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SUBJECT: Forwards response to follow-up request for addl info re
GL 92-08, "Thermo-Lag 330-1 Fire Barriers."

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WILLIAM L. STEWART
EXECUTIVE VICE PRESIDENT
NUCLEAR

102-03297-WLS/SAB/NLT
March 28, 1995

U. S. Nuclear Regulatory Commission
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- References: 1) Letter dated December 28, 1994, from Roy P. Zimmerman, Associate Director for Projects, Office of Nuclear Reactor Regulation, USNRC, to William L. Stewart, Executive Vice President, Nuclear, APS
- 2) Letter dated February 21, 1995, W. H. Rasin, NEI, to W. T. Russell, Director, Office of Nuclear Reactor Regulation, USNRC
- 3) Letter dated December 22, 1994, from W. L. Stewart, Executive Vice President, Nuclear, APS, to USNRC

Dear Sirs:

**Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2, and 3
Docket Nos. STN 50-528/529/530
Response to the Follow-up to the Request for Additional Information
Regarding Generic Letter 92-08, Issued Pursuant to 10 CFR 50.54(f) on
December 28, 1994**

By letter dated December 28, 1994 (Reference 1), the NRC required that Arizona Public Service Company (APS), pursuant to 10 CFR 50.54(f), submit additional information regarding Generic Letter (GL) 92-08, "Thermo-Lag 330-1 Fire Barriers." The following information is provided as the response to this request.

APS is participating in the Nuclear Energy Institute (NEI) program, communicated to the NRC in Reference 2, to evaluate chemical composition as a means of addressing product consistency. APS has sent fire barrier material samples taken from Palo Verde Nuclear Generating Station (PVNGS), Units 1, 2, and 3, to the NEI designated laboratory so that generic data on product composition can be developed by NEI. APS will address the need for additional sampling and chemical analysis based upon the results and completion of the NEI program. Reasonable assurance will be obtained that products purchased from Thermal Sciences Incorporated (TSI) and installed in PVNGS Units 1,

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2, and 3, are representative of tested materials and configurations relied upon in order to perform fire endurance, ampacity derating, and combustibility evaluations.

APS has taken many actions, independent of the information and data supplied by TSI and independent of generic industry actions, which allow us to assess the applicability of generic data and information to the PVNGS Thermo-Lag 330-1 installations. These actions include the following:

- Destructive examinations on a sample basis of installations in each of the PVNGS units.
- Extensive plant walkdowns and visual inspections of as-built installations.
- Interviews with original installers on installation techniques and practices.
- Reviews of installation documentation, QA documentation, and procedures.

APS has performed destructive examinations of Thermo-Lag 330-1 installations primarily to document construction techniques and barrier parameters which could not be obtained via visual inspections. APS has not performed and does not intend to perform a quantitative statistical sampling campaign for destructive examinations. Examinations have been performed on barriers which are no longer credited for compliance to Appendix R commitments. These barriers were discussed in Section III.B.2 of Reference 3. The installations were located in each PVNGS unit and installed during various times of construction of PVNGS, and are considered a representative sample of PVNGS installations. At present, 15 configurations have been disassembled, inspected, documented on "as-built" field sketches, and the barriers' parameters have been analyzed. These 15 configurations, which include ancillary Thermo-Lag on supports and intervening steel, comprise approximately 500 square feet of Thermo-Lag 330-1 material. Individual panel thickness measurements were taken. There were no significant material deficiencies noted in the form of voids, cracks, or delaminations in the panels. The installations are consistent with the construction methods described during interviews with craft personnel involved in the original installation of the Thermo-Lag 330-1 panels at PVNGS.

The method for verification of each important barrier parameter provided in Section II of the December 1993 Request for Additional Information, was annotated in Attachment D to the Reference 3 submittal. This information is again provided as an enclosure to this letter, and contains additional information on those barrier and cable parameters for which field verification or destructive examination was performed. Since APS has relied

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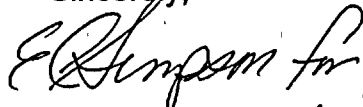
on TSI for information on the weight and density of Thermo-Lag 330-1 panels, further destructive examinations will be performed, as appropriate, by September 30, 1995, to evaluate panel weight and density. APS has not established a specific sampling campaign to obtain this information, but to maximize plant safety, an emphasis will be placed on barriers which will be maintained in place or those that need to be reworked to meet generically tested configurations.

APS has qualitatively concluded that the potential failure of Thermo-Lag in a seismic event will not adversely impact the functioning of any Seismic Category I plant feature. Thermo-Lag 330-1 panels are secured in place with extensive use of mechanical fasteners, tie wires, and stress skin stitched with tie wire. Based upon observations of destructive examinations performed to date, APS has concluded that in a seismic event Thermo-Lag 330-1 will crack, chip, and crumble, but will not fail in a gross manner (i.e., detachment of panels or sections from raceways). Quantitative mechanical properties of Thermo-Lag have not been used and are not required in evaluating Seismic Category 9 (Seismic 2 over 1) issues at PVNGS. APS will review raceway seismic calculations following the aforementioned evaluation of panel weight and density.

APS has not verified the mechanical properties identified by the NRC in Reference 1 such as tensile strength, compressive strength, shear strength, and flexural strength. The listed material properties are not required for evaluating the attributes of fire endurance rating, ampacity derating and combustibility of Thermo-Lag 330-1. These attributes are determined from laboratory testing to Industry Standards. Product performance is based on the criteria outlined in each individual Industry Standard, which is independent of the mechanical property values. Reasonable assurance of product consistency (chemical composition) will provide assurance of product performance in these areas.

Should you have any questions, please contact Scott A. Bauer at (602) 393-5978.

Sincerely,


W.L. Stewart

WLS/SAB/NLT/rv
Enclosure

cc: L. J. Callan
K. E. Perkins
B. E. Holian
K. E. Johnston

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

I, E. C. Simpson, represent that I am Vice President - Nuclear Support, Arizona Public Service Company (APS), that the foregoing document has been signed by me on behalf of APS with full authority to do so, that I am familiar with the content of such document and its enclosure and that to the best of my knowledge and belief, the statements made therein are true and correct.

E. C. Simpson
E. C. Simpson

Sworn To Before Me This 28 Day Of march, 1995.

Roxanne Vandillen
Notary Public

My Commission Expires

My Commission Expires June 12, 1997





ENCLOSURE

THERMO-LAG BARRIER

INSTALLATION AND CABLE PARAMETERS

THERMO-LAG BARRIER INSTALLATION AND CABLE PARAMETERS

BARRIER PARAMETER	DESCRIPTION	OBTAINED	VERIFIED (METHOD)	SUMMARY OF FIELD EVALUATIONS
1.	Raceway orientation (horizontal, vertical, radial bends)	Yes	Yes (Note 1)	Field walkdowns performed on 100% of fire-rated raceways.
2.	Conduit	Yes	Yes (Note 3)	Field evaluations not required.
3.	Junction boxes and lateral bends	Yes	Yes (Notes 1 & 3)	Field walkdowns performed on 100% of fire-rated raceways.
4.	Ladder back cable tray with single layer cable fill	Yes	Yes (Note 5)	Fire endurance parameter only; cable tray protection no longer required, parameter no longer required.
5.	Cable tray with T- section	Yes	Yes (Notes 1,3 & 5)	Fire endurance parameter only; cable tray protection no longer required, parameter no longer required.
6.	Raceway material (aluminum, steel)	Yes	Yes (Note 3)	Field evaluations not required.
7.	Support Protection, thermal shorts (penetrating elements)	Yes	Yes (Notes 1 & 3)	Field walkdowns performed on 100% of fire-rated raceways.
8.	Air drops	Yes	Yes (Note 5)	Fire endurance parameter only; cable tray protection no longer required, parameter no longer required.

BARRIER PARAMETER	DESCRIPTION	OBTAINED	VERIFIED (METHOD)	SUMMARY OF FIELD EVALUATIONS
9.	Baseline fire barrier panel thickness	Yes	Yes (Notes 1,2 & 3)	Approximately 500 sq. ft. of Thermo-Lag was destructively examined.
10.	Preformed conduit panels	Yes	Yes (Notes 1 & 4)	Field walkdowns performed on 100% of fire-rated raceways.
11.	Panel rib orientation (parallel or perpendicular to the raceway)	Yes	Yes (Note 2)	Approximately 500 sq. ft. of Thermo-Lag was destructively examined.
12.	Unsupported Spans	Yes	Yes (Note 1)	Field walkdowns performed on 100% of fire-rated raceways.
13.	Stress skin orientation (inside or outside)	Yes	Yes (Notes 1 & 2)	Externally: field walkdowns performed on 100% of fire-rated enclosures. Internally 500 sq. ft. of Thermo-Lag was destructively examined for information on utilization of internal stress skin.
14.	Stress skin over joints or no stress skin over joints	Yes	Yes (Notes 1 & 2)	Approximately 500 sq. ft. of Thermo-Lag was destructively examined including over 1300 linear feet of corner joints and approximately 120 individual butt joints.
15.	Stress skin ties or no stress skin ties	Yes	Yes (Note 2)	Over 1300 linear feet of corner joints were evaluated.

BARRIER PARAMETER	DESCRIPTION	OBTAINED	VERIFIED (METHOD)	SUMMARY OF FIELD EVALUATIONS
16.	Dry-fit, post buttered joints or pre-buttered joints	Yes	Yes (Note 2)	Approximately 500 sq. ft. of Thermo-Lag was destructively examined including over 1300 linear feet of corner joints and approximately 120 individual butt joints.
17.	Joint gap width	Yes	Yes (Note 2)	Approximately 120 individual butt joints.
18.	Butt joints or grooved and scored	Yes	Yes (Note 2)	Approximately 120 individual butt joints.
19.	Steel bands or tie wires	Yes	Yes (Note 2)	Approximately 500 sq. ft. of Thermo-Lag was destructively examined.
20.	Band/wire spacing	Yes	Yes (Note 2)	Approximately 500 sq. ft. of Thermo-Lag was destructively examined.
21.	Band/wire distance to joints	Yes	Yes (Note 2)	Approximately 120 individual butt joints.
22.	No internal bands in trays	Yes	Yes (Note 5)	Fire endurance parameter only; cable ray protection no longer required, parameter no longer required.

BARRIER PARAMETER	DESCRIPTION	OBTAINED	VERIFIED (METHOD)	SUMMARY OF FIELD EVALUATIONS
23.	No additional trowel material over sections and joints or additional trowel material applied.	Yes	Yes (Notes 1 & 2)	Field walkdowns performed on 100 % of fire-rated enclosures, 500 sq ft of Thermo-Lag was destructively examined to determine thickness of trowel material.
24.	No edge guards or edge guards	Yes	Yes (Notes 1 & 2)	Approximately 500 sq. ft. of Thermo-Lag was destructively examined.
CABLE PARAMETER	DESCRIPTION	OBTAINED	VERIFIED (METHOD)	SUMMARY OF FIELD EVALUATIONS
1.	Cable size and type (power, control, or instrumentation).	Yes	Yes (Note 3)	Field evaluations not required.
2.	Cable jacket type (thermoplastic, thermoset) and materials	Yes	Yes (Note 3)	Field evaluations not required.
3.	Cable conductor insulation type (thermoplastic, thermoset plastic) and materials	Yes	Yes (Note 3)	Field evaluations not required.
4a.	Cable fill	Yes	Yes (Note 3)	Field evaluations not required.

CABLE PARAMETER	DESCRIPTION	OBTAINED	VERIFIED (METHOD)	SUMMARY OF FIELD EVALUATIONS
4b.	Distribution of cables within the protected conduit or cable tray	No	No (Note 6)	
5.	Proximity of cables to the unexposed (inside) surfaces of the fire barrier.	No	No	
6.	Presence of materials between the cables and the unexposed side of the fire barrier material (for example, Sealtemp cloth, which is used in the NUMARC test specimens).	Yes	Yes (Notes 2 & 3)	Approximately 500 sq. ft. of Thermo-Lag was destructively examined.
7.	Cable operating temperature	Yes	Yes (Note 3)	Field verification is not required.
8.	Temperatures at which the cables can no longer perform their intended function when energized at rated voltage and current.	No	No (Note 7)	

NOTES PERTAINING TO TABLE

- Note 1: Verification is from field walkdowns to perform installation verification. Walkdowns were performed by Engineering with second party verification.
- Note 2: Field verification for each specific PVNGS installation was not performed. However, the installation technique for generic enclosures was determined by original installer testimony and verification of the testimony was performed utilizing destructive examination.
- Note 3: Verification is from design documentation.
- Note 4: PVNGS does not use pre-formed conduit panels. This has been validated by field walkdowns, Specifications, and Purchase Orders.
- Note 5: PVNGS no longer credits Thermo-Lag 330-1 on cable trays to comply with commitments to 10 CFR 50, Appendix R.
- Note 6: PVNGS no longer credits Thermo-Lag 330-1 on cable trays. Cables in conduits are random and the distribution of cables in conduit does not affect the applicability of fire endurance tests.
- Note 7: PVNGS will use the equipment qualification maximum temperature limitation for LOCA events for PVNGS' IEEE 383 cable.

