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Portland General Electric Company

D.R. Miller Assistant Vice President

June 15, 1979

Trojan Nuclear Plant
Docket 50-344
License NPF-1

Mr. R. H. Engelken, Director
U.S. Nuclear Regulatory Commission
Region V
Suite 202, Walnut Creek Plaza
1990 N. California Blvd.
Walnut Creek, California 94596

Dear Sir:

Attached please find (Attachment 1) the supplemental submittal referred to in our letter of June 12, 1979, which transmitted our response to NRC IE Bulletin 79-01. As requested at the PGE/Westinghouse/NRC meeting in Washington, D. C. on June 8, 1979, the intent of this supplement is to provide additional information documenting discussions on the capabilities of the presently installed in-Containment instrumentation to perform short-term trip and long-term monitoring functions and means of backup long-term monitoring. In addition, please note that we have discovered the following typographical errors in the June 12 submittal that require your attention:

Item	Reference	Description
1	Enclosure 1, Last Paragraph, Page 5	Paragraph begins with: "Based on the above, we have concluded that proper documentation exists to assume that the safety-related electrical equipment will function...." The typographical error is with the word "assume". Please revise this to read: "Based on the above, we have concluded that proper documentation exists to assure that the safety-related electrical equipment will function...." A corrected version of Page 5 is attached (Attachment 2).
2	Attachment 3, All Pages	The column heading for pressure qualification is given as: VENDOR PRESSURE (PSIA) Please revise this to read: VENDOR PRESSURE (PSIG)

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Item	Reference	Description
3	Attachment 3, Pages 3 and 7	Arrows indicating common qualification references were inadvertently omitted from these pages. Corrected versions are attached (Attachments 3 and 4).

Please contact Mr. C. Goodwin, Jr., Assistant Vice President, Thermal Plant Operation and Maintenance, if you have any questions concerning this supplementary submittal.

Sincerely,

D. R. Miller
Assistant Vice President
System Engineering-Construction

DRM/HEW/SML/4kk3B18
Attachments

c: Mr. Lynn Frank, Director
State of Oregon
Department of Energy

Attachment No. 1
Supplement to IE Bulletin No. 79-01 Submittal

IN-CONTAINMENT INSTRUMENTATION -
SHORT-TERM TRIP/LONG-TERM MONITORING

I. SHORT-TERM TRIP CAPABILITY

The only in-Containment sensors and devices required to function for post-LOCA initiation of the safety-injection system are: (a) pressurizer pressure, (b) reactor coolant system RTDs (T_{avg}), and (c) steam line flows. Attachment No. 3 to the Portland General Electric Company's submittal dated June 12, 1979, responding to NRC IE Bulletin No. 79-01, documents the qualification of these instruments for operation in a post-LOCA environment. Attached Table No. 1 provides additional information concerning this qualification.

A review of the Trojan FSAR Chapter 15 (Accident Analyses) indicates that a maximum of 35 sec is expected before reaching a safety-injection signal setpoint in the postulated accident situation involving the slowest signal rise time. Since the minimum instrument operability time is at least 1 minute (per Table 1). the Trojan plant is assured of short-time trip capability for these in-Containment devices.

II. LONG-TERM MONITORING CAPABILITY

The inside Containment instrumentation available to provide operational information or safety-injection initiation or both, that can provide post-accident monitoring capability is as follows[1]:

(A) Pressurizer water level signal transmitter (three total)

(B) Steam generator water level signal transmitter (three per steam generator)

(C) RCS wide-range pressure signal transmitter (two total)

(D) RCS T_{cold} or T_{hot} RTDs (one T_{hot} and one T_{cold} per loop)

Attached Table No. 2, based on Attachment No. 3 to the 79-01 bulletin submittal, provides additional information concerning the long-term monitoring capability of these instruments.

The steam generator water level transmitters and RCS pressure (wide-range) transmitters are located at the 48 ft elevation in the Containment or about . ft below the maximum water level that would result from a condition III or IV LOCA break. Estimated instrument submergence would occur within about 3 hr for a 1 in. break, 1 hr for a 2 in. break and lesser time for larger breaks. These instruments are pressure tight, but submergence testing has not been conducted and the instruments may not provide monitoring capability when submerged. The signal transmitters (Items A, B and C) will be replaced at the earliest

[1] Reference: Trojan Nuclear Plant FSAR Tables 7.5-1 and 7.5-2.

opportunity, upon acceptance of the Westinghouse qualification testing of Barton Models 763 and 764 by the NRC. These models will be qualified for long-term post-accident environment monitoring capability, including submergence, as part of the Westinghouse Supplemental Qualification Program.

In addition to the above instrumentation, outside-Containment instrumentation (or alternative inside-Containment instrumentation) is presently available for long-term monitoring in the event of an accident. This instrumentation acts to back up the existing instrumentation for long-term monitoring and is considered an interim method of achieving reliable long-term post-accident monitoring. Once the Barton Model 763 and 764 transmitters are installed, following NRC approval of the Westinghouse Qualification Program, this instrumentation will not be necessary or relied upon to achieve reliable long-term monitoring (although most of it is essential to plant operation and/or safeguards initiation and will still be available). This backup instrumentation, the function that it backs up, and the way in which it can be used to perform that function are as follows:

FUNCTION	BACKUP INSTRUMENTATION [1]	PRESENTLY INSTALLED?	USE OF BACKUP INSTRUMENTATION
(A) Pressurizer Water Level	(1) Differential pressure measured outside Containment	No	Read directly from remote indication. PGE is presently in the process of adding a differential pressure transmitter utilizing existing pressurizer sample lines located outside Containment. If operation of the instrumentation is tested and found successful, specific test procedures (and operating procedures required in the event of an accident requiring long-term monitoring) can be made available before commercial operation is resumed, but are not available at this date (6/15/79).
	(2) Pressurizer steam temperature and water temperature RTDs	Yes (Some modification required)	By use of pressurizer temperature indication from existing pressurizer RTDs, a comparison of pressurizer steam and water temperatures can be made by the operator. If the water temperature is approaching the

[1] Listed in order of preference.

FUNCTION	BACKUP INSTRUMENTATION [1]	PRESENTLY INSTALLED?	USE OF BACKUP INSTRUMENTATION
			steam temperature, the pressurizer may be empty. However, if the steam temperature is approaching the water temperature, then the pressurizer is going solid. [NOTE: The existing pressurizer RTDs contain teflon-insulated lead wires and may not be satisfactorily moisture tight for the post-LOCA environment. The operability of these RTDs in such an environment will be enhanced by a modification to the RTD wiring and encapsulation of the terminals with a high temperature sealing compound. This work will be completed prior to plant operation.]
	(3) RCS pressure and charging pump flow	Yes (see Item C)	Read RCS pressure directly. The reactor coolant system is going solid if RCS pressure is rapidly increasing at the same time that the charging flow decreases.
	(4) RCP ammeter	Yes	Read ammeter directly. A fluctuating or low reactor coolant pump ammeter reading indicates approach of two-phase (steam/water mixture) flow.
	(5) Nuclear Instrumentation	Yes	Read directly. An increasing count rate indicates a decrease in shielding as water level approaches core.
(B) Steam Generator Water Level	(1) Differential pressure measured outside Containment	No	Read directly from remote indication. PGE is presently in the process of adding signal transmitters for each steam generator utilizing the

[1] Listed in order of preference.

FUNCTION	BACKUP INSTRUMENTATION [1]	PRESENTLY INSTALLED?	USE OF BACKUP INSTRUMENTATION
			existing steam generator blowdown lines and main steam lines located outside Containment. If operation of the instrumentation is tested and found successful, specific test procedures (and operating procedures required in the event of an accident requiring long-term monitoring) can be made available before commercial operation is resumed, but are not availalle at this date (6/15/79).
	(2) Steam generator pressure	Yes	Read pressure directly. (a) The atmospheric relief valve can be periodically opened. If the steam generator is nearly dry, it will rapidly depressurize. (b) While using the condenser steam dump valves, the operator can listen for flow through the dump valve and confirm that the steam generator pressure is stable near the no load value.
	(3) RCS Loop T_{hot} and T_{cold}	Yes	Safe shutdown conditions should show an RCS loop ΔT (ie, $T_{hot} - T_{cold}$) less than full load ΔT. Steam generator level has predictable effects on RCS loop ΔT characteristics.
	(4) Fill steam generator solid	Yes	This method would be considered a last resort. Indication is (a) water flow in steam lines and (b) possible discharge of two-phase water through atmospheric dump valves.

[1] Listed in order of preference.

FUNCTION	BACKUP INSTRUMENTATION [1]	PRESENTLY INSTALLED?	USE OF BACKUP INSTRUMENTATION
(C) Reactor Coolant System Pressure	(1) Centrifugal charging pump (high pressure) discharge pressure	Yes	Charging pump discharge pressure is available from panel C12 in the control room and from the plant computer.
	(2) Centrifugal charging pump flow	Yes	Charging pump flow is available at panel C12 in the control room and from the plant computer. With the charging pump running, the pump curve can be examined to estimate discharge pressure.
	(3) Safety injection pump (intermediate pressure) discharge pressure	Yes	Safety injection pump discharge pressure is available at panel C19 in the control room. This pressure is only accurate after the flow starts. If there is no safety injection flow, this indicates that the RCS pressure is greater than the safety injection pump discharge pressure.
	(4) RHR pump (low pressure) discharge pressure	Yes	RHR pump discharge pressure is available at panels C12 and C13 in the control room and from the plant computer. This pressure is only accurate after flow starts. If there is no flow, this indicates that the RCS pressure is greater than the RHR pump discharge pressure.
	(5) Pressure indicators in various RCS sample lines	Yes	Manipulate sample valves as necessary and read locally at the sample stations.
(D) RCS loops T_{cold}, T_{hot}, incore thermocouples	Steam generator pressure	Yes	Calculate RCS temperature by use of steam table.

[1] Listed in order of preference.

III. CONCLUSION

Based on the above information, we feel assured that the in-Containment instrumentation is adequately qualified as stated in the Trojan Nuclear Plant FSAR for the short-term task of initiating safety injection in a post-LOCA environment. Long-term post-accident monitoring will be improved when the Barton Model 763 and 764 transmitters are installed. However, the backup monitoring methods available as described above, and the procedures for their use, provide adequate long-term monitoring should the need arise.

TABLE NO. 1

IN-CONTAINMENT INSTRUMENTATION FOR SHORT-TERM TRIPS

Item	Description	Trojan Nuclear Plant Instrument Numbers	Make & Model	Qualification Reference	Qualified Time for Post-LOCA Operability
A.	Pressurizer Pressure Transmitter	PT455 PT456 PT457	Barton Model 393	Similarity to Model 386 WCAP-7744	> 1 minute
B.	Reactor Coolant System RTDs	TE413 A & B TE423 A & B TE433 A & B TE443 A & B	Rosemount Model 176KS	Qualified by type test in WCAP-9157	14 days
C.	Steam Generator Steam flow	FT512 FT513 FT522 FT523 FT532 FT533 FT542 FT543	Barton Model 384	Franklin Institute Research Lab Report C-2623	> 1 minute

TABLE No. 2

IN-CONTAINMENT INSTRUMENTATION USEFUL FOR LONG-TERM MONITORING

Item	Description	Trojan Nuclear Plant Instrument Numbers	Make & Model	Qualification Reference	Qualified Time for Post-LOCA Operability	Capable of Long-Term Monitoring
A.	Pressurizer Water Level Signal Transmitter	LT459 LT460 LT461	Foxboro Model E13-DH	1. WCAP-8541 2. Westinghouse letter filed on D. C. Cook docket*	14 days minimum	Yes
B.	Steam Generator Water Level Signal Transmitter	LT517 LT537 LT518 LT538 LT519 LT539 LT527 LT547 LT528 LT548 LT529 LT549	Barton Model 384	Franklin Institute Research Lab Report C-2623	> 1 minute	Indeterminate
C.	RCS Wide Range Pressure Signal Transmitters	PT403 PT405	Barton Model 389	None	Not tested	Indeterminate
D.	RCS T_{cold} and T_{hot}	TE413 A & B TE423 A & B TE433 A & B TE443 A & B	Rosemount Model 176KS	WCAP-9157	14 days	Yes

*Note: This reference not included in attachment No. 3 of 6/12/79 submittal, as this letter has not yet been made available to PGE from Westinghouse.

PGE Response

Representative Class IE equipment located in the Containment that must function as described in Tables 3.11-1 and 6.2-1 of the FSAR was selected for the environmental qualification survey. The circuits for this equipment were checked from the Containment penetration to the end device to insure that all components such as connectors, terminal blocks, and splices were in accordance with the design drawings.

Color-marked prints, showing the cable routing, were developed for the survey team to aid them in following the cables in the plant. The survey team developed a checkoff list for each circuit that identified the circuit and all its components between the Containment penetration and the end device. The checkoff list information was then compared with the design drawings to identify any "unqualified" components.

The survey was completed by December 19, 1978.

4. Confirm radiation qualification exposure for Class 1E items in the Control and Auxiliary Buildings.

PGE Response

Radiation qualification noted on Attachment 3.

5. Confirm that environmental testing was sequential and the effects cumulative.

PGE Response

Refer to the "Remarks" column for equipment in Attachment 3.

Based on the above, we have concluded that proper documentation exists to assure that the safety-related electrical equipment will function under the environmental conditions created by the postulated loss-of-coolant accident and main stream line break, as specified in the Trojan Final Safety Analysis Report. Supplemental information will be provided to address in-Containment signal transmitter qualifications and interim backup monitoring.

TROJAN NUCLEAR PLANT
ENVIRONMENTAL QUALIFICATION REVIEW OF CLASS 1E ELECTRICAL EQUIPMENT

INSIDE CONTAINMENT

ATTACHMENT NO. 3
June 15, 1979

EQUIPMENT NO.	DESCRIPTION	SPEC NO.	LOCATION BLDG.	LOCATION ELEV.	ENVIRONMENTAL SERVICE CONDITION	VENDOR DOCUMENTATION TEMP. (°F)	VENDOR DOCUMENTATION PRESSURE (PSIA)	VENDOR DOCUMENTATION HUMIDITY %	RADIATION	CHEMICAL	METHOD OF QUALIFICATION AND REMARKS
101	Instrumentation Cable (American Insulated Wire, 2/c-#16, EP, 300V)	E-23A	All	All	I	286	60	100	1×10^8 R	Boric acid w/ NaOH, pH 9.0	Qualified by Type test in Franklin Institute Research Lab. Report F-C3463, Aug. 1972. Sequential Type II. Long-term capability.
102	Instrumentation Cable (AIW, 2/c-#16, Shld, EP, 300V)	E-23A	All	All	I	286	60	100	1×10^8 R		Qualified by Type test in Franklin Institute Research Lab. Report F-C3463, Aug. 1972. Sequential Type II. Long-term capability.
103	Instrumentation Cable (AIW, 3/c-#16, Shld, EP, 300V)	E-23A	All	All	I	286	60	100	1×10^8 R		Qualified by Type test in Franklin Institute Research Lab. Report F-C3463, Aug. 1972. Sequential Type II. Long-term capability.
104	Instrumentation Cable (AIW, 4/c-#16, Shld, EP, 300V)	E-23A	All	All	I	286	60	100	1×10^8 R		Qualified by Type test in Franklin Institute Research Lab. Report F-C3463, Aug. 1972. Sequential Type II. Long-term capability.
201	Instrumentation Cable (AIW, 2/c-#16, Shld, EP, 300V)	E-23A	Containment	All	I	286	60	100	1×10^8 R		Same as Cable 101. Sequential Type II. Long-term capability.
202	Instrumentation Cable (AIW, 3/c-#16, Shld, EP, 300V)	E-23A	Containment	All	I	286	60	100	1×10^8 R		Same as Cable 101. Sequential Type II. Long-term capability.
203	Instrumentation Cable (AIW, 4/c-#16, Shld, EP, 300V)	E-23A	Containment	All	I	286	60	100	1×10^8 R		Same as Cable 101. Sequential Type II. Long-term capability.
[illegible]	Instrumentation Cable - Triaxial (Twinlite, PE, 5kV)	E-23B	Containment	All	I	307	60	100	3.5×10^7 R	NaOH 10% by weight	Source, intermediate and power range detectors signal cable - not required for containment accident situations. Reference IEEE paper 68TP651 for qualification.
LT461	Pressurizer Level (Foxboro Model E13-DH)	M1	Containment	71 ft	I	300	60	100	2×10^8 R	1.5% Boric acid w/ NaOH, pH 9.25-10.0	Qualified by Type test in W Test Report WCAP-8541. Sequential Type II but separate testing for LOCA and radiation. Long-term capability.
LT461	Pressurizer Level (Foxboro Model E13-DH)	M1	Containment	71 ft	I	300	60	100	2×10^8 R		Qualified by Type test in W Test Report WCAP-8541.
LT461	Pressurizer Level (Foxboro Model E13-DH)	M1	Containment	71 ft	I	300	60	100	2×10^8 R		Qualified by Type test in W Test Report WCAP-8541.

TROJAN NUCLEAR PLANT
ENVIRONMENTAL QUALIFICATION REVIEW OF CLASS 1E ELECTRICAL EQUIPMENT

INSIDE CONTAINMENT

ATTACHMENT NO. 4
June 15, 1979

EQUIPMENT NO.	DESCRIPTION	SPEC NO.	LOCATION BLDG.	LOCATION ELEV.	ENVIRONMENTAL SERVICE CONDITION	VENDOR DOCUMENTATION TEMP. (°F)	VENDOR DOCUMENTATION PRESSURE (PSIA)	VENDOR DOCUMENTATION HUMIDITY %	RADIATION	CHEMICAL	METHOD OF QUALIFICATION AND REMARKS
TE413A & B	RC Hot/Cold Leg Temp. (Flexmount Model 176KS)	M1	Containment	60 ft	I	320	90	100	2×10^8R	1.14% Boric Acid w/0.17% NaOH	Same as TE 413A & B
TE423A & B	RC Hot/Cold Leg Temp. (Flexmount Model 176KS)	M1	Containment	60 ft	I	320	90	100	2×10^8R		
TE443A & B	RC Hot/Cold Leg Temp. (Flexmount Model 176KS)	M1	Containment	60 ft	I	320	90	100	2×10^8R		
TE410A & B	RC Δ T (Flexmount Model 176KF)	M1	Containment	60' 8"	I	320	90	100	2×10^8R		
TE411A & B	RC Δ T (Flexmount Model 176KF)	M1	Containment	60' 8"	I	320	90	100	2×10^8R		
TE420A & B	RC Δ T (Flexmount Model 176KF)	M1	Containment	60' 8"	I	320	90	100	2×10^8R		
TE421A & B	RC Δ T (Flexmount Model 176KF)	M1	Containment	60' 8"	I	320	90	100	2×10^8R		
TE430A & B	RC Δ T (Flexmount Model 176KF)	M1	Containment	60' 8"	I	320	90	100	2×10^8R		
TE431A & B	RC Δ T (Flexmount Model 176KF)	M1	Containment	60' 8"	I	320	90	100	2×10^8R		
TE440A & B	RC Δ T (Flexmount Model 176KF)	M1	Containment	60' 8"	I	320	90	100	2×10^8R		
TE441A & B	RC Δ T (Flexmount Model 176KF)	M1	Containment	60' 8"	I	320	90	100	2×10^8R		