the creation of a harsh environment in any other section of the primary auxiliary building.

The following equipment from the Master List of Reference (c), Appendix I is located in the upper level of the primary auxiliary building:

1. containment isolation system solenoid operated valves

2. pressure switches for containment isolation actuation

3. pressure transmitter for vapor container pressure indication

4. vapor container pressure indicator

None of this equipment is required to mitigate the consequences of a blowdown line break since it is outside containment, and all of the affected equipment is part of the containment isolation system. If the harsh environment resulting from this break causes an inadvertent containment isolation, the plant emergency systems will still function since they are designed to function with a complete containment isolation.

ATTACHMENT B

TABLE 1

One-Year Integrated Dose In and Around The Primary Containment Due to the Design Basis LOCA

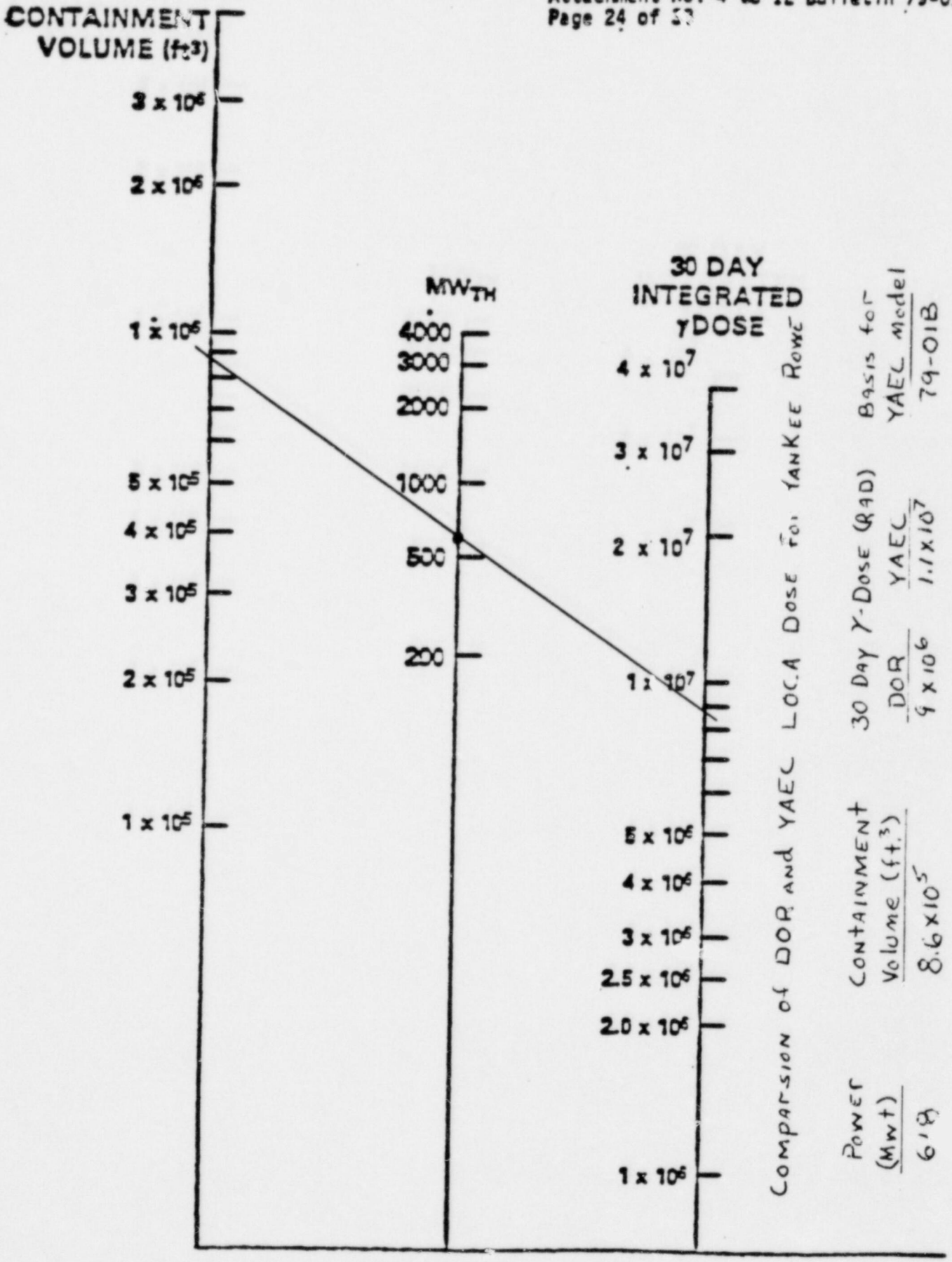
This table of doses is for equipment qualification and may be used to specify the maximum dose at a location provided that:

1. The location will not be immersed in water (i.e., must be above elevation 1058 if in containment),
2. The location is more than two feet from the surface of any recirculati fluid pipe,
3. The normal operating dose rate is less than 2R/hr,
4. The location is more than one meter from a pool of water, and the pool is less than one centimeter deep.

If any one of these conditions is not met, a special analysis has to be made.

	Applicability	One-Year Dose
A.	Any area in primary containment	1 x 10↑8↓ Rad
B.	Same as A., but shielded by a vapor-tight enclosure of at least 20 gauge steel	2 x 10↑7↓ Rad
C.	Same as B., but against a concrete surface which is more than 2 feet thick	1 x 10↑7↓ Rad
D.	Same as B., but outside the biological shield	5 x 10↑6↓ Rad
E.	Any area in the steam generator cubicles, shielded by 2 feet of concrete from containment	5 x 10↑6↓ Rad
F.	Any location from the outside surface of the containment out to 10 meters	5 x 10↑6↓ Rad

FIGURE 1
NOMOGRAM FOR CONTAINMENT VOLUME AND REACTOR POWER
LOCA DOSE CORRECTIONS*



Comparsion of DOR and YAEC LOCA Dose for YANKEE Rowe

Power (Mwt)	Containment Volume (ft.³)	30 Day γ-Dose (RAD) DOR	YAEC	Basis for YAEC model
619	8.6×10^5	9×10^6	1.1×10^7	79-01B

*YSLB ACCIDENT DOSES SHOULD BE READ AS A FACTOR OF 10 LESS

ATTACHMENT C

YANKEE ROWE

NOTES FOR DEFICIENCIES

R - Radiation
T - Temperature
QT - Qualification time
RT - Required time
P - Pressure
H - Humidity
CS - Chemical spray
A - Material aging evaluation, replacement schedule, ongoing equipment surveillance
S - Submergence
M - Margin
I - HELB evaluation outside containment not completed
QM - Qualification method
RPN - Equipment relocation or replacement, adequate schedule not provided
EXN - Exempted equipment justification inadequate
SEN - Separate effects qualification justification inadequate
QI - Qualification information being developed
RPS - Equipment relocation or replacement schedule provided

NOTES FOR RESOLUTIONS

1. Qualification documents associated with this piece of equipment have been evaluated and have been found to meet the intent of the applicable standards and is therefore qualified. (Refer to latest revision of 79-01B worksheet.)

2. Equipment deleted from master list because it already has been replaced.

3. Due to advances in equipment design, this equipment is slated to be replaced during the next available outage consistent with equipment delivery time requirements.

4. The aging program described in the body of the cover letter (Section 3.7) responds to the NRC concern.

5. TMI Items

6. Qualification testing is currently being conducted on this piece of equipment. Upon completion of testing, reports will be reviewed to provide adequate qualification documentation.

RESOLUTION OF SER APPENDIX B ITEMS

NUM	KEY#	REF	EQUIPMENT	MANUFACTURER	MODEL	DEFICIENCY	RES
001B	0351	AR1	MOTOR	WESTINGHOUSE	72Y51238	QI,QM,A	1
002B	0531	SI9	MOV	LIMITORQUE	SMA-2	QI,A	1
003B	0531	SC1	MOV	LIMITORQUE	SMA-1	QI,A	1
004B	0951	J18	TERMINAL BLOCK	WESTINGHOUSE	542247	QI,A,QM,R	1
005B	1053	J19	ELECTRICAL PENETRATION	CHICAGO BRIDGE & IRON	UNK	QI,A,QM,QT,R	3
006B	0122	FW4	TRANSMITTER	FISCHER & PORTER	13D-2495-J BNS	QI,QM,QT,M	3
007B	0404	(R) HV1	SOLENOID	ATKOMATIC	32861-CV	QI	3
008B	0647	MC10	THERMOCOUPLES	THERMO-ELECTRIC	UNK	QI,A	6
009B	0242	SI6	PRESSURE SWITCH	STATIC-O-RING	7828-100	QI,R,M	3
010B	0136	MC4	TRANSMITTER	ROSEMOUNT	1152	RPN	1

RESOLUTION OF SER APPENDIX C ITEMS

NUM	KEY#	REF	EQUIPMENT	MANUFACTURER	MODEL	DEFICIENCY	RES
011C	0138	AM2	TRANSMITTER	ROSEMOUNT	1153A	A	4
012C	0138	AM3	TRANSMITTER	ROSEMOUNT	1153A	A	4
013C	0840	J23	CABLES	ROCKBESTOS	UNK	A	4
014C	0840	J24	CABLE	ROCKBESTOS	FIREWALL III	A	4
015C	0814	J25	CABLE	CONTINENTAL WIRE & CABLE	UNK	A	4
016C	0138	MC3	TRANSMITTER	ROSEMOUNT	1153GA9	A	4
017C	0138	PR1	TRANSMITTER	ROSEMOUNT	1153GA9	A	4
018C	0854	J20	CABLES	GENERAL CABLE	UNK	A	4
019C	0815	J32	CABLE	COLLYER CABLE	UNK	A	4
020C	0836	J33	CABLE	OKONITE	UNK	A	4
021C	0854	J34	CABLE	GENERAL CABLE	UNK	A	4
022C	0531	SI8A	MOV	LIMITORQUE	SMB-1	A	4
023C	0531	SI8B	MOV	LIMITORQUE	SMB-00	A	4
024C	0531	SI8C	MOV	LIMITORQUE	SMB-000	A	4
025C	0855	J17	CABLE	MANHATTAN	UNK	A	2
026C	0856	J21	CABLE	SIMPLEX WIRE & CABLE	UNK	A	2
027C	0856	J22	CABLE	SIMPLEX WIRE & CABLE	UNK	A	2

RESOLUTION OF ADDITIONAL ITEMS

NUM	KEY#	REF	EQUIPMENT	MANUFACTURER	MODEL	DEFICIENCY	RES #
028E	2450	AM-1	RAD. DET. & CABLE	VICTOREEN	RM-130,RM-131	QI	5
029E	0351	CC-1	MOTOR	WESTINGHOUSE	P-20-1,P-20-2	QI	1
030E	2062	EPS-1	BATTERY	C&D	BATTERY #3	QI	1
031E	1951	EPS-2	BATTERY SWITCHBOARD	WESTINGHOUSE		QI	1
032E	0725	EPS-3	480V SWITCHGEAR	GE		QI	1
033E	0751	EPS-4	480V MCC	WESTINGHOUSE	MCC-2	QI	1
034E	1810	PR-6	ACOUSTIC ACCEL.	BABCOCK & WILCOX	PR-ZE-1A PR-ZE-1B PR-ZE-1C	QI	5
035E	1810	PR-7	ACOUSTIC TRANS.	BABCOCK & WILCOX	PR-ZE-1A PR-ZE-1B PR-ZE-1C	QI	5
036E	0351	SC-2	MOTOR	WESTINGHOUSE	P-19	QI	1
037E	0363	SI-4	MOTOR	ELECTRIC MACH.	P-48-1,P-48-2, P-48-13	QI	1
038E	0325	SI-5	MOTOR	GE	P-49-1,P-49-2, P-49-3	QI	1
039E	0856	J-26	POWER CABLE	SIMPLEX CO.	BUTYL/PVC	QI	1

NUM	KEY#	REF	EQUIPMENT	MANUFACTURER	MODEL	DEFICIENCY	RES
040E	2228	J-27	CONTACTOR	ITE/GOULD	A103C12 & 2032-T3	QI	1
041E	2251	J-28	MOTOR STARTER	WESTINGHOUSE	A210MICAT	QI	1
042E	0856	J-29	CONTROL CABLE	SIMPLEX CO.	PE/PVC	QI	1
043E	1051	J-31	PENETRATION	WESTINGHOUSE	N/A	QI	1
044E	0751	J-35	MOTOR CONTROL CENTER	WESTINGHOUSE	N/A	QI	1
045E	1012	J-36	CONNECTION SEAL	CONAX	N/A	QI	1
046E	0965	J-37	TERMINAL BLOCK	MARATHON	6012-B	QI	1

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Simul. Test and Eng. Analysis	--
Temperature	Fig. III.3-1	Fig. IV.3-16	101	104	Simultaneous Test	--
Pressure	Fig. III.3-1	Fig. IV.3-16	101	104	Simultaneous Test	--
Relative Humidity	100%	100%	Note 2	104	Simultaneous Test	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	2×10^7R	2×10^8R	107	104	Sequential Test	--
Aging	40 years	40 years	Note 3	Note 4 104	Seq. Test and Eng. Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Radiation Detector and Cable

Manufacturer:
Victoreen

Model or Type:
877

Accuracy:
Specified:
Demonstrated:

Location:
Area: Vapor Container
Elevation: Various

Flood Level:
Elevation: 1057'
Above Flood Level: Yes

System:
Accident Monitoring (TMI)

Function (See Appendix IV.2-23):
High Range Radiation

Service:
RM-130, RM-131

Associated Components:
J-31 Penetration Assembly - Westinghouse

APPENDIX II

NOTES:

(1) A long-term operating requirement of one year has been assumed.

(2) 100% relative humidity has been assumed due to saturated steam conditions.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

DOCUMENTATION REFERENCES:

101 YAEC Letter to NRC, dated May , 1980.
YAEC Letter to NRC, dated June 5, 1980.

104 YAEC Qualification Document Review Package #QDR-5435-104-2450 which includes the following documents:

a) Qualification Type Test Data Report for Class 1E Victoreen High Range Containment Radiation Area Monitor System.

107 YAEC Report #1253, "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1981.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Simul. Test and Eng. Analysis	--
Temperature	95°F (Max.)	Fig. IV.3-8	106	104	Simultaneous Test	--
Pressure	Atmos.	Fig. IV.3-8	Note 2	104	Simultaneous Test	--
Relative Humidity	Ambient	100%	Note 2	104	Simultaneous Test	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	5×10^6R	4×10^7R	102	104	Sequential Test	--
Aging	40 years	40 years	Note 3	104 Note 4	Seq. Test and Eng. Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Level Transmitter

Manufacturer:
Rosemount

Model or Type:
1153A

Accuracy:
Specified: 8%
Demonstrated: 6.95%

Location:
Area: Primary Auxiliary Building
Elevation: Lower Level

Flood Level:
Elevation: N/A
Above Flood Level: N/A

System:
Accident Monitoring (TMI)

Function (See Appendix IV.2-15):
Containment Level

Service:
CI-LT-240
CI-LT-241

Associated Components:

APPENDIX II

NOTES:

(1) A long-term operating requirement of one year has been assumed.

(2) This area is ventilated with outside air.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

DOCUMENTATION REFERENCES:

102 Engineering Analysis #YR-ADH-80-5, "Summary of Radiation Exposure to Class 1E Equipment Outside Containment at Yankee Rowe".

104 NUS Qualification Document Review Package #QDR-5435-104-0138 which includes the following documents:

a) Acton Report No. 15421-18 (Revision 2), Report of "Thermal Aging Analysis of Rosemount Transmitters for Class 1E Service at Yankee Rowe Nuclear Power Generating Station", dated 11/14/80.

b) Qualification Test Report for Rosemount Pressure Transmitters, Model 1153, Series A, RMT Report No. 3788.

c) Qualification Test Report for Rosemount Pressure Transmitters, Model 1152, RMT Report #117415 (Revision B).

106 Attachment 2 - Thermal Effects of Recirculating Fluids.

APPENDIX II

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Simul. Test and Analysis	--
Temperature	95°F (Max.)	Fig. IV.3-8	106	104	Simultaneous Test	--
Pressure	Atmos.	Fig. IV.3-8	Note 2	104	Simultaneous Test	--
Relative Humidity	Ambient	100%	Note 2	104	Simultaneous Test	--
Chemical Spray	N/A	—	--	--	--	--
Radiation	5×10^6R	4×10^7R	102	104	Sequential Test	--
Aging	40 years	40 years	Note 3	104 Note 4	Seq. Test and Eng. Analysis	--
Submergence	N/A	—	--	--	--	--

Component:
Pressure Transmitter

Manufacturer:
Rosemount

Model or Type:
1153A

Accuracy:
Specified: 8%
Demonstrated: 6.95%.

Location:
Area: Primary Auxiliary Building
Elevation: Lower Level

Flood Level:
Elevation: N/A
Above Flood Level: N/A

System:
Accident Monitoring

Function (See Appendix IV.2-14):
Containment Pressure

Service:
CI-PT-240
CI-PT-241

Associated Components:

APPENDIX II

NOTES:

(1) A long-term operating requirement of one year has been assumed.

(2) This area is ventilated with outside air.

(3) A 40-year qualified life requirement has been assumed.

(4) This equipment will be included in the plant maintenance and surveillance program for evaluation of aging degradation.

DOCUMENTATION REFERENCES:

102 Engineering Analysis #YR-ADH-80-5, "Summary of Radiation Exposure to Class 1E Equipment Outside Containment at Yankee Rowe".

104 NUS Qualification Document Review Package #QDR-5435-104-0138 which includes the following documents:

a) Acton Report No. 15421-18 (Revision 2), Report of "Thermal Aging Analysis of Rosemount Transmitters for Class 1E Service at Yankee Rowe Nuclear Power Generating Station", dated 11/14/80.

b) Qualification Test Report for Rosemount Pressure Transmitters, Model 1153, Series A, RMT Report No. 3788.

c) Qualification Test Report for Rosemount Pressure Transmitters, Model 1152, RMT Report #117415 (Revision 3).

106 Attachment 2 - Thermal Effects of Recirculating Fluids.

APPENDIX II

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Simul. Test and Eng. Analysis	--
Temperature	Fig. III.1-1	Fig. IV.3-7	101	104	Simultaneous Test	--
Pressure	Fig. III.1-1	Fig. IV.3-7	101	104	Simultaneous Test	--
Relative Humidity	100%	100%	Note 2	104	Simultaneous Test	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	5×10^6R	2×10^8R	107	104	Sequential Test	--
Aging	40 years	40 years	Note 3	104 Note 4	Engineering Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Motor

Manufacturer:
Westinghouse

Model or Type:
77Y51238

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Vapor Container
Elevation: 1101'

Flood Level:
Elevation: 1057'
Above Flood Level: Yes

System:
Atmospheric Recirculation

Function (See Appendix IV.2-3):
Vapor Container Air Recirculation

Service:
FN-18-1, FN-18-2, FN-18-3

Associated Components:
J-18 Terminal Block - Westinghouse
J-19 Penetration - CBI and Field Fabrication
J-23 Cable - Rockbestos
J-26 Cable - Simplex
J-29 Cable - Simplex

APPENDIX II

NOTES:

(1) Start one hour after LOCA and run continuously.

(2) 100% relative humidity has been assumed for saturated steam conditions.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

(5) YAEC has obtained and reviewed the proprietary report referenced in the TER, and has included the report as a Documentation Reference. The FRC concerns relative to qualified life, lubrication, and bearings will be addressed in the plant maintenance and surveillance program. The motor splices were not specifically addressed in the subject report; however, the motors are located in an enclosure, thus providing the splices an additional degree of protection from the environment.

DOCUMENTATION REFERENCES:

101 YAEC Letter to NRC, dated May 1, 1980.
YAEC Letter to NRC, dated June 5, 1980.

104 YAEC Qualification Document Review Package #QDR-5335-104-0351-2 which includes the following documents:

a) Letter, Westinghouse to Yankee, March 27, 1973.

b) Westinghouse Topical Report, WCAP 7410L, Volume II.

c) Letter, RG&E to NRC, February 24, 1978.

d) Acton Report No. 15421-16, Report of "Thermal Aging Analysis of Westinghouse Motor for Class 1E Service at Yankee Rowe Nuclear Power Generating Station".

e) WCAP-8754.

107 YAEC Report #1253, "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1981.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Engineering Analysis	--
Temperature	Fig. III.1-1	Fig. IV.3-14	101	104	Simultaneous Test	--
Pressure	Fig. III.1-2	Fig. IV.3-14	101	104	Simultaneous Test	--
Relative Humidity	100%	100%	Note 2	104	Simultaneous Test	--
Chemical Spray	None	N/A	--	--	--	--
Radiation	1×10^7R	2×10^7R	102	104	Engineering Analysis	--
Aging	40 years	40 years	Note 3	104 Note 4	Engineering Analysis	--
Submergence	N/A	N/A	--	--	--	--

Component:
Terminal Block

Manufacturer:
Westinghouse

Model or Type:
542247

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Vapor Container
Elevation: Various

Flood Level:
Elevation: 1057'
Above Flood Level: Yes

System:
Electrical Distribution System

Function:
Electrical Connection

Service:
Equipment in Containment Noted in Appendix II

APPENDIX II

NOTES:

(1) A long-term requirement of one year has been assumed.

(2) 100% relative humidity has been assumed for saturated steam conditions.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

(5) In the TER, FRC notes that YAEC has committed to replace these terminal blocks, and suggests they be replaced with splices. Since YAEC has not committed to replacement, we believe FRC's assumption was drawn from its review of Documentation Reference 2.4, relative to a meeting with YAEC and NRC. At that meeting YAEC and NRC discussed in detail the qualification of the Westinghouse terminal blocks, and YAEC committed to replace the then existing Marathon blocks on safety circuits in containment with the qualified Westinghouse terminal blocks. YAEC has not since committed to replace the Westinghouse blocks as they are still considered by YAEC to be adequately qualified.

FRC's concerns are related to aging degradation during the installed life of the plant and a Sandia test report. Since the blocks are located outside the shield wall and in protective enclosures which are immediately adjacent to the steel vapor containment shell, their normal environmental conditions in relation to temperature and radiation are essentially a mild environment; or normal, ambient, background conditions. The Sandia test report addresses failures of terminal blocks within enclosures, but the Westinghouse blocks were tested in an open, borated steam environment and did not fail. In addition, Yankee Rowe has no spray system.

To reaffirm its position that the Westinghouse terminal blocks are adequately qualified, Yankee Rowe had a consultant perform an independent review. This review confirmed the Yankee Rowe position, so Yankee Rowe believes that these terminal blocks will adequately perform their function under the postulated conditions.

DOCUMENTATION REFERENCES:

101 YAEC Letter to NRC, dated May 1, 1980.
YAEC Letter to NRC, dated June 5, 1980.

APPENDIX II

104 NUS Qualification Document Review Package #QDR-5435-104-0951 which includes the following documents:

a) Westinghouse Electric Corporation, "Test Report on the Effect of a LOCA on the Electrical Performance of Four Terminal Blocks", September 13, 1977.

b) USNRC to YAEC Letter, February 3, 1978, "Summary of Meeting February 1, 1978, Concerning Yankee Rowe".

c) Acton Report No. 15421-17, Report of "Thermal Aging Analysis of Westinghouse Terminal Block for Class 1E Service at Yankee Rowe Nuclear Power Generating Station".

107 YAEC Report #1253, "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1981.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Engineering Analysis	--
Temperature	Fig. III.1-1	Fig. IV.3-6	101	104	Test	--
Pressure	Fig. III.1-2	Fig. IV.3-6	101	104	Test	--
Relative Humidity	100%	100%	Note 2	104	Engineering Analysis	
Chemical Spray	N/A	--	--	--	--	--
Radiation	1×10^7R	10^7R	2	104	Engineering Analysis	--
Aging	40 years	40 years	Note 3	104 Note 4	Engineering Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Penetration Assembly

Manufacturer:
Chicago Bridge & Iron Co. and Field Fabrication

Model or Type:
None

Accuracy
Specified: N/A
Demonstrated: N/A

Location:
Area: Vapor Container
Elevation: Various

Flood Level:
Elevation: 1057'
Above Flood Level: Yes

System:
Electrical Distribution System

Function:
Electrical Connection

Service:
Equipment in Containment as Noted on Worksheets in Appendix II

APPENDIX II

NOTES:

(1) A long-term requirement of one year has been assumed.

(2) 100% relative humidity has been assumed for conservatism.

(3) A 40-year qualified life requirement has been assumed.

(4) This equipment will be included in the plant maintenance and surveillance program for evaluation of aging degradation.

(5) Yankee Rowe believes FRC's initial concerns relative to the electrical penetrations were adequately answered by Yankee Rowe's response (TER, pages 4-62 and 4-63). In FRC's evaluation of Yankee Rowe's response, additional concerns are raised relative to the analysis of materials for radiation and aging.

The penetrations at Yankee Rowe are located in sealed enclosures outside the shield wall and are attached to the containment steel shell which is the main heat sink to normal ambient temperature conditions. Therefore, the normal conditions at the penetrations with respect to aging parameters of temperature and radiation are essentially a mild environment. Therefore, no advanced aging of the seal materials should be expected, and leakage testing of the containment and the penetrations through plant life have not demonstrated indications of aging degradation.

In addition, calculations completed on the effect of a LOCA or MSLB on O-Ring seal temperatures indicate that maximum seal ring temperature is within the continuous operating temperature rating of the materials of the O-Ring. Also review of various DBE and aging test data on materials of the same generic family, performed by cable vendors, solenoid valve manufacturers, and motor-operated valve manufacturers for similar applications (O-Ring, or seals) indicate that the materials in question perform very well under the service conditions of temperature, pressure and radiation expected at Yankee Rowe.

With regard to the concerns relative to the coaxial penetration potting compound and seals, we believe these were resolved by filling the entire penetration with the potting compound and performing a successful retest, as reported in TER Reference 2.5.

APPENDIX II

The failure of the Teflon insulator in the cable coupler within the coaxial penetration due to an accident dose greater than 10E5 is not significant because the coaxial signals through these penetrations are only used for neutron monitoring purposes. They are not required for post-accident monitoring or accident mitigation. New penetrations (Worksheet J-31) were installed during the recent refueling shutdown to carry post-accident monitoring signals which require coaxial cable penetrations (Worksheet AM-1).

FRC's concern relative to short circuit heating effects is related more toward auxiliary electrical equipment than to penetration design. As previously indicated, this topic is being addressed in the SEP review and will be resolved in the integrated assessment.

Yankee Rowe believes it has demonstrated the adequacy of the CB&I penetrations for continued operation by addressing each of FRC's concerns. However, FRC concludes that consideration should be given to replacement of the penetrations due to their age. As noted above, no general aging degradation has been found through the life of the penetrations. However, Yankee Rowe replaced several penetrations during the recent refueling shutdown to accommodate newly installed equipment, and in the process has rewired instruments on the following worksheets through the new penetrations: AM-1, FW-4, MC-3, MC-4, PR-1, and PR-7. Yankee Rowe intends to further upgrade the penetrations by rewiring equipment on the following worksheets through new penetrations: AR-1, HV-1, MC-10, SC-1, SI-8, and SI-9. With this change, all equipment in containment which is required to function in LOCA or MSLB environments will be wired through fully qualified penetrations by the next scheduled refueling outage.

DOCUMENTATION REFERENCES:

101 YAEC Letter to NRC, dated May , 1, 1980.
YAEC Letter to NRC, dated June 5, 1980.

104 YAEC Qualification Document Review Package #QDR-5435-104-1053 which includes the following documents:

a) Assoc. Nucleonics Report AN-115, May 15, 1959.

b) Letter, YAEC to NRC, December 12, 1977.

c) Acton Report No. 15421-10, Report of "Thermal Aging Analysis of CB&I and Fabrications Penetration Assembly for Class 1E Service at Yankee Rowe Nuclear Power Generating Station".

107 YAEC Report #1253, "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1981.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Engineering Analysis	--
Temperature	Fig. III.1-1	482°F	101	104	Vendor Data	--
Pressure	Fig. III.1-2	47 psia	101	104	Test	--
Relative Humidity	100%	100%	Note 2	104	Vendor Data	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	2×10^7 R	2×10^{10} R	107	104	Vendor Data	--
Aging	40 years	40 years	Note 3	104 Note 4	Engineering Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Cable

Manufacturer:
General Cable

Model or Type:
Mineral Insulated

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Vapor Container
Elevation: Various

Flood Level:
Elevation: 1057'
Above Flood Level: Yes

System:
Electrical Distribution System

Function:
Electrical Power and Control

Service:
CS-MOV-535
SC-MOV-551
SC-MOV-552
SC-MOV-553
SC-MOV-554

APPENDIX II

NOTES:

(1) Operating requirement is based on operating of shutdown cooling valves.

(2) 100% relative humidity has been assumed for conservatism.

(3) A 40-year qualified life has been assumed.

(4) Qualification of this component for the required operating time has been determined to be adequate based on an evaluation of the qualification data used to qualify it for all applicable environmental parameters indicated on this worksheet (see Reference 104).

DOCUMENTATION REFERENCES:

101 YAEC Letter to NRC, dated May 1, 1980.
YAEC Letter to NRC, dated June 5, 1980.

104 YAEC Qualification Document Review Package #QDR-5435-104-0854 which includes the following documents:

a) Report "Reactor Containment Building Integrated Leak Rate Test", May 1974, YAEC 1074.

b) General Cable Catalog "Mineral Insulated Cable".

c) Acton Report No. 15421-2, Report of "Thermal Aging Analysis of General Power Cable for Class 1E Service at Yankee Rowe Nuclear Power Generating Station".

107 YAEC Report #1253, "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1981.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Simul. Test and Eng. Analysis	--
Temperature	Fig. III.1-1	Fig. IV.3-5	101	104	Simultaneous Test	--
Pressure	Fig. III.1-2	Fig. IV.3-5	101	104	Simultaneous Test	--
Relative Humidity	100%	100%	Note 2	104	Simultaneous Test	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	2×10^7R	1×10^8R	107	104	Sequential Test	--
Aging	40 years	40 years	Note 3	104 Note 4	Engineering Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Cable

Manufacturer:
Rockbestos

Model or Type:
Silicone Rubber/Asbestos

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Vapor Container
Elevation: Various

Flood Level:
Elevation: 1057'
Above Flood Level: Yes

System:
Electrical Distribution System

Function:
Power Cable

Service:
HV-SOV-1
HV-SOV-2
FN-18-1
FN-18-2
FN-18-3

APPENDIX II

NOTES:

(1) A long-term requirement of one year has been assumed.

(2) 100% relative humidity has been assumed for conservatism.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

DOCUMENTATION REFERENCES:

101 YAEC Letter to NRC, dated May 1, 1980.
YAEC Letter to NRC, dated June 5, 1980.

104 NUS Qualification Document Review Package #QDR-5435-104-0840-1 which includes the following documents:

a) Acton Report No. 15421-3, Report of "Thermal Aging Analysis of Rockbestos Control Cable for Class 1E Service at Yankee Rowe Nuclear Power Generating Station".

b) FIRL Test Report #F-C2750 "Test of Electrical Cables Under Simulated Post-Accident Containment Service".

c) "Qualification of Firewall SR, Class 1E Electric Cables", the Rockbestos Co., March 2, 1978.

107 YAEC Report #1253, "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1981.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Simul. Test and Eng. Analysis	--
Temperature	Fig. III.1-1	Fig. IV.3-4	101	104	simultaneous Test	--
Pressure	Fig. III.1-2	Fig. IV 3-4	101	104	Simultaneous Test	--
Relative Humidity	100%	100%	Note 2	104	Simultaneous Test	--
Chemical Spray	N/A	N/A	--	--	--	--
Radiation	1×10^7R	2×10^8R	107	104	Sequential Test	--
Aging	40 years	40 years	Note 3	104 Note 4	Seq. Test and Eng. Analysis	--
Submergence	N/A	N/A	--	--	--	--

Component:
Cable

Manufacturer:
Rockbestos

Model or Type:
Firewall III

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Vapor Container
Elevation: Various

Flood Level:
Elevation: 1057'
Above Flood Level: Yes

System:
Electrical Distribution System

Function:
Electrical Power, Instrumentation & Control

Service:
MC-PT-712, MC-PT-710, MC-PT-100, SI-PS-14
PR-PT-700, SC-MOV-551, SC-MOV-552, SC-MOV-554
CS-MOV-535, MC-PT-200, MC-PT-300, PR-ZT-1A
PR-ZT-1B, PR-ZT-1C

APPENDIX II

NOTES:

(1) A long-term requirement of one year has been assumed.

(2) 100% relative humidity has been assumed for conservatism.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

DOCUMENTATION REFERENCES:

101 YAEC Letter to NRC, dated May 1, 1980.
YAEC Letter to NRC, dated June 5, 1980.

104 NUS Qualification Document Review Package #QDR-5435-104-0840-2 which includes the following documents:

a) Acton Report No. 15421-1, Report of "Thermal Aging Analysis of Rockbestos Power and Control Cable for Class 1E Service at Yankee Rowe Nuclear Power Generating Station".

b) Qualification of Firewall III Class IE Electrical Cables, July 7, 1977.

107 YAEC Report #1253, "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1981.

SYSTEM C PONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Short Term	Long Term	Note 1	104	Engineering Analysis	
Temperature	Fig. III.1-1	Fig. IV.3-3	101	104	Simultaneous Test	--
Pressure	Fig. III.1-2	Fig. IV.3-3	101	104	Simultaneous Test	--
Relative Humidity	100%	100%	Note 2	104	Simultaneous Test	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	2.4×10^6R	5×10^6R	107	104	Engineering Analysis	--
Aging	40 years	40 years	Note 3	104 Note 4	Engineering Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Cable

Manufacturer:
Continental

Model or Type:
XLP/HYPALON

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Vapor Container
Elevation: Various

Flood Level:
Elevation: 1057'
Above Flood Level: Yes

System:
Electrical Distribution System

Function:
Instrumentation

Service:
FW-LT-1003
FW-LT-1103
FW-LT-1203
FW-LT-1303

APPENDIX II

NOTES:

(1) These cables are only required for a short-term reactor protection function (see FW-4).

(2) 100% relative humidity has been assumed for conservatism.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

DOCUMENTATION REFERENCES:

101 YAEC Letter to NRC, dated May 1, 1980.
YAEC Letter to NRC, dated June 5, 1980.

104 YAEC Qualification Document Review Package #QDR-5435-104-0814 which includes the following documents:

a) Acton Report No. 15421-5, Report of "Thermal Aging Analysis of Continental Instrumentation Cable for Class 1E Service at Yankee Rowe Nuclear Power Generating Station".

b) Test Report: #IPS-383, "Qualification Test Program of Electrical Instrumentation Cables for Virginia Electric and Power Company for Surry Power Station - Units 1 and 2", dated 11/27/78.

107 YAEC Report #1253, "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1981.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Engineering Analysis	--
Temperature	95°F (Max.)	Note 5	106	Note 5	Note 5	--
Pressure	Atmos.	Note 5	Note 2	Note 5	Note 5	--
Relative Humidity	Ambient	Note 5	Note 2	Note 5	Note 5	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	5×10^6R	4.3×10^7R	107	104	Engineering Analysis	--
Aging	40 years	40 years	Note 3	104 Note 4	Engineering Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Cable

Manufacturer:
Simplex

Model or Type:
Butyl/PVC

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Outside V.C.
Elevation: Various

Flood Level:
Elevation: N/A
Above Flood Level: N/A

System:
Electrical Distribution System

Function:
Electrical Power

Serivce:
FN-18-1, FN-18-2, FN-18-3
480V MCC-4
CS-MOV-535
SC-MOV-551, SC-MOV-552,
SC-MOV-553, SC-MOV-554
P-19

APPENDIX II

NOTES:

(1) A long-term requirement of one year has been assumed.

(2) These areas are ventilated with outside air.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

(5) The maximum postulated DBE level for this environmental parameter is within normal operating limits. Equipment has been specified and designed in accordance with industry standards to operate continuously in this environment.

DOCUMENTATION REFERENCES:

104 NUS Qualification Document Review Package #QDR-5435-104-0856 which includes the following documents:

a) Okonite Report NQRN-1.

106 Attachment 2 - Thermal Effects of Recirculating Fluids.

107 YAEC Report #1253, "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1981.

APPENDIX II

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	30 days	Long Term	Note 1	104	Engineering Analysis	--
Temperature	95°F	Note 5	106	Note 5	Note 5	--
Pressure	Atmos.	Note 5	Note 2	Note 5	Note 5	--
Relative Humidity	Ambient	Note 5	Note 2	Note 5	Note 5	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	3.6×10^5R	1×10^6R	102	104	Seq. Test and Eng. Analysis	--
Aging	40 years	40 years	Note 3	104 Note 4	Seq. Test and Eng. Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Contractor w/Control Transformer

Manufacturer:
ITE/Gould

Model or Type:
A103C12 & 2032-T3

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: PAB
Elevation: 1022'-8"

Flood Level:
Elevation: N/A
Above Flood Level: N/A

System:
Electrical Distribution System

Function:
Electrical Control

Service:
SI-MOV-48, SI-MOV-514, SI-MOV-515, SI-MOV-516, SI-MOV-517, SI-MOV-518, SI-MOV-49

APPENDIX II

NOTES:

(1) The valves served by these contactors will be required to operate within 24 hours.

(2) This area is ventilated with outside air.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

(5) The maximum postulated DBE level for this environmental parameter is within normal operating limits. Equipment has been specified and designed in accordance with industry standards to operate continuously in this environment.

DOCUMENTATION REFERENCES:

102 Engineering Analysis #YR-ADH-80-5, "Summary of Radiation Exposure to Class 1E Equipment Outside Containment at Yankee Rowe".

104 YAEC Qualification Document Review Package #QDR-5435-104-2228 which includes the following documents:

a) Qualification Summary Report for Class 1E Equipment, CC-323.74-64, Revision 0, 1/31/80.

106 Attachment 2 - Thermal Effects of Recirculating Fluids.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	30 days	30 days	Note 1	104	Engineering Analysis	--
Temperature	95°F	Note 5	106	Note 5	Note 5	--
Pressure	Atmos.	Note 5	Note 2	Note 5	Note 5	--
Relative Humidity	Ambient	Note 5	Note 2	Note 5	Note 5	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	$<1 \times 10^6$R	1×10^6R	102	104		--
Aging	40 years	Note 4	Note 3	Note 4	Engineering Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Motor Starter

Manufacturer:
Westinghouse

Model or Type:
A210M1CAT (Note 6)

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Plant Auxiliary Building
Elevation: 1022'-8"

Flood Level:
Elevation: N/A
Above Flood Level: N/A

System:
Electrical Distribution System

Function:
Electrical Control

Service:
SI-MOV-48, SI-MOV-514, SI-MOV-515, SI-MOV-516, SI-MOV-517, SI-MOV-518

APPENDIX II

NOTES:

(1) Provides power to safety-related equipment.

(2) This area is ventilated with outside air.

(3) A 40-year qualified life requirement has been assumed.

(4) This equipment will be included in the plant maintenance and surveillance program for evaluation of aging degradation.

(5) The maximum postulated DBE level for this environmental parameter is within normal operating limits. Equipment has been specified and designed in accordance with industry standards to operate continuously in this environment.

(6) YAEC proposes to use a new motor control center instead of these contactors. The new MCC will be installed during the next refueling outage.

DOCUMENTATION REFERENCES:

102 Engineering Analysis #YR-ADH-80-5.

104 YAEC Qualification Document Review Package #QDR-5435-104-2251 which includes the following documents:

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Engineering Analysis	--
Temperature	95°F	Note 5	106	Note 5	Note 5	--
Pressure	Atmos.	Note 5	Note 2	Note 5	Note 5	--
Relative Humidity	Ambient	Note 5	Note 2	Note 5	Note 5	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	5.0×10^6R	2×10^7R	107	104	Engineering Analysis	--
Aging	40 years	40 years	Note 3	Note 4	Seq. Test and Eng. Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Cable

Manufacturer:
Simplex

Model or Type:
PE/PVC

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Outside Vapor Container
Elevation: Various

Flood Level:
Elevation: N/A
Above Flood Level: N/A

System:
Electrical Distribution System

Function:
Electrical Control

Service:
SC-MOV-551, SC-MOV-552, SC-MOV-553
SC-MOV-554, CS-MOV-535
FN-18-1, FN-18-2, FN-18-3

APPENDIX II

NOTES:

(1) Provides control for safety-related equipment.

(2) This area is ventilated with outside air.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

(5) The maximum postulated DBE level for this environmental parameter is within normal operating limits. Equipment has been specified and designed in accordance with industry standards to operate continuously in this environment.

DOCUMENTATION REFERENCES:

104 NUS Qualification Document Review Package #QDR-5435-104-0856 which includes the following documents:

a) Stone & Webster Spec. Order J.O. No. 9699 for 1000V Polyethylene Insulated Control Cable.

b) Okonite Test Report NQRN-1, Qualification of Okonite Ethylene Propylene Rubber Insulation for Nuclear Plants.

c) Spec. No. 4618 for 1000V control cable for Yankee Rowe.

106 Attachment 2 - Thermal Effects of Recirculating Fluids.

107 YAEC Report #1253, "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1981.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Simul. Test and Eng. Analysis	--
Temperature	Fig. III.1-1	Fig. IV.3-18	101	104	Simultaneous Test	--
Pressure	Fig. III.1-2	Fig. IV.3-20	101	104	Simultaneous Test	--
Relative Humidity	100%	100%	Note 2	104	Simultaneous Test	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	1×10^7R	1.1×10^8R	107	104	Sequential Test	--
Aging	40 years	40 years	Note 3	104 Note 4	Seq. Test and Eng. Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Penetration Assembly

Manufacturer:
Westinghouse

Model or Type:

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Vapor Container
Elevation: Various

Flood Level:
Elevation: 1057'
Above Flood Level: Yes

System:
Electrical Distribution System

Function:
Electrical Connection

Service:
MC-PT-100, MC-PT-200, MC-PT-300 PR-PD-6
PR-PT-700, PR-PT-712, RM-130, RM-131
PR-ZE-1A, PR-ZE-1B, PR-ZE-1C, PR-ZT-1A
FW-LT-1003, FW-LT-1103, FW-LT-1203, FW-LT-1303
PR-ZT-1B, PR-ZT-1C

APPENDIX II

NOTES:

(1) A long-term requirement of one year has been assumed.

(2) 100% relative humidity has been assumed due to saturated steam conditions.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

DOCUMENTATION REFERENCES:

101 YAEC Letter to NRC, dated May 1, 1980.
YAEC Letter to NRC, dated June 5, 1980.

104 YAEC Qualification Document Review Package #QDR-5435-104-1051 which includes the following documents:

a) "Technical Reports and Qualification Data for Low Voltage, Control, and Instrumentation Electrical Penetrations", PEN-TR-79-07, dated January 25, 1979, Westinghouse Electric Corporation (PROPRIETARY).

b) "Technical Reports for Material Used in Modular Electrical Penetrations", PEN-TR-79-06, dated January 25, 1979 (Revision 1) (PROPRIETARY).

107 YAEC Report #1253, "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1981.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Engineering Analysis	--
Temperature	95°F (Max.)	Note 5	106	Note 5	Note 5	--
Pressure	Atmos.	Note 5	Note 2	Note 5	Note 5	--
Relative Humidity	Ambient	Note 5	Note 2	Note 5	Note 5	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	1.5×10^6R (Max.)	1×10^7R	102	104	Engineering Analysis	--
Aging	40 years	40 years	Note 3	104 Note 4	Engineering Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Cable

Manufacturer:
Collyer

Model or Type:
XLP/NEOPRENE

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Primary Auxiliary Building
Elevation: Various

Flood Level:
Elevation: N/A
Above Flood Level: N/A

System:
Electrical Distribution System

Function
Electrical Control

Service:
SI-MOV-48, SI-MOV-49, SI-MOV-514, SI-MOV-515, SI-MOV-516, SI-MOV-517, SI-MOV-518, EMERG MCC-2 P-48-1,2,3, P-49-1,2,3

APPENDIX II

NOTES:

(1) Provides control power for safety-related equipment which is required for long-term operability.

(2) This area is ventilated with outside air.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

DOCUMENTATION REFERENCES:

102 Engineering Analysis #YR-ADH-80-5, "Summary of Radiation Exposure to Class 1E Equipment Outside Containment at Yankee Rowe".

104 YAEC Qualification Document Review Package #QDR-5435-104-081[5] which includes the following documents:

a) Spec. No. 4618 for 1000V Control Cable for Yankee Rowe.

b) "Qualification Testing of Electrical Cables Under Simulated Reactor Containment Service Conditions and Loss-of-Coolant Accident", F-C3306-01.

106 Attachment 2 - Thermal Effects of Recirculating Fluids.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Engineering Analysis	--
Temperature	95°F (Max.)	Note 5	106	Note 5	Note 5	--
Pressure	Atmos.	Note 5	Note 2	Note 5	Note 5	--
Relative Humidity	Ambient	Note 5	Note 2	Note 5	Note 5	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	3.0×10^5R	5×10^5R	102	104	Engineering Analysis	--
Aging	40 years	30 years	Note 3	104 Note 4	Engineering Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Cable

Manufacturer:
Okonite

Model or Type:
Styrene/Butadiene

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Primary Auxiliary Building
Elevation: Various

Flood Level:
Elevation: N/A
Above Flood Level: N/A

System:
Electrical Distribution System

Function:
Electrical Power

Service:
P-20-1
P-20-2

APPENDIX II

NOTES:

(1) Provides electrical power to safety-related equipment.

(2) This area is ventilated with outside air.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

(5) The maximum postulated DBE level for this environmental parameter is within normal operating limits. Equipment has been specified and designed in accordance with industry standards to operate continuously in this environment.

DOCUMENTATION REFERENCES:

102 Engineering Analysis #YR-ADH-80-5, "Summary of Radiation Exposure to Class 1E Equipment Outside Containment at Yankee Rowe".

104 YAEC Qualification Document Review Package #QDR-5435-104-0836 which includes the following documents:

a) Acton Report No. 15421-22, Report of "Thermal Aging Analysis of Collyer Cable for Yankee Nuclear Power Station".

b) Insulation and Jackets for Control and Power Cables in Thermal Reactor Nuclear Generating Stations, IEEE Transactions, Volume PAS 88, No. 5, May 1969.

c) L.O. No. 167, Schedule of Requirements.

106 Attachment 2 - Thermal Effects of Recirculating Fluids.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Engineering Analysis	--
Temperature	95°F (Max.)	Note 5	106	Note 5	Note 5	--
Pressure	Atmos.	Note 5	Note 2	Note 5	Note 5	--
Relative Humidity	Ambient	Note 5	Note 2	Note 5	Note 5	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	9.9×10^5R	1×10^7R	102	104	Engineering Analysis	--
Aging	40 years	40 years	Note 3	104	Engineering Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Cable

Manufacturer:
General Cable Corporation

Model or Type:
XLP

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Primary Auxiliary Building
Elevation: Various

Flood Level:
Elevation: N/A
Above Flood Level: N/A

System:
Electrical Distribution System

Function:
Electrical Power

Service:
Battery #3, Battery #3 SWBD
Emer. Bus 1, Emer. Bus 2, Emer. Bus 3
P48-1, P48-2, P48-3, P49-1
P49-2, P49-3, SI-MOV-48, SI-MOV-49
SI-MOV-514, SI-MOV-515, SI-MOV-516, SI-MOV-517
SI-MOV-518

APPENDIX II

NOTES:

(1) Provides electrical power to safety-related equipment.

(2) This area is ventilated with outside air.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

(5) The maximum postulated DBE level for this environmental parameter is within normal operating limits. Equipment has been specified and designed in accordance with industry standards to operate continuously in this environment.

DOCUMENTATION REFERENCES:

102 Engineering Analysis #YR-ADH-80-5, "Summary of Radiation Exposure to Class 1E Equipment Outside Containment at Yankee Rowe".

104 Qualification Document Review Package #QDR-5435-104- which includes the following documents:

a) Spec. No. YS-4617.

b) Thermal Radiation Aging Degradation of Selected Material, NRC IEB 79-01B, Table C1.

c) Acton Report #15421-24, "Thermal Aging Analysis of General Cable for Yankee Nuclear Power Station", dated 12/12/80.

106 Attachment 2 - Thermal Effects of Recirculating Fluids.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	24 hours	Long Term	Note 1	104	Engineering Analysis	—
Temperature	95°F	Note 5	106	Note 5	Note 5	—
Pressure	Atmos.	Note 5	Note 2	Note 5	Note 5	--
Relative Humidity	Ambient	Note 5	Note 2	Note 5	Note 5	--
Chemical Spray	N/A	—	--	--	--	--
Radiation	<1 x 10^6R	1 x 10^6R	102	104	Engineering Analysis	--
Aging	40 years	Note 4	Note 3	Note 4	Surveillance program	—
Submergence	N/A	—	--	--	--	--

Component:
480V Motor Control Center

Manufacturer:
Westinghouse (Note 6)

Model or Type:

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Primary Auxiliary Building
Elevation: 1022'-8"

Flood Level:
Elevation: N/A
Above Flood Level: N/A

System:
Electrical Distribution System

Function:
480V a-c Electrical Power

Service:
480V MCC-4

Associated Components:
SI-MOV-48, SI-MOV-514, SI-MOV-515, SI-MOV-516, SI-MOV-517, SI-MOV-518

APPENDIX II

NOTES:

(1) Provides power to safety-related equipment.

(2) This area is ventilated with outside air.

(3) A 40-year qualified life requirement has been assumed.

(4) This equipment will be included in the plant maintenance and surveillance program for evaluation of aging degradation.

(5) The maximum postulated DBE level for this environmental parameter is within normal operating limits. Equipment has been specified and designed in accordance with industry standards to operate continuously in this environment.

(6) YAEC proposes to use a new motor control center instead of this unit. The new MCC will be installed during the next refueling.

DOCUMENTATION REFERENCES:

102 Engineering Analysis #YR-ADH-80-5.

104 YAEC Qualification Document Review Package #QDR-5435-104-0751 which includes the following documents:

a) Generic Material Evaluation of Components Use in Motor Control Centers.

106 Attachment 2 - Thermal Effects of Recirculating Fluids.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Simul. Test and Eng. Analysis	--
Temperature	Fig. III.1-1	Fig. IV.3-19	101	104	Simultaneous Test	--
Pressure	Fig. III.1-2	Fig. IV.3-19	101	104	Simultaneous Test	--
Relative Humidity	100%	100%	Note 2	104	Simultaneous Test	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	1×10^7R	2.2×10^8R	107	104	Sequential Test	--
Aging	40 years	40 years	Note 3	104 Note 4	Seq. Test and Eng. Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Seal

Manufacturer:
Conax

Model or Type:

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Vapor Container
Elevation: N/A

Flood Level:
Elevation: 1057'
Above Flood Level: Yes

System:
Electrical Distribution System

Function:
Electrical Connection

Service:
PR-PT-700, PR-PT-710, MC-PD-9
MC-PT-100, MC-PT-200, MC-PT-300

APPENDIX II

NOTES:

(1) A long-term requirement of one year has been assumed.

(2) 100% relative humidity has been assumed for conservatism.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

DOCUMENTATION REFERENCES:

101 YAEC Letter to NRC, dated May 1, 1980.
YAEC Letter to NRC, dated June 5, 1980.

104 YAEC Qualification Document Review Package #QDR-5435-104-1012 which includes the following documents:

a) Qualification Report for Conductor Modules for Arkansas Nuclear One, Unit 2, No. IPS-409.

b) Thermal Aging of Conax Electrical Penetrations, No. IPS-325.

107 YAEC Report #1253 "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1981.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Simul. Test and Eng. Analysis	--
Temperature	95°F (Max.)	Fig. IV.3-21	106	104	Simultaneous Test	--
Pressure	Atmos.	Fig. IV.3-21	Note 2	104	Simultaneous Test	--
Relative Humidity	Ambient	100%	Note 2	104	Simultaneous Test	--
Chemical Spray	N/A	—	--	--	--	--
Radiation	5×10^6R	2.2×10^8R	107	104	Sequential Test	--
Aging	40 years	40 years	Note 3	104 Note 4	Seq. Test and Eng. Analysis	--
Submergence	N/A	—	--	--	--	--

Component:
Terminal Block

Manufacturer:
Marathon Special Products

Model or Type:
6012-B

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Outside Vapor Container
Elevation: Various

Flood Level:
Elevation: N/A
Above Flood Level: N/A

System:
Electrical Distribution System

Function:
Electrical Connection

Service:
Equipment in Containment Noted in Appendix II.

APPENDIX II

NOTES:

(1) A long-term requirement of one year has been assumed.

(2) This area is ventilated with outside air.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

DOCUMENTATION REFERENCES:

104 NUS Qualification Document Review Package #QDR-5435-104-0965 which includes the following documents:

a) Westinghouse Electric Corporation Test Report No. PEN-TR-80-18, Qualification Test Report for Marathon Series 300 Terminal Blocks Used on the Seabrook Plant Electrical Penetrations, March 10, 1980.

b) EPRI NP-1558, Project 890-1 Final Report, September 1980.

c) General Electric Letter to Vermont Yankee dated February 2, 1978. (Test Report Attached).

d) Marathon Special Products Catalog Bulletins 4.4 and 4.5.

106 Attachment 2 - Thermal Effects of Recirculating Fluids.

107 YAEC Report #1253, "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1981.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Engineering Analysis	--
Temperature	95°F (Max.)	Note 5	106	Note 5	Note 5	--
Pressure	Atmos.	Note 5	Note 2	Note 5	Note 5	--
Relative Humidity	Ambient	Note 5	Note 2	Note 5	Note 5	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	3.0×10^5R	1×10^8R	102	104	Engineering Analysis	
Aging	40 years	Note 4	Note 3	Note 4	Surveillance Program	--
Submergence	N/A	--	--	--	--	--

Component:
Motor

Manufacturer:
Westinghouse

Model or Type:
CSP/19N2705-1
CSP/19N2705-2

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Primary Auxiliary Building
Elevation: Lower Level

Flood Level:
Elevation: N/A
Above Flood Level: N/A

System:
Component Cooling System

Function (See Appendix IV.2-16):
Primary Component Cooling Pump

Service:
P-20-1
P-20-2

Associated Components:
J-29 Control Cable
J-33 Power Cable

APPENDIX II

NOTES:

(1) Provides cooling water for essential components which are required for long-term operability.

(2) This area is ventilated with outside air.

(3) A 40-year qualified life requirement has been assumed.

(4) This equipment will be included in the plant maintenance and surveillance program for evaluation of aging degradation.

(5) The maximum postulated DBE level for this environmental parameter is within normal operating limits. Equipment has been specified and designed in accordance with industry standards to operate continuously in this environment.

DOCUMENTATION REFERENCES:

102 Engineering Analysis #YR-ADH-80-5," Summary of Radiation Exposure to Class 1E Equipment Outside Containment at Yankee Rowe".

104 YAEC Qualification Document Review Package #QDR-5435-104-0351-1 which includes the following documents:

a) EDS Report #02-0570-1066, "Environmental Qualification of Class 1E Electrical Equipment".

106 Attachment 2 - Thermal Effects of Recirculating Fluids.

FACILITY: YANKEE ROWE
DOCKET NO.:

APPENDIX II

EPS-1

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Engineering Analysis	--
Temperature	95°F (Max.)	Note 5	106	Note 5	Note 5	--
Pressur	Atmos.	Note 5	Note 2	Note 5	Note 5	--
Relative Humidity	Ambient	Note 5	Note 2	Note 5	Note 5	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	9.9×10^5	2×10^7R	102	104	Engineering Analysis	--
Aging	20 years	20 years	Note 3	104 Note 4	Engineering Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Battery

Manufacturer:
C&D

Model or Type:
KU-15

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Primary Auxiliary Building
Elevation: 1022'-8"

Flood Level:
Elevation: N/A
Above Flood Level: N/A

System:
Emergency Power System

Function:
125V DC Power

Service:
Battery #3

Associated Components:
J-34 Power Cable
EPS-2 Battery Switchboard

APPENDIX II

NOTES

(1) Provides 125V dc power for diesel starting, breaker control, and dc SOV's which are required for long-term operability.

(2) This area is ventilated with outside air.

(3) A 20-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

(5) The maximum postulated DBE level for this environmental parameter is within normal operating limits. Equipment has been specified and designed in accordance with industry standards to operate continuously in this environment.

DOCUMENTATION REFERENCES:

102 Engineering Analysis #YR-ADH-80-5, "Summary of Radiation Exposure to Class 1E Equipment Outside Containment at Yankee Rowe".

104 YAEC Qualification Document Review Package #QDR-5435-104-2062 which includes the following documents:

a) EDS Repor 570-1066, "Environmental Qualification of Class 1E Electi equipment".

b) Spec. #4625 - "Station Battery for Yankee Rowe".

c) Acton Report No. 15421-, Report of "Thermal Aging Analysis of Station Batteries for Class 1E Service at Yankee Rowe Nuclear Power Generating Station".

106 Attachment 2 - Thermal Effects of Recirculating Fluids.

FACILITY: YANKEE ROWE
DOCKET NO.:

APPENDIX II

EPS-2

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Engineering Analysis	--
Temperature	95°F (Max.)	Note 5	106	Note 5	Note 5	--
Pressure	Atmos.	Note 5	Note 2	Note 5	Note 5	--
Relative Humidity	Ambient	Note 5	Note 2	Note 5	Note 5	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	8.7×10^5R	1×10^6R	102	104	Engineering Analysis	--
Aging	40 years	Note 4	Note 3	Note 4	Surveillance Program	--
Submergence	N/A	--	--	--	--	--

Component:
Battery Switchboard

Manufacturer:
Westinghouse

Model or Type:
CDP

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Primary Auxiliary Building
Elevation: 1022'-8"

Flood Level:
Elevation: N/A
Above Flood Level: N/A

System:
Emergency Power System

Function:
125V DC Electrical Distribution

Service:
No. 3 Battery Switchboard

Associated Components
J-34 Power Cable
[illegible]-1 Battery No. 3

APPENDIX II

NOTES:

(1) Provides electrical distribution and protection for 125V dc Battery #3 which is required for long-term operability.

(2) This area is ventilated with outside air.

(3) A 40-year qualified life requirement has been assumed.

(4) This equipment will be included in the plant maintenance and surveillance program for evaluation of aging degradation.

(5) The maximum postulated DBE level for this environmental parameter is within normal operating limits. Equipment has been specified and designed in accordance with industry standards to operate continuously in this environment.

DOCUMENTATION REFERENCES:

102 Engineering Analysis #YR-ADH-80-5, "Summary of Radiation Exposure to Class 1E Equipment Outside Containment at Yankee Rowe".

104 YAEC Qualification Document Review Package #QDR-5435-104-1951 which includes the following documents:

a) Generic Material Evaluation of Components Used in Motor Control Centers.

b) Specification #YS-4643, "Battery Switchboard at Yankee Rowe".

106 Attachment 2 - Thermal Effects of Recirculating Fluids.

FACILITY: YANKEE ROWE
DOCKET NO.: 50-29

APPENDIX II

EPS-3

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Engineering Analysis	--
Temperature	95°F	Note 5	106	Note 5	Note 5	--
Pressure	Atmos.	Note 5	Note 2	Note 5	Note 5	--
Relative Humidity	Ambient	Note 5	Note 2	Note 5	Note 5	--
Chemical Spray	N/A	N/A	--	--	--	--
Radiation	7.5×10^5R	8.0×10^6R	105	104	Engineering Analysis	--
Aging	40 years	40 years	Note 3	104 Note 4	Engineering Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
480V Switchgear

Manufacturer:
General Electric

Model or Type:
AKD-5

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Primary Auxiliary Building
Elevation: 1022'-8"

Flood Level:
Elevation: N/A
Above Flood Level: N/A

System:
Emergency Power System

Function:
Electrical Power

Service:
480V Emergency Bus-1
480V Emergency Bus-2
480V Emergency Bus-3

Associated Components:
J-34 Power Cable
J-32 Control Cable

FACILITY: YANKEE ROWE
DOCKET NO.: 50-29

EPS-3

APPENDIX II

NOTES:

(1) Provides 480V power to essential equipment which is required for long-term operability.

(2) This area is ventilated with outside air.

(3) A 40-year qualified life requirement has been assumed.

(4) This equipment will be included in the plant maintenance and surveillance program for evaluation of aging degradation.

(5) The maximum postulated DBE level for this environmental parameter is within normal operating limits. Equipment has been specified and designed in accordance with industry standards to operate continuously in this environment.

DOCUMENTATION REFERENCES:

102 Engineering analysis #YR-ADH-80-5, "Summary of Radiation Exposure to Class 1E Equipment Outside Containment at Yankee Rowe".

104 YAEC Qualification Document Review Package #QDR-5435-104-0725 which includes the following documents:

a) Spec. #4615 - "480V Unit Substations for Yankee Rowe".

b) EDS Report #02-0570-1066, "Environmental Qualification of Class 1E Electrical Equipment".

c) Acton Report #15421-23, "Thermal Aging Analysis of General Electric AK Series Breakers for Yankee Nuclear Power Station", dated 11/6/80.

106 Attachment 2 - Thermal Effects of Recirculating Fluids.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Engineering Analysis	--
Temperature	95°F (Max.)	Note 5	106	Note 5	Note 5	--
Pressure	Atmos.	Note 5	Note 2	Note 5	Note 5	--
Relative Humidity	Ambient	Note 5	Note 2	Note 5	Note 5	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	3.6×10^5R	1×10^6R	102	104	Engineering Analysis	--
Aging	40 years	Note 4	Note 3	Note 4	Surveillance Program	--
Submergence	N/A	--	--	--	--	--

Component:
480V MCC

Manufacturer:
Westinghouse

Model or Type:
N/A

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Primary Auxiliary Building
Elevation: 1022'-8"

Flood Level:
Elevation: N/A
Above Flood Level: N/A

System:
Emergency Power System

Function:
Electrical Power

Service:
480V Emergency MCC-2

Associated Components:

J-34	Power Cable
J-32	Control Cable

APPENDIX II

NOTES:

(1) Provides electrical power for essential components which are required for long-term operation.

(2) This area is ventilated with outside air.

(3) A 40-year qualified life requirement has been assumed.

(4) This equipment will be included in the plant maintenance and surveillance program for evaluation of aging degradation.

DOCUMENTATION REFERENCES:

102 Engineering Analysis #YR-ADH-80-5, "Summary of Radiation Exposure to Class 1E Equipment Outside Containment at Yankee Rowe".

104 YAEC Qualification Document Review Package #QDR-5435-104-0725 which includes the following documents:

a) EDS Report #02-0570-1066, "Environmental Qualification of Class 1E Electrical Equipment".

b) Spec. #4616 - "Motor Control Centers for Yankee Rowe".

c) Generic Material Evaluation of Components Used in Motor Control Centers.

106 Attachment 2 - Thermal Effects of Recirculating Fluids.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Short Term	2.75 hours	Note 1	104 Note 5	Simul. Test and Eng. Analysis	--
Temperature	Fig. III.1-1	Fig. IV.3-10	101	104	Simultaneous Test	--
Pressure	Fig. III.1-2	Fig. IV.3-11	101	104	Simultaneous Test	--
Relative Humidity	100%	100%	Note 2	104	Simultaneous Test	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	2.4 x 10^6R	2.5 x 10^6R	107	104	Sequential Test	--
Aging	40 years	40 years	Note 3	104 Note 4	Engineering Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Level Transmitter

Manufacturer:
Fischer & Porter

Model or Type:
13D-2495-JANS

Accuracy:
Specified: 5%
Demonstrated: 3.5%

Location:
Area: Vapor Container
Elevation: 1079'

Flood Level:
Elevation: 1057'
Above Flood Level: Yes

System:
Feedwater System

Function (See Appendix IV.2-2):
Steam Generator Level Trip

Service:
FW-LT-1003
FW-LT-1103
FW-LT-1203
FW-LT-1303

Associated Components:
J-18 Terminal Block - Westinghouse
J-25 Cable - Continental
J-31 Penetrations - Westinghouse

APPENDIX II

NOTES:

(1) These transmitters are only required for a short-term reactor protection function.

(2) 100% relative humidity has been assumed for saturated steam conditions.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

(5) In the TER, FRC concludes that these transmitters are not qualified for long-term operation based on an environmental test (not referenced by Yankee Rowe) where a similar transmitter failed after 6 minutes. However, the TER does establish that in the test on which Yankee Rowe has based its qualification (Documentation Reference 2.8) the time-dependent temperature and pressure profile exceeded the postulated accident profile for 2.75 hours. In addition, FRC concludes that acceptable accuracy is demonstrated for 7 hours. Therefore, the Yankee Rowe units are acceptable for a short-term reactor protection function. Yankee Rowe will add a fully qualified wide range steam generator level transmitter on each steam generator to provide long-term level indication and retain the F&P transmitters only for the reactor protection function.

Yankee Rowe believes the failure of the transmitters in the FRC-referenced test was due to the lack of radiation-hardened electronics, which resulted in failure after heavy radiation and exposure to high temperature steam. The transmitters at Yankee Rowe were specifically quoted and purchased with radiation-resistant components. Similar units were successfully tested, although not sequentially, with a high radiation dose. Therefore, Yankee Rowe concludes that these transmitters are acceptable for long-term use until fully qualified transmitters are installed for the long-term requirement.

(6) The specified dose is the one-year dose. The actual dose will be much less for the short-term function.

DOCUMENTATION REFERENCES:

101 YAEC Letter to NRC, dated May 1, 1980.
YAEC Letter to NRC, dated June 5, 1980.

APPENDIX II

104 YAEC Qualification Document Review Package #QDR-5435-104-0122 which includes the following documents:

a) Acton Report No. 15421-6, Report of "Thermal Aging Analysis of Fischer and Porter Level Transmitter for Class 1E Service at Yankee Rowe Nuclear Power Generating Station".

b) Test Report 2204-51, B0006 - "Maximum Credible Accident Test on Electronic Transmitter".

c) Engineering Report - "Nuclear Radiation Investigation", Fischer and Porter Company.

107 YAEC Report #1253, "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1981.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Simul. Test and Eng. Analysis	--
Temperature	Fig. III.1-1	Fig. IV.3-17	101	104	Simultaneous Test	--
Pressure	Fig. III.1-2	Fig. IV.3-17	101	104	Simultaneous Test	--
Relative Humidity	100%	100%	Note 2	104	Simultaneous Test	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	1×10^7R	2×10^8R	107	104	Sequential Test	--
Aging	40 years	40 years	Note 3	104 Note 4	Seq. Test and Eng. Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Solenoid Valve

Manufacturer:
Valcor (Note 5)

Model or Type:
V526-5820-9

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Vapor Container
Elevation: 1105'

Flood Level:
Elevation: 1057'
Above Flood Level: Yes

System:
Hydrogen Vent System

Function (See Appendix IV.2-4):
Vapor Container Atmosphere Sampling

Service:
HV-SOV-1
HV-SOV-2

Associated Components:
J-18 Terminal Blocks - Westinghouse
J-19 Penetration - CBI and Field Fabrication
J-23 Cable - Rockbestos

APPENDIX II

NOTES:

(1) The valves operate intermittently during and after a LOCA event.

(2) 100% relative humidity has been assumed for saturated steam conditions.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintined by the plant maintenance and surveillance program.

(5) Yankee Rowe has previously provided documentation references which provide a high degree of confidence that the existing Atkomatic solenoid valves will perform their intended function. However, the documentation does not meet DOR guidelines, so Yankee Rowe will replace these valves with qualified solenoid valves as indicated by the revised worksheet.

DOCUMENTATION REFERENCES:

101 YAEC Letter to NRC, dated May 1, 1980.
YAEC Letter to NRC, dated June 5, 1980.

104 YAEC Qualification Document Review Package #QDR-5435-104-0404 which includes the following documents:

a) "Qualification Test Report for IEEE Class 1E Solenoid", QR 52600-5940-2.

107 YAEC Report #1253, "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1981.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	0.1 min.	Long Term	Note 1	104	Simul. Test and Eng. Analysis	--
Temperature	Fig. III.1-1	Fig. IV.3-8	101	104	Simultaneous Test	--
Pressure	Fig. III.1-2	Fig. IV.3-8	101	104	Simultaneous Test	--
Relative Humidity	100%	100%	Note 2	104	Simultaneous Test	--
Chemical Spray	None	--	--	--	--	--
Radiation	1 x 10^7R	4 x 10^7R	107	104	Sequential Test	--
Aging	40 years	40 years	Note 3	104 Note 4	Seq. Test and Eng. Analysis	--
Submergence	None	--	--	--	--	--

Component:
Pressure Transmitter

Manufacturer:
Rosemount

Model or Type:
1153 GA9

Accuracy:
Specified: 8%
Demonstrated: 6.95%

Location:
Area: Vapor Container
Elevation: 1105'

Flood Level:
Elevation: 1057'
Above Flood Level: Yes

System:
Main Coolant System

Function: (See Appendix IV.2-6 and IV.2-8):
Reactor Trip/Safety Injection

Service:
MC-PT-100 (Formerly MC-PD-9)
MC-PT-200 (New)
MC-PT-300 (New)
PR-PT-710 (Formerly PR-PD-6)

Associated Components:
J-18 Terminal Block - Westinghouse
J-24 Cable - Rockbestos
J-36 Seal - Conax
J-31 Penetration - Westinghouse

FACILITY: YANKEE ROWE
DOCKET NO.: 50-29

MC-3

APPENDIX II

NOTES:

(1) The time specified is based on the condition that these transmitters are used for reactor trip and safety injection actuation.

(2) 100% relative humidity has been assumed for conservatism.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

DOCUMENTATION REFERENCES:

101 YAEC Letter to NRC, dated May 1, 1980.
YAEC Letter to NRC, dated June 5, 1980.

104 NUS Qualification Document Review Package #QDR-5435-104-0138 which includes the following documents:

a) Acton Report No. 15421-18 (Revision 2), Report of "Thermal Aging Analysis of Rosemount Transmitters for Yankee Nuclear Power Station", dated 11/14/80.

b) RMT Report No. 117415, Revision B, Qualification Tests for Rosemount Pressure Transmitter, Model 1152.

c) RMT Report No. 3788, Qualification Test Report for Rosemount Pressure Transmitters, Model 1153 Series A.

107 YAEC Report #1253, "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1981.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Simul. Test and Eng. Analysis	--
Temperature	Fig. III.1-1	Fig. IV.3-12	101	104	Simultaneous Test	--
Pressure	Fig. III.1-2	Fig. IV.3-13	101	104	Simultaneous Test	--
Relative Humidity	100%	100%	Note 2	104	Simultaneous Test	--
Chemical Spray	N/A	—	--	--	--	--
Radiation	5×10^6R	5×10^6R	107	104	Sequential Test	--
Aging	40 years	40 years	Note 3	104 Note 4	Seq. Test and Eng. Analysis	--
Submergence	N/A	—	--	--	--	--

Component:
Pressure Transmitter

Manufacturer:
Rosemount

Model or Type:
1152

Accuracy:
Specified:
Demonstrated:

Location:
Area: Vapor Container
Elevation: 1105' (Note 5)

Flood Level:
Elevation: 1057'
Above Flood Level: Yes

System:
Main Coolant System

Function (See Appendix IV.2-7):
Pressure Information

Service:
MC-PT-712

Associated Components:
J-18 Terminal Block - Westinghouse
J-24 Cable - Rockbestos
J-36 Seal - Conax
J-31 Penetration - Westinghouse

FACILITY: YANKEE ROWE
DOCKET NO.: 50-29

MC-4

APPENDIX II

NOTES:

(1) Provides continuous pressure indication.

(2) 100% relative humidity has been assumed for conservatism.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

(5) This transmitter has been moved to a new location outside the biological shield wall. A Conax seal has been used to protect the internals of the transmitter from any harsh environmental conditions.

DOCUMENTATION REFERENCES:

101 YAEC Letter to NRC, dated May 1, 1980.
YAEC Letter to NRC, dated June 5, 1980.

104 NUS Qualification Document Review Package #QDR-5435-104-0138 which includes the following documents:

a) Acton Report No. 15421-18 (Revision 2), Report of "Thermal Aging Analysis of Rosemount Transmitters for Yankee Nuclear Power Station", dated 11/14/80.

b) RMT Report No. 117415, Revision B, Qualification Tests for Rosemount Pressure Transmitter, Model 1152.

c) RMT Report No. 3788, Qualification Test Report for Rosemount Pressure Transmitters, Model 1153 series A.

107 YAEC Report #1253, "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1981.

APPENDIX II

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term		Note 1	Note 4		--
Temperature	Fig. III.1-1		101	Note 4		--
Pressure	Fig. III.1-2		101	Note 4		--
Relative Humidity	100%		Note 2	Note 4		--
Chemical Spray	N/A	--	--	--	--	--
Radiation	2×10^7R		107	Note 4		--
Aging	40 years		Note 3	Note 4		--
Submergence	N/A	--	--	--	--	--

Component:
In-Core Thermocouple

Manufacturer:
Thermo-Electric

Model or Type:
W E Spec 676511

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Vapor Container
Elevation: Approx. 1080'

Flood Level:
Elevation: 1057'
Above Flood Level: Yes

System:
Main Coolant System

Function (See Appendix IV.2-5):
Temperature Measurement

Service:

MC-TD-D1	MC-TD-A4	MC-TD-E2
MC-TD-E1	MC-TD-B4	MC-TD-G10
MC-TD-C2	MC-TD-C4	MC-TD-B7
MC-TD-D2	MC-TD-D4	MC-TD-K6
MC-TD-G3	MC-TD-E4	MC-TD-D8
MC-TD-B3	MC-TD-A5	MC-TD-H2
MC-TD-C3	MC-TD-B5	MC-TD-H5
MC-TD-D3	MC-TD-C5	MC-TD-H7
MC-TD-E3	MC-TD-D5	MC-TD-F7
MC-TD-E5	MC-TD-C6	

Associated Components:
J-19 Penetration - CBI and Field Fabrication

FACILITY: YANKEE ROWE
DOCKET NO.: 50-29

MC-10

APPENDIX II

NOTES:

(1) Provides continuous temperature indication.

(2) 100% relative humidity has been assumed for conservatism.

(3) A 40-year qualified life requirement has been assumed.

(4) The thermocouples provide information to the saturation meter as a TMI requirement. The connection of the extension wire to the thermocouple is made at the reactor head and is in an enclosure. Since this connection could be exposed to a steam environment, Yankee Rowe will have tests performed to assure the connections are qualified to current requirements. We have a contract with Acton Environmental Testing Corporation (see Reference 028) to test the incore thermocouple connections to the requirements of IEEE 323-1974. These tests will envelope the Yankee Rowe environmental parameters. Upon completion of the test, a report will be available. The expected completion of these tests is 12/81.

DOCUMENTATION REFERENCES:

028 YAEC Letter to Acton Laboratories, dated September 8, 1980.

101 YAEC Letter to NRC, dated May 1, 1980.
YAEC Letter to NRC, dated June 5, 1980.

107 YAEC Report #1253, "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1981.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Simul. Test and Eng. Analysis	--
Temperature	Fig. III.1-1	Fig. IV.3-8	101	104	Simultaneous Test	--
Pressure	Fig. III.1-2	Fig. IV.3-8	101	104	Simultaneous Test	--
Relative Humidity	100%	100%	Note 2	104	Simultaneous Test	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	1×10^7	4×10^7R	107	104	Sequential Test	--
Aging	40 years	40 years	Note 3	104 Note 4	Seq. Test and Eng. Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Pressurizer Pressure Transmitter

Manufacturer:
Rosemount

Model or Type:
1153 GA9

Accuracy:
Specified: 8%
Demonstrated: 6.95%

Location:
Area: Vapor Container
Elevation: 1110'

Flood Level:
Elevation: 1057'
Above Flood Level: Yes

System:
Pressurizer System

Function (See Appendix IV.2-9):
Pressurizer Pressure Information

Service:
PR-PT-700

Associated Components:
J-18 Terminal Block - Westinghouse
J-24 Cable - Rockbestos
J-36 Seal - Conax
J-31 Penetration - Westinghouse

FACILITY: YANKEE ROWE
DOCKET NO.: 50-29

APPENDIX II

NOTES:

(1) Operates continuously to provide input to subcooled margin monitor.

(2) 100% relative humidity has been assumed for saturated steam conditions.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

DOCUMENTATION REFERENCES:

101 YAEC Letter to NRC, dated May 1, 1980.
YAEC Letter to NRC, dated June 5, 1980.

104 NUS Qualification Document Review Package #QDR-5435-104-0138 which includes the following documents:

a) Acton Report No. 15421-18 (Revision 2), Report of "Thermal Aging Analysis of Rosemount Transmitters for Yankee Nuclear Power Station", dated 11/14/80.

b) RMT Report No. 117415, Revision B, Qualification Tests for Rosemount Pressure Transmitter, Model 1152.

c) RMT Report No. 3788, Qualification Test Report for Rosemount Pressure Transmitters, Model 1153 Series A.

107 YAEC Report #1253, "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1981.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term		Note 1	Note 5		--
Temperature	Fig. III.1-1		101	Note 5		--
Pressure	Fig. III.1-2		101	Note 5		--
Relative Humidity	100%		Note 3	Note 5		--
Chemical Spray	N/A	--	--	--	--	--
Radiation	2×10^7R		107	Note 5		--
Aging	40 years		Note 2	Note 5 Note 4		--
Submergence	N/A	--	--	--	--	--

Component:
Acoustic Accelerometer

Manufacturer:
Babcock & Wilcox

Model or Type:
N/A

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Vapor Container
Elevation: 1115'

Flood Level:
Elevation: 1057'
Above Flood Level: Yes

System:
Pressurizer System

Function (See Appendix IV.2-10):
Valve Position Indication

Service:
PR-2E-1A
PR-2E-1B
PR-2E-1C

Associated Components:
PR-7 Acoustic Transmitter - Babcock & Wilcox
J-38 Penetration - Westinghouse

APPENDIX II

NOTES:

(1) A long-term operating requirement of one year has been assumed.

(2) A 40-year qualified life requirement has been assumed.

(3) 100% relative humidity has been assumed for saturated steam conditions.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

(5) This is a TMI related item. The qualification program addressing all environmental parameters is presently in progress. Upon completion of this test program, all necessary qualification information will be reviewed to provide adequate qualification documentation.

DOCUMENTATION REFERENCES:

101 YAEC Letter to NRC, dated May 1, 1980.
YAEC Letter to NRC, dated June 5, 1980.

107 YAEC Report #1253, "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1981.

FACILITY: YANKEE ROWE
DOCKET NO.: 50-29

APPENDIX II

PR-7

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term		Note 1	Note 5		--
Temperature	Fig. III.1-1		101	Note 5		--
Pressure	Fig. III.1-2		101	Note 5		--
Relative Humidity	100%		Note 3	Note 5		--
Chemical Spray	N/A	--	--	--	--	--
Radiation	2×10^7R		107	Note 5		--
Aging	40 years		Note 2	Note 5 Note 4		--
Submergence	N/A	--	--	--	--	--

Component:
Acoustic Transmitter

Manufacturer:
Babcock & Wilcox

Model or Type:
N/A

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Vapor Container
Elevation: 1115'

Flood Level:
Elevation: 1057'
Above Flood Level: Yes

System:
Pressurizer System

Function (See Appendix IV.2-11):
Valve Position Indication

Service:
PR-ZT-1A
PR-ZT-1B
PR-ZT-1C

Associated Components:
J-18 Terminal Block - Westinghouse
J-24 Cable - Rockbestos
J-38 Penetration - Westinghouse
PR-6 Acoustic Accelerometer - B&W

APPENDIX II

NOTES:

(1) A long-term operating requirement of one year has been assumed.

(2) A 40-year qualified life requirement has been assumed.

(3) 100% relative humidity has been assumed for saturated steam conditions.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

(5) This is a TMI related item. The qualification program addressing all environmental parameters is presently in progress. Upon completion of this test program, all necessary qualification information will be reviewed to provide adequate qualification documentation.

DOCUMENTATION REFERENCES:

101 YAEC Letter to NRC, dated May 1, 1980.
YAEC Letter to NRC, dated June 5, 1980.

107 YAEC Report #1253, "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1982.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Engineering Analysis	--
Temperature	92°F (Max.)	Note 5	106	Note 5	Note 5	--
Pressure	Atmos.	Note 5	Note 2	Note 5	Note 5	--
Relative Humidity	Ambient	Note 5	Note 2	Note 5	Note 5	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	2.3×10^6R	8×10^6R	102	104	Engineering Analysis	--
Aging	40 years	Note 4	Note 3	Note 4	Surveillance Program	--
Submergence	N/A	--	--	--	--	--

Component:
Motor

Manufacturer:
Electric Machinery

Model or Type:
1C

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Primary Auxiliary Building
Elevation: 1022'-8"

Flood Level:
Elevation: N/A
Above Flood Level: N/A

System:
Safety Injection System

Function (See Appendix IV.2-17):
Low Pressure SI Pump

Service:
P-48-1
P-48-2
P-48-3

Associated Components:

J-32	Control Cable
J-34	Power Cable
EPS-3	480V SWGR

APPENDIX II

NOTES:

(1) Provides long-term injection into the cold legs.

(2) This area is ventilated with outside air.

(3) A 40-year qualified life requirement has been assumed.

(4) This equipment will be included in the plant maintenance and surveillance program for evaluation of aging degradation.

(5) The maximum postulated DBE level for this environmental parameter is within normal operating limits. Equipment has been specified and designed in accordance with industry standards to operate continuously in this environment.

DOCUMENTATION REFERENCES:

102 Engineering Analysis #YR-ADH-80-5, "Summary of Radiation Exposure to Class 1E Equipment Outside Containment at Yankee Rowe".

104 YAEC Qualification Document Review Package #QDR-5435-104-0363 which includes the following documents:

a) EDS Report #02-0570-1066, "Environmental Qualification of Class 1E Electrical Equipment".

106 Attachment 2 - Thermal Effects of Recirculating Fluids.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Engineering Analysis	--
Temperature	92°F	Note 5	106	Note 5	Note 5	--
Pressure	Atmos.	Note 5	Note 2	Note 5	Note 5	--
Relative Humidity	Ambient	Note 5	Note 2	Note 5	Note 5	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	6.5×10^5R	3×10^7R	105	104	Engineering Analysis	--
Aging	40 years	Note 4	Note 3	Note 4	Surveillance Program	--
Submergence	N/A	--	--	--	--	--

Component:
Motor

Manufacturer:
General Electric

Model or Type:
5K404AK174

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Primary Auxiliary Building
Elevation: 1022'-8"

Flood Level:
Elevation: N/A
Above Flood Level: N/A

System:
Safety Injection System

Function (See Appendix IV.2-17):
High Pressure SI Pump

Service:
P49-1
P49-2
P49-3

Associated Components:

J-32	Control Cable
J-34	Power Cable
EPS-3	480V SWGR

APPENDIX II

NOTES:

(1) Provides long-term injection into the cold legs.

(2) This area is ventilated with outside air.

(3) A 40-year qualified life requirement has been assumed.

(4) This equipment will be included in the plant maintenance and surveillance program for evaluation of aging degradation.

(5) The maximum postulated DBE level for this environmental parameter is within normal operating limits. Equipment has been specified and designed in accordance with industry standards to operate continuously in this environment.

DOCUMENTATION REFERENCES:

102 Engineering Analysis #YR-ADH-80-5, "Summary of Radiation Exposure to Class 1E Equipment Outside Containment at Yankee Rowe".

104 YAEC Qualification Document Review Package #QDR-5435-104-0325 which includes the following documents:

a) FIRL Final Report, F-C2902, "Qualification Test of Prototype Vertical Induction Motor Containment Recirculation Spray Pump".

106 Attachment 2 - Thermal Effects of Recirculating Fluids.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	0.1 min.	0.1 min.	Note 1	104	Engineering Analysis	--
Temperature	Fig. III.1-1	Fig. IV.3-9	101	104	Simultaneous Test	--
Pressure	Fig. III.1-2	Fig. IV.3-9	101	104	Simultaneous Test	--
Relative Humidity	100%	100%	Note 2	104	Simultaneous Test	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	4 x 10^2R	4 x 10^2R	Note 6	104	Engineering Analysis	--
Aging	10 years	10 years	Note 3	104 Note 4	Engineering Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Pressure Switch

Manufacturer:
Static "O" Ring

Model or Type:
7828-100

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Vapor Container
Elevation: 1105'

Flood Level:
Elevation: N/A
Above Flood Level: Yes

System:
Safety Injection System

Function (See Appendix IV.2-13):
Safety Injection Initiation

Service:
SI-PS-14

Associated Components:
J-18 Terminal Block - Westinghouse
J-19 Penetration - CBI and Field Fabrication
J-24 Cable - Rockbestos
J-37 Terminal Block - Marathon

APPENDIX II

NOTES:

(1) This switch is used to initiate safety injection; it is not required to function once safety injection has commenced.

(2) 100% relative humidity has been assumed for conservatism.

(3) Replacement of this switch is scheduled prior to the end of its 10-year qualified life.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

(5) FRC's evaluation of this switch agrees with the Yankee Rowe position that the switch has a short-term function. However, FRC is committed to adhere to the one-hour NRC requirement for minimum operating time. This requirement ignores the Yankee Rowe position that no fuel damage can occur before the switch operates, even in more than one hour, because the pressure is too high to permit fuel failure. Therefore, Yankee Rowe does not believe the switch is deficient for radiation dose tolerance, because the most tolerant material has been evaluated to withstand a one-year dose. Although the steam temperature/pressure test was not run for one hour, the test was specified and performed according to the exact requirements of IEEE-323-1974 at the time the test was performed (before the one-hour requirement). FRC concludes that the switch is not qualified, because the one-hour requirement is not met.

Yankee Rowe believes this switch will adequately perform its intended function. However, since the switch is not tested to the latest requirements, Yankee Rowe will replace this switch when a qualified replacement (if availab. , possibly by late 1981) or we will redesign the SIAS initiation circuitry to accomplish the switch's function by other methods.

(6) The specified radiation dose is only the normal operating dose expected prior to any DBE (see Note 5).

DOCUMENTATION REFERENCES:

101 YAEC Letter to NRC, dated May 1, 1980.
YAEC Letter to NRC, dated June 5, 1980.

APPENDIX II

104 YAEC Qualification Document Review Package #QDR-5435-104-0242 which includes the following documents:

a) Acton Report No. 15421-11, Report of "Thermal Aging Analysis of Static-O-Ring Pressure Switches for Class 1E Service at Yankee Rowe Nuclear Power Generating Station".

b) Qualification Test Report #44296-2, Wyle Laboratories.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	24 hours	Long Term	Note 1	104	Simul. Test and Eng. Analysis	--
Temperature	95°F	Fig. IV.3-15	106	104	Simultaneous Test	--
Pressure	Atmos.	Fig. IV.3-15	Note 2	104	Simultaneous Test	--
Relative Humidity	Ambient	100%	Note 2	104	Simultaneous Test	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	1.0×10^6R Note 5	2×10^7R	102	104	Sequential Test	--
Aging	40 years	40 years	Note 3	104 Note 4	Seq. Test and Eng. Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Motor Operated Valve

Manufacturer:
Limitorque

Model or Type:
SMB-1, SMB-00
SMB-000

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Primary Auxiliary Building
Elevation: Various

Flood Level:
Elevation: N/A
Above Flood Level: N/A

System:
Safety Injection System

Function (See Appendix IV.2-18, IV.2-19, IV.2-20, & IV.2-21):
Transfer to Recirculation Mode

Service:
SI-MOV-48, SI-MOV-49, SI-MOV-514
SI-MOV-515, SI-MOV-516, SI-MOV-517,
SI-MOV-518

Associated Components:

J-24	Power and Control Cable - Rockbestos
J-27	Contactor - ITE
J-28	Reversing Starter - Westinghouse
J-32	Control Cable - Collyer
J-34	Power Cable - General Cable
EPS-4	480V MCC - Westinghouse

APPENDIX II

NOTES:

(1) These valves will be required to operate within 24 hours.

(2) This area is ventilated with outside air.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

(5) The specified radiation value is a 30-day dose. The actual dose will be less.

DOCUMENTATION REFERENCES:

102 Engineering Analysis #YR-ADH-80-5, "Summary of Radiation Exposure to Class 1E Equipment Outside Containment at Yankee Rowe".

104 YAEC Qualification Document Review Package #QDR-5435-104-0531 which includes the following documents:

a) "Qualification Type Test Report, Limitorque Valve Actuators for Class 1E Service Outside Primary Containment", 11/13 - 1/23/75, Report No. B0003.

b) Limitorque Valve Actuator Temperature Related to High Superheat Ambient Temperatures", Report No. B0027, Revision A, 10/18/78.

c) Acton Report No. 15421-20, Revision 2, Report of "Thermal Aging Analysis of Limitorque Valve Actuators for Yankee Nuclear Power Station", Rowe, Massachusetts.

d) "Limitorque Valve Actuator Qualification for Nuclear Power Station Service", Test Report No. B0058, 1/11/80.

e) Acton Report No. 15421-26, "Analysis of 1E Qualification of Limitorque Valve Actuators for Yankee Nuclear Power Station", Rowe, Massachusetts.

f) "Performance Qualification Tests of Four Valve Operators", Final Report F-C4124.

106 Attachment 2 - Thermal Effects of Recirculating Fluids.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	0.5 hours	5 hours	Note 1	104	Simul. Test and Eng. Analysis	--
Temperature	Fig. III.1-1	Fig. IV.3-1	101	104	Simultaneous Test	--
Pressure	Fig. III.1-2	Fig. IV.3-2	101	104	Simultaneous Test	--
Relative Humidity	100%	100%	Note 2	104	Simultaneous Test	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	1.1×10^7R Note 6	$\times 10^7$R	107	104	Sequential Test	--
Aging	40 years	40 years	Note 3	104 Note 4	Seq. Test and Eng. Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Motor Operated Valve

Manufacturer:
Limitorque

Model or Type:
SMA-2

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Vapor Container
Elevation: 1062' 8"

Flood Level:
Elevation: 1057'
Above Flood Level: Yes

System:
Safety Injection System

Function (See Appendix IV.2-1):
Recirculation Mode Alignment

Service:
CS-MOV-535

Associated Components:
J-18 Terminal Block - Westinghouse
J-19 Penetration - CBI and Field Fabrication
J-20 Cable - General Cable
J-24 Cable - Rockbestos

APPENDIX II

NOTES:

(1) The time specified is based upon the time required to pump 77,000 gallons from the SI tank.

(2) 100% relative humidity has been assumed for conservatism.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

(5) Although there is a deficiency in the availability of complete documentation to demonstrate complete compliance to the DOR guidelines, the available test data and other supporting documents provide reasonable assurance that operation of the valve operator will be satisfactory.

(6) The specified radiation value is a 30-day dose. The actual dose will be less.

DOCUMENTATION REFERENCES:

101 YAEC Letter to NRC, dated May 1, 1980.
YAEC Letter to NRC, dated June 5, 1980.

104 YAEC Qualification Document Review Package #QDR-5435-104-0531 which includes the following documents:

a) "Qualification Type Test Report, Limitorque Valve Actuators for Class 1E Service Outside Primary Containment", 11/13 -1/23/75, Report No. B0003.

b) "Limitorque Valve Actuator Temperature Related to High Superheat Ambient Temperatures", Report No. B0027, Revision A, 10/18/78.

c) Acton Report No. 15421-20,, Revision 2, Report of "Thermal Aging Analysis of Limitorque Valve Actuators for Yankee Nuclear Power Station", Rowe, Massachusetts.

d) "Limitorque Valve Actuator Qualification for Nuclear Power Station Service", Test Report No. B0058, 1/11/80.

e) Acton Report No. 15421-26, "Analysis of 1E Qualification of Limitorque Valve Actuators for Yankee Nuclear Power Station", Rowe, Massachusetts.

APPENDIX I

f) "Performance Qualification Tests of Four Valve Operators", Final Report F-C4124.

107 YAEC Report #1253, "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1982.

FACILITY: YANKEE ROWE
DOCKET NO.: 50-29

APPENDIX II

SC-1

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	30 days	Long Term	Note 1	104	Simul. Test and Eng. Analysis	--
Temperature	Fig. III.1-1	Fig. IV.3-1	101	104	Simultaneous Test	--
Pressure	Fig. III.1-2	Fig. IV.3-2	101	104	Simultaneous Test	--
Relative Humidity	100%	100%	Note 2	104	Simultaneous Test	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	1.1×10^7R	2×10^7R	107	104	Sequential Test	--
Aging	40 years	40 years	Note 3	104 Note 4	Seq. Test and Eng. Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Motor Oper. Valve

Manufacturer:
Limitorque

Model or Type:
SMA-1

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Vapor Container
Elevation: 1066', 1068'

Flood Level:
Elevation: 1057'
Above Flood Level: Yes

System:
Shutdown Cooling

Function (See Appendix IV.2-12):
Long-Term Cooling

Service:
SC-MOV-551
SC-MOV-552
SC-MOV-553
SC-MOV-554

Associated Components:
J-18 Terminal Block - Westinghouse
J-19 Penetration - CBI and Field Fabrication
J-20 Cable - General Cable
J-24 Cable - Rockbestos
J-26 Cable - Simplex
J-29 Cable - Simplex
J-37 Terminal Block - Marathon

FACILITY: YANKEE ROWE
DOCKET NO.: 50-29

APPENDIX II

NOTES:

(1) Valves are operated when shutdown cooling is initiated.

(2) 100% relative humidity has been assumed for saturated steam conditions.

(3) A 40-year qualified life requirement has been assumed.

(4) The qualified life of this equipment will be maintained by the plant maintenance and surveillance program.

(5) Although there is a deficiency in the availability of complete documentation to demonstrate complete compliance to the DOR guidelines, the available test data and other supporting documents provide reasonable assurance that operation of the valve operator will be satisfactory.

DOCUMENTATION REFERENCES:

101 YAEC Letter to NRC, dated May 1, 1980.
YAEC Letter to NRC, dated June 5, 1980.

104 YAEC Qualification Document Review Package #QDR-5335-104-0531 which includes the following documents:

a) Qualification Type Test Report, "Limitorque Valve Actuators for Class 1E Service Outside Primary Containment", 11/13 - 1/23/75, Report No. B0003.

b) "Limitorque Valve Actuator Temperature Related to High Superheat Ambient Temperatures", Report No. B0027, Revision A, 10/18/78.

c) Acton Report No. 15421-20, Revision 2, Report of "Thermal Aging Analysis of Limitorque Valve Actuators for Yankee Nuclear Power Station, Rowe, Massachusetts.

d) "Limitorque Valve Actuator Qualification for Nuclear Power Station Service", Test Report No. B0058, 1/11/80.

e) Acton Report No. 15421-25, "Analysis of 1E Qualification of Limitorque Valve Actuators for Yankee Nuclear Power Station", Rowe, Massachusetts.

f) Performance Qualification Tests of Four Valve Motor Operators, Final Report F-C4124.

APPENDIX II

107 YAEC Report #1253, "Yankee Rowe Post-LOCA Radiation Exposure Due to Fission and Activation Products in the Vapor Container", August 1981.

SYSTEM COMPONENT EVALUATION WORKSHEET

ENVIRONMENT			DOCUMENTATION REFERENCE		QUALIFICATION METHOD	OUTSTANDING ITEMS
PARAMETER	SPECIFIED	QUALIFIED	SPECIFIED	QUALIFIED		
Operating Time	Long Term	Long Term	Note 1	104	Engineering Analysis	--
Temperature	95°F	Note 5	106	Note 5	Note 5	--
Pressure	Atmos.	Note 5	Note 2	Note 5	Note 5	--
Relative Humidity	Ambient	Note 5	Note 2	Note 5	Note 5	--
Chemical Spray	N/A	--	--	--	--	--
Radiation	5×10^5 R	1.0×10^8 R	102	104	Engineering Analysis	--
Aging	40 years	Note 4	Note 3	Note 4	Engineering Analysis	--
Submergence	N/A	--	--	--	--	--

Component:
Motor

Manufacturer:
Westinghouse

Model or Type:
CSP

Accuracy:
Specified: N/A
Demonstrated: N/A

Location:
Area: Primary Auxiliary Building
Elevation: 1022'-8"

Flood Level:
Elevation: N/A
Above Flood Level: N/A

System:
Shutdown Cooling

Function (See Appendix IV.2-22):
Shutdown Cooling Pump

Service:
P-19

Associated Components:
J-26 Power Cable
J-20 MI Cable

APPENDIX II

NOTES:

(1) Provides cooling to attain cold shutdown condition.

(2) This area is ventilated with outside air.

(3) A 40-year qualified life requirement has been assumed.

(4) This equipment will be included in the plant maintenance and surveillance program for evaluation of aging degradation.

(5) The maximum postulated DBE level for this environmental parameter is within normal operating limits. Equipment has been specified and designed in accordance with industry standards to operate continuously in this environment.

DOCUMENTATION REFERENCES:

102 Engineering Analysis #YR-ADH-80-5, "Summary of Radiation Exposure to Class 1E Equipment Outside Containment at Yankee Rowe".

104 YAEC Qualification Document Review Package #QDR-5435-104-0351 which includes the following documents:

106 Attachment 2 - Thermal Effects of Recirculating Fluids.

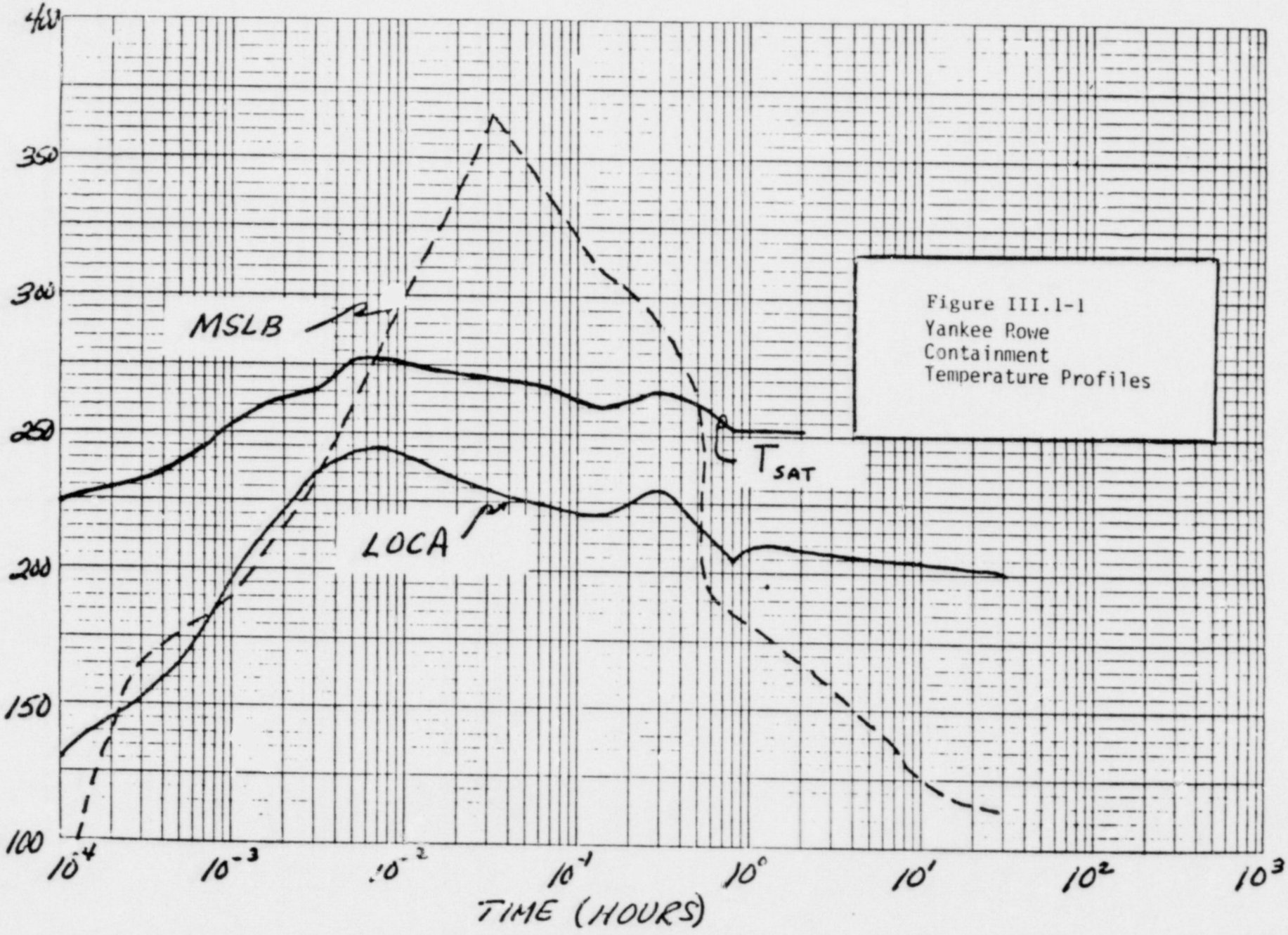
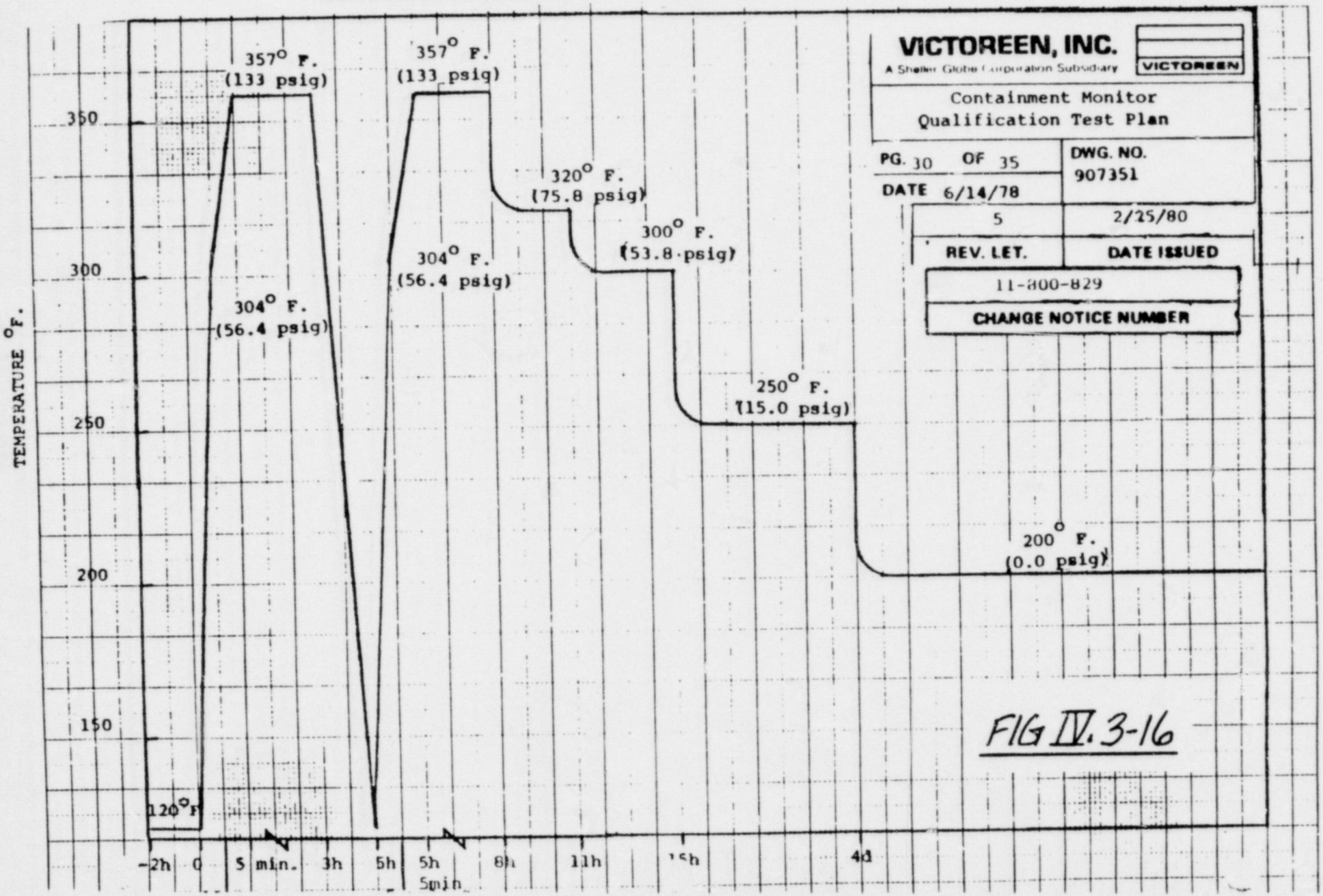


Figure III.1-1
Yankee Rowe
Containment
Temperature Profiles

Figure III.1-1

ENVIRONMENTAL TEST CYCLE



VICTOREEN, INC.
A Sheller Globe Corporation Subsidiary
VICTOREEN

Containment Monitor
Qualification Test Plan

PG. 30 OF 35	DWG. NO. 907351
DATE 6/14/78	
5	2/25/80
REV. LET.	DATE ISSUED

11-800-829
CHANGE NOTICE NUMBER

FIG IV.3-16

ENVIRONMENTAL TEST CYCLE

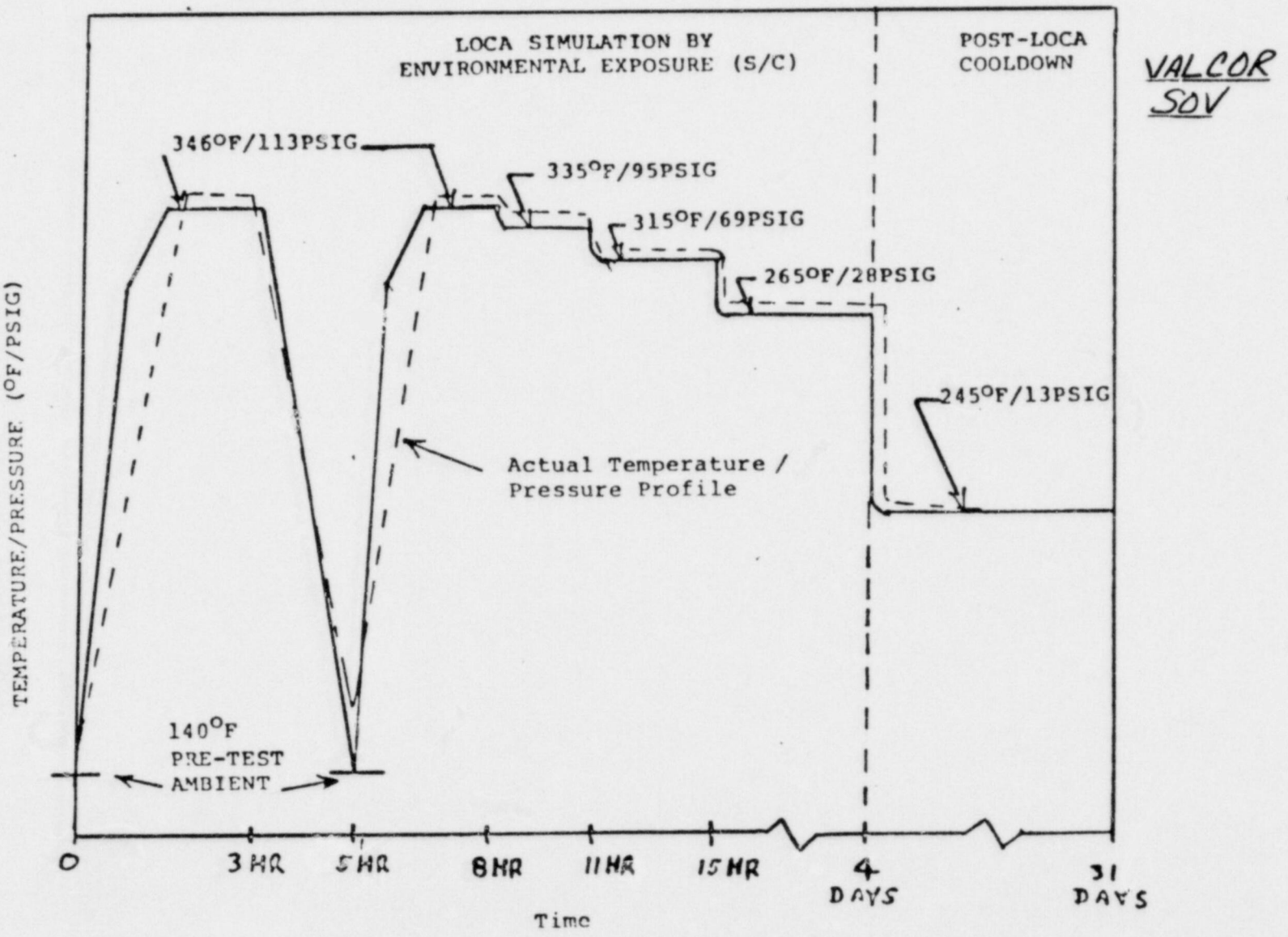


FIG IV.3-17

ENVIRONMENTAL TEST CYCLE

WESTINGHOUSE PENETRATION

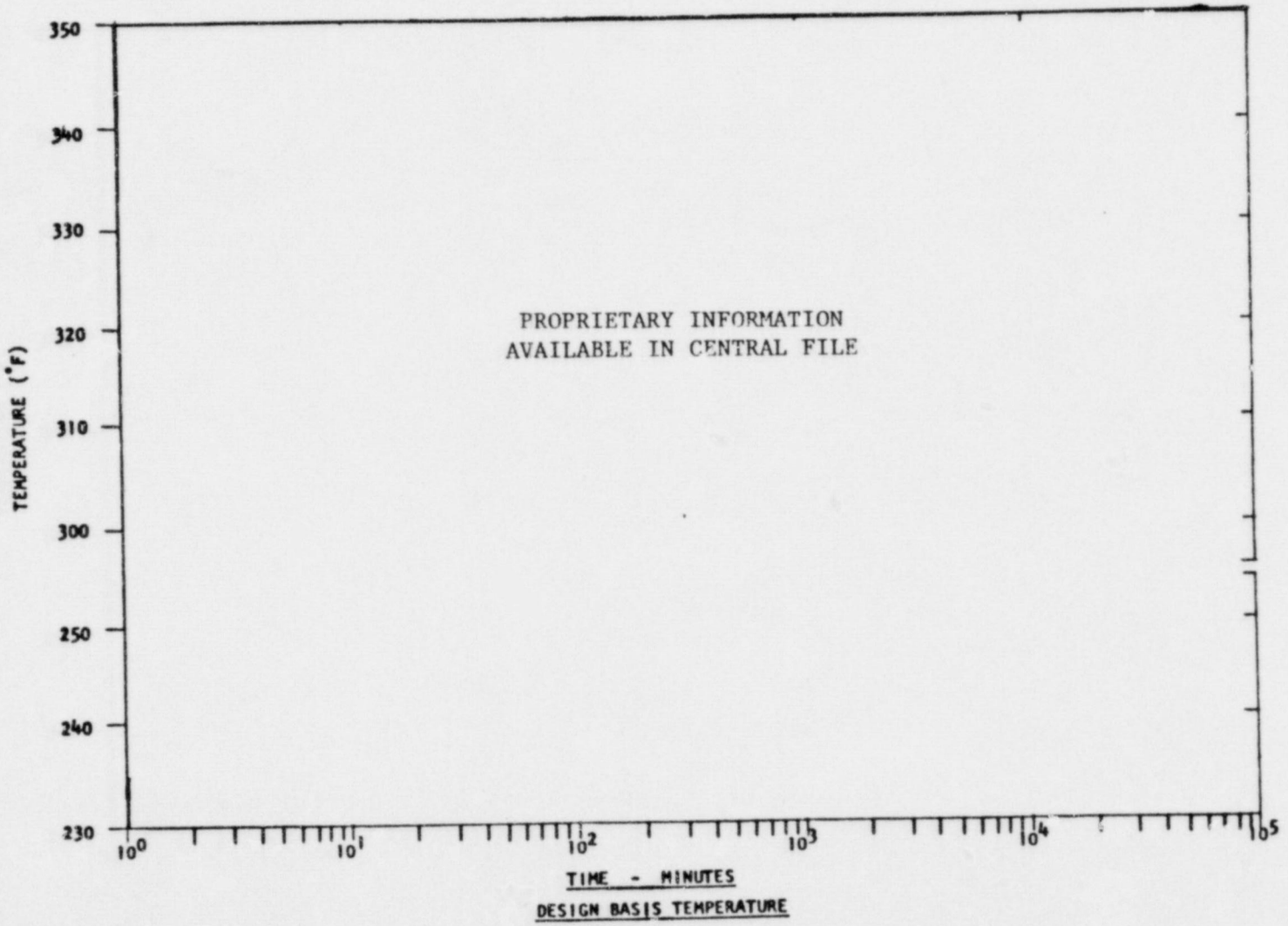


FIG IV.3-18

ENVIRONMENTAL TEST CYCLE

CONAX: SEAL

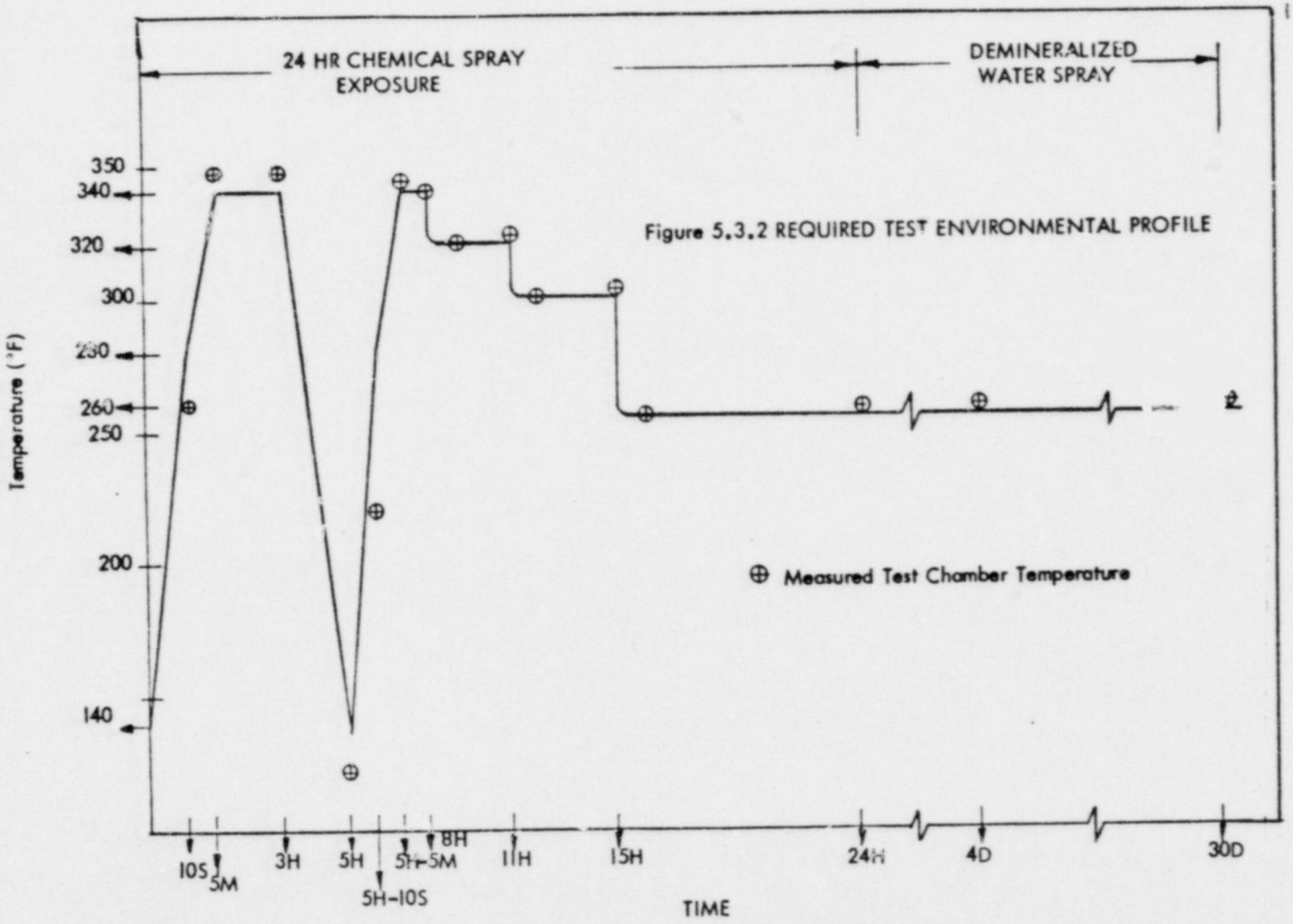


FIG IV.3-19

ENVIRONMENTAL TEST CYCLE

WESTINGHOUSE PENETRATION

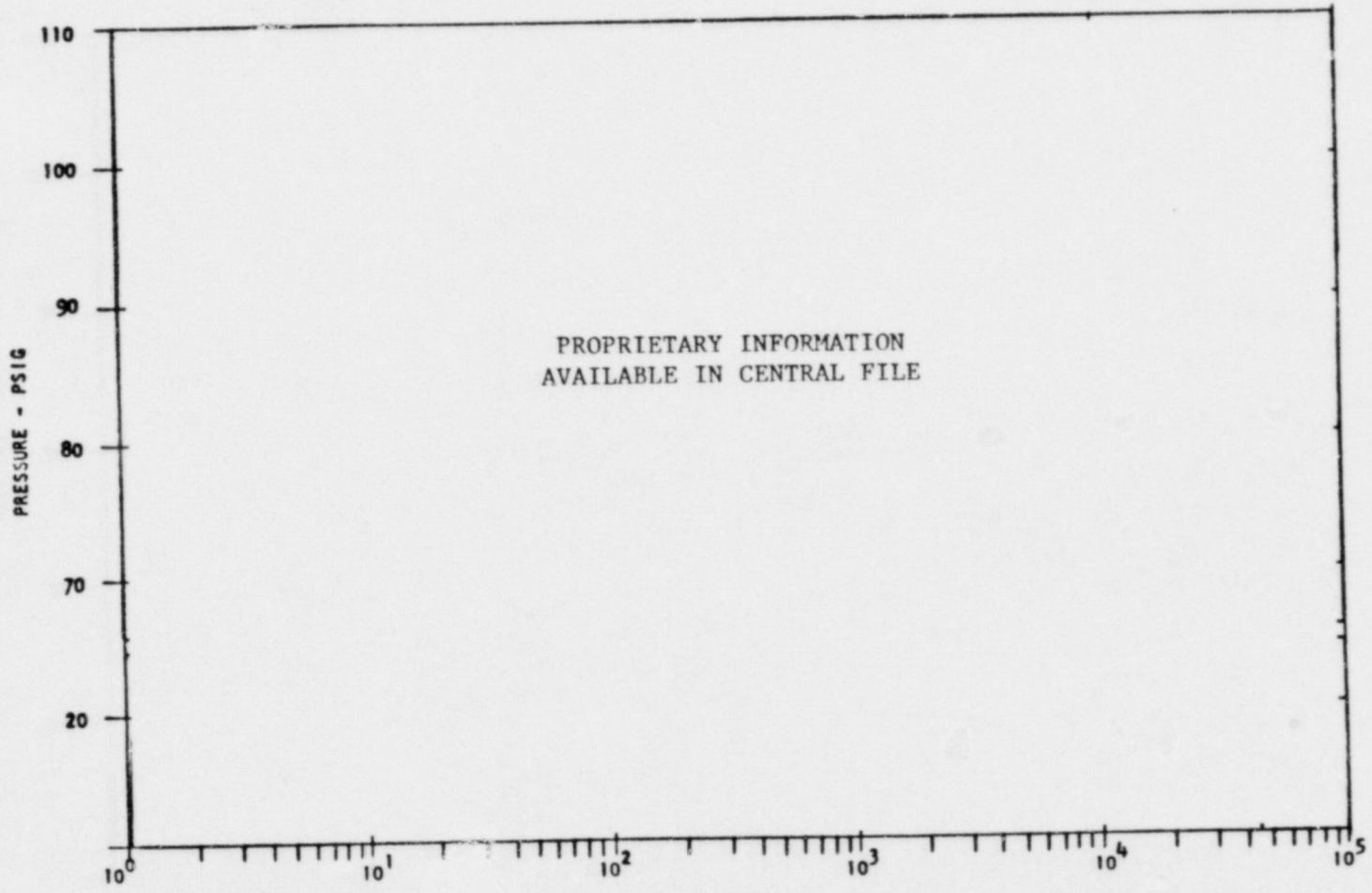


FIG IV.3-20

ENVIRONMENT TEST CYCLE

MARATHON TERMINAL BLOCK

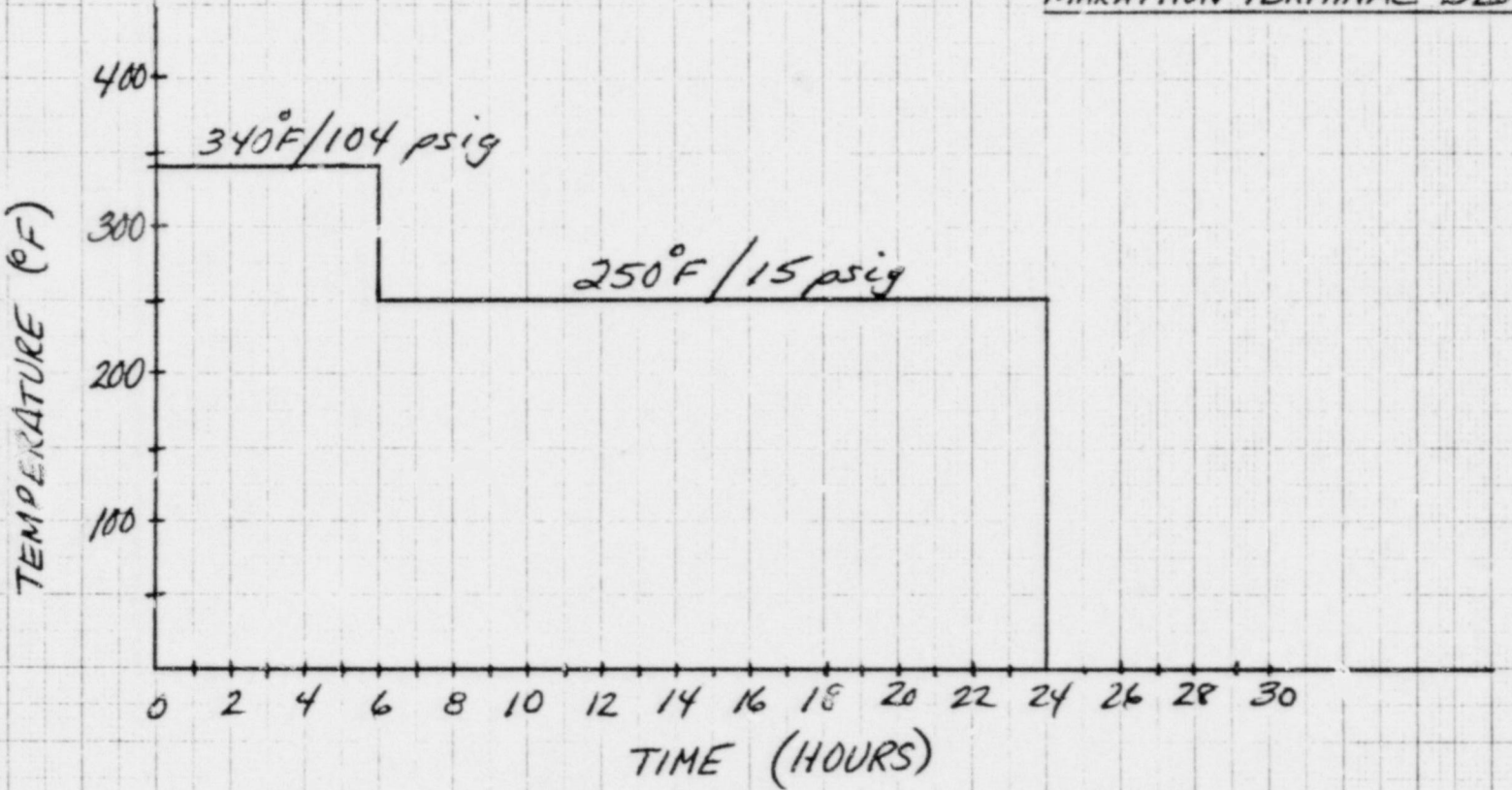


FIG IV. 3-21