



Portland General Electric Company

James E. Cross Vice President, Nuclear

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January 31, 1991

Trojan Nuclear Plant  
Docket 50-344  
License NPF-1

Mr. John B. Martin  
Regional Administrator, Region V  
U.S. Nuclear Regulatory Commission  
1450 Maria Lane, Suite 210  
Walnut Creek CA 94596-5368

Dear Mr. Martin:

Title 10 of the Code of Federal Regulations,  
Part 21 (10 CFR 21), Electrical Terminations

The attached report is submitted in accordance with 10 CFR 21, "Reporting of Defects and Noncompliance". A defect has been identified in the design of bolted-splice electrical termination kits used to connect No. 16 American Wire Gauge (AWG) electrical penetration assembly leads and field extension cables inside the Containment Building. Use of the termination kits, supplied by Conax Buffalo Corporation, results in terminations with diameters which exceed the allowable use range of the shrinkable sleeving covering the connections.

Sincerely,

Attachment

c: U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington DC 20555

Mr. David Stewart-Smith  
State of Oregon  
Department of Energy

Mr. R. C. Barr  
NRC Resident Inspector  
Trojan Nuclear Plant

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Mr. John B. Martin  
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Page 1 of 2

TITLE 10 OF THE CODE OF FEDERAL  
REGULATIONS, PART 21 (10 CFR 21) DEFECT REPORT

Portland General Electric Company (PGE)  
121 SW Salmon Street  
Portland, Oregon 97204

Report No. 91-01, Final Report  
Report Date: January 31, 1991

Responsible Officer:

Mr. J. E. Cross, Vice President, Nuclear

Date Responsible Officer Received Information:

January 31, 1991

Basic Component:

Bolted-Splice Electrical Termination Kit - PGE Purchase Order: NQ54328

<u>Part Description</u>	<u>Supplier Part Number</u>
No. 16 American Wire Gauge (AWG) Ring Tongue Connector	N44071-10
No. 8 - 32 x 0.25 Round Head Slotted Screw	N48323-16
No. 8 Internal Tooth Lock Washer	N48324-06
No. 8 - 32 Hex Nut	N48325-04
Braided Sleeving (Bolt Pad)	N45212-01
Heat Shrink Shim	N45180-019
Heat Shrink Sleeve (Raychem WCSF-200-N)	N45181-056

Firm Supplying Basic Component:

Conax Buffalo Corporation  
2300 Walden Avenue  
Buffalo, New York 14225

Description of Defect and  
Substantial Safety Hazard That Could Be Caused:

Two Containment Building electrical penetration assemblies (EPAs) through which safety-related and post-accident monitoring instrumentation circuits pass were replaced at Trojan during the 1990 Refueling Outage. Bolted-splice connections between the No. 16 AWG EPA leads and field extension cables inside the Containment Building were made using electrical termination kits supplied by Conax Buffalo Corporation. A defect has been

identified in the design of the termination kits. Use of the termination kits results in terminations with diameters which exceed the allowable use range of the shrinkable sleeving covering the connections.

The subject termination configuration is documented in Conax Buffalo Corporation's IPS-1622, "Installation and Maintenance Manual for Electrical Penetration Assemblies for Trojan Nuclear Plant". PGE created 13 models of the configuration for testing and determined that the measured diameters of the bolt pads of 12 of the models were in the range of 0.467 to 0.543 inches. The shrinkable sleeve allowable use range, which is the minimum to maximum range of substrate diameters over which the sleeving is intended for use, is 0.20 to 0.40 inches for loss of coolant accident conditions, per Raychem Corporation Product Book, "In-Line Splice Application Guide".

PGE, with assistance from Conax Buffalo Corporation and Raychem Corporation, searched for environmental qualification (EQ) testing that would support fully the use of the subject terminations. The search revealed only parts of several tests that could be applied to demonstrate the integrity of the terminations at Trojan. An engineering evaluation performed by PGE has determined that the use of the terminations is acceptable until replacement or successful EQ testing can be accomplished; however, it is concluded that had the design error gone undiscovered, performance of the affected circuits under loss of coolant accident conditions would be indeterminate. It is concluded that this design deficiency could have created a substantial safety hazard.

Number and Location of Such  
Components in Use at the Trojan Nuclear Plant:

The bolted-splice connections between the No. 16 AWG leads of EPAs AZ07 and CZ07 and the field extension cables inside the Containment Building are terminated with the subject termination kits.

Corrective Action:

PGE performed an engineering evaluation which considered the partial test data discussed above and the protection provided by the physical installation of the terminations at Trojan. It was concluded that the use of the terminations is acceptable until successful EQ testing or replacement can be accomplished at the next outage of sufficient duration. Both alternatives for final resolution are being pursued in parallel.