

Duquesne Light Company

Beaver Valley Power Station
P.O. Box 4
Shippingport, PA 15077-0004

JOHN D. SIEBER
Senior Vice President and
Chief Nuclear Officer
Nuclear Power Division

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(412) 393-5255
Fax (412) 643-8069

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

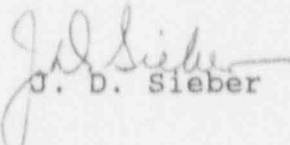
Subject: Beaver Valley Power Station, Unit No. 1
BV-1 Docket No. 50-334, License No. DPR-66
Response to Request for Additional Information for BVPS
Unit No. 1, NRC Generic Letter 92-08, "Thermo-Lag 330-1
Fire Barriers"

Provided as Enclosure 1 is the response to the request for additional information regarding Generic Letter 92-08, "Thermo-Lag 330-1 Fire Barriers" specific to Beaver Valley Power Station (BVPS) Unit 1.

The enclosed report provides information concerning the configurations and the quantity of Thermo-Lag fire barriers installed at BVPS Unit 1. An evaluation was previously developed for the existing Thermo-Lag fire barrier material installed at BVPS Unit 1. This was identified in our previous submittal response to Generic Letter 92-08, dated April 16, 1993.

Should you have any questions regarding this information or require additional information, please contact John Maracek at (412) 393-5232.

Sincerely,


J. D. Sieber

Attachment

cc: Mr. L. W. Rossbach, Sr. Resident Inspector
Mr. T. T. Martin, NRC Region I Administrator
Mr. G. E. Edison, Project Manager

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Response To Request for Additional Information
NRC Generic Letter 92-08 For
Beaver Valley Power Station (BVPS) Unit 1

ENCLOSURE 1

Introduction

The BVPS Unit No. 1 Cable Mezzanine Area (CS-1) was previously identified as an area utilizing Thermo-Lag 330-1 fire barrier material in our response to Generic Letter 92-08, dated April 16, 1993. Thermo-Lag 330-1 pre-formed conduit sections are used to extend certain fire barrier penetration seal configurations involving conduit sleeves for maintaining the integrity of the fire area boundary of the cable mezzanine floor.

The application of Thermo-Lag material for a 3" and a 5" conduit sleeve at BVPS Unit 1 was necessary due to modifications involving additional cables being routed through the penetrations resulting in rework of the original penetration seals. The new seals had to comply with our upgraded site fire seal program which was modeled to the latest standards of our Unit 2 facility for sealing internal conduit seals. Since the fire seal could not be installed within the plane of the barrier, the conduit sleeve was wrapped with Thermo-Lag fire barrier material to effectively extend the barrier to the seal (see enclosed sketches in Attachments 1 and 2). This method of sealing fire barrier penetrations was previously reviewed by the NRC and determined to be acceptable in our Safety Evaluation Report for BVPS Unit 2 (NUREG-1057, Supplement No. 5).

Engineering evaluations were developed for both configurations which demonstrated the adequacy of the configurations to effectively provide equivalent protection to that of the fire area boundary. The evaluations were based on the criteria and guidance provided in Generic Letter 86-10. The details of the evaluations are summarized in Attachments 1 and 2 of this correspondence, and are being provided as supporting documentation of our Thermo-Lag installations at BVPS Unit 1.

Itemized Response to Request for Additional Information

- I. Required Information for Section I.B, "Thermo-Lag Fire Barrier Configurations and Amounts"

Response:

Thermo-Lag 330-1 fire barrier material is used in the Unit 1 Cable Mezzanine Area for the purpose of extending the fire barrier penetrations of two conduit sleeves. Detailed descriptions of the two installations are provided in Attachments 1 and 2 which were developed as engineering evaluations to demonstrate the adequacy of the fire area boundary of the Cable Mezzanine Area.

Thermo-Lag was not utilized at BVPS Unit 1 for Regulatory Guide 1.75 applications or as a radiant energy shield. The Thermo-Lag installations at BVPS Unit 1 involve penetration seal configurations of conduit sleeves to effectively extend the barrier of the fire area boundary. Thermo-Lag was not utilized for the protection of electrical raceway applications at BVPS Unit 1.

II. Required Information for Section II.B, "Important Barrier Parameters"

Response:

Evaluations performed for the two penetration seals involving conduit sleeves utilizing Thermo-Lag material were based on qualified fire testing as noted in Attachments 1 and 2.

The Thermo-Lag material is not utilized to protect the electrical cables associated with the fire barrier penetration seals but to maintain the integrity of the fire area boundary of the cable mezzanine floor. The cables associated with their particular penetration seals are not required to be protected for Appendix R safe shutdown purposes.

III. Required Information for Section III.B, "Thermo-Lag Fire Barriers Outside the Scope of the NUMARC Program"

Response:

The two configurations involving Thermo-Lag material at BVPS Unit 1 were evaluated independent of the NUMARC fire testing program. The results of the NUMARC testing has substantiated our previous evaluation for conduit configurations as noted in Attachment 1.

IV. Required Information for Section IV.B, "Ampacity Derating"

Response:

Ampacity derating does not apply since the associated cables are instrument and control cables which are not considered for derating due to the nature of their service and the resulting negligible heat release from these cables.

V. & VI. Required Information for Section V.B, "Alternatives" and VI.B, "Schedules"

Response:

Upgrades will not be required for the two configurations involving Thermo-Lag at BVPS Unit 1. Evaluations have been conducted which demonstrate the adequacy of the configurations to effectively extend the barrier and provide equivalent protection to that of the fire area boundary. The details are summarized in Attachment 1 and 2.

VII. Required Information for Section VII, "Sources and Correctness of Information"

Response:

Plant-specific information relative to the two configurations involving Thermo-Lag at BVPS Unit 1 were provided by plant personnel utilizing the following means:

1. Review of installation details and design documents.
2. Walkdowns and inspections of installed configurations.

**Beaver Valley Power Station - Unit No. 1
Cable Mezzanine Area (CS-1)
Evaluation of 3" Conduit Sleeve Extension 1FX420N08
Fire Area Boundary Penetration Seal Configuration**

Discussion:

The BVPS Unit No. 1 Cable Mezzanine Area was previously identified as an area utilizing Thermo-Lag fire barrier material in our response to Generic Letter 92-08, dated April 16, 1993. Thermo-Lag 330-1 pre-formed conduit sections are used to extend certain fire rated penetration seal configurations involving conduit sleeves for maintaining the integrity of the fire area boundary of the cable mezzanine floor. Engineering evaluations were conducted and the configurations were reviewed utilizing the criteria and guidance provided in Generic Letter 86-10 for providing equivalent protection to that of the fire area boundary.

Generic Letter 86-10 Enclosure 1 "Interpretations of Appendix R" provided guidance for fire area boundaries and stated the following:

"The term 'fire area' as used in Appendix R means an area sufficiently bounded to withstand the hazards associated with the area and, as necessary, to protect important equipment within the area from a fire outside the area. In order to meet the regulation, fire area boundaries need not be completely sealed floor-to-ceiling, wall-to-wall boundaries. However, all unsealed openings should be identified and considered when evaluating effectiveness of the overall barrier. Where fire area boundaries are not wall-to-wall, floor-to-ceiling boundaries with all penetrations sealed to the fire rating required of the boundaries, licensees must perform an evaluation to assess the adequacy of fire boundaries in their plants to determine if the boundaries will withstand the hazards associated with the area. This analysis must be performed by at least a fire protection engineer and, if required, a systems engineer. Although not required, licensees may submit their evaluations for staff review and concurrence..."

Based on the above guidance, the Unit No. 1 configuration involving the 3" conduit sleeve extension 1FX420N08 was evaluated as a deviation from a tested fire seal configuration.

It should be noted that NUMARC Phase 2 Test Assembly 2-3 demonstrated that a 3" diameter conduit, utilizing non-upgraded Thermo-Lag fire barrier material of 1" thickness, exhibited satisfactory temperature performance for 91 minutes. This provides reasonable assurance that the fire resistive rating of the barrier is at least equivalent to the 1 1/2 hour rating of the cable mezzanine floor.

Description:

Conduit 1FX420N08 is a 3" diameter rigid conduit sleeve which penetrates the 1 1/2 hour fire rated floor in an area where it is impossible to install a fire rated internal conduit seal within the plane of the barrier. The conduit sleeve is wrapped with Thermo-Lag 330-1 pre-formed conduit sections (approximately 15 1/2" long and 1" nominal thickness) from the floor to the top of the conduit sleeve to maintain the integrity of the fire area boundary. The conduit has a 30% cable fill and the sleeve extends approximately 6" below the floor (see included sketch, p. 4 of 4). Thermo-Lag barrier material is not used to protect the electrical cabling associated with this fire seal as shown in the sketch provided.

Evaluation:

The conduit is internally sealed with a low density silicone elastomer (LDSE) fire rated seal material at the top of the conduit sleeve. The Thermo-Lag pre-shaped conduit sections, which were installed to extend the fire barrier from the top of the conduit sleeve down to the floor, were evaluated for acceptability.

The Thermo-Lag 1" thick pre-shaped conduit sections provide an adequate extension of the fire seal for the fire area boundary based on the following:

1. The Thermo-Lag conduit extension consists of 2 straight pre-shaped conduit sections (1" thick) with trowel-grade material at the joints and stainless steel banding. The sections are 15 1/2" long and are supported by the concrete floor. Therefore, there are no stresses on the longitudinal seams and there are no butt joints to open.
2. The cable mezzanine area is provided with an early warning smoke detection system and an automatic CO₂ fire suppression system.
3. Based on the Perry Fire Test (No. PY-CE1/NRR-0304L), 3" conduits do not allow the transmission of flames, hot gases or radiant energy through the fire barrier.
4. Thermo-Lag 330-1 fire barrier material is utilized as an extension of the penetration seal for the fire area boundary. Therefore, the temperatures inside the conduit can reach as high as 400°F for a fire outside of the conduit above the floor. This is based on IEEE 634 "Standard Cable Penetration Fire Stop Qualification Test." Thermo-Lag is not used to protect or fire wrap the electrical cables associated with the fire seal but to maintain the integrity of the fire area boundary.

Evaluation: (Continued)

5. A correlation of fire testing results for Thermo-Lag applications involving conduits relative to the Unit No. 1 conduit sleeve extension 1FX420N08 is provided below:

- The Gulf States Utilities fire test article IV effectively tested a 4" aluminum conduit for 3 hours with a peak temperature of less than 300°F with upgraded joints. Test article II tested a 4" aluminum conduit for 85 minutes with the stress skin removed and no joint treatment and a peak temperature of only 341°F.
- The Texas Utilities Fire Test schemes 9-1, 10-1, and 10-2 demonstrate that 3" diameter conduits do not require an additional thickness of material in a one hour test (1/2" of material is all that is required).

Therefore, the 3" conduit sleeve configuration installed at BVPS Unit No. 1, utilizing Thermo-Lag 1" thick pre-shaped conduit sections with the joints pre-buttered and the stress skin intact, provides an acceptable barrier to that of the 1 1/2 hour fire rated barrier (cable mezzanine floor).

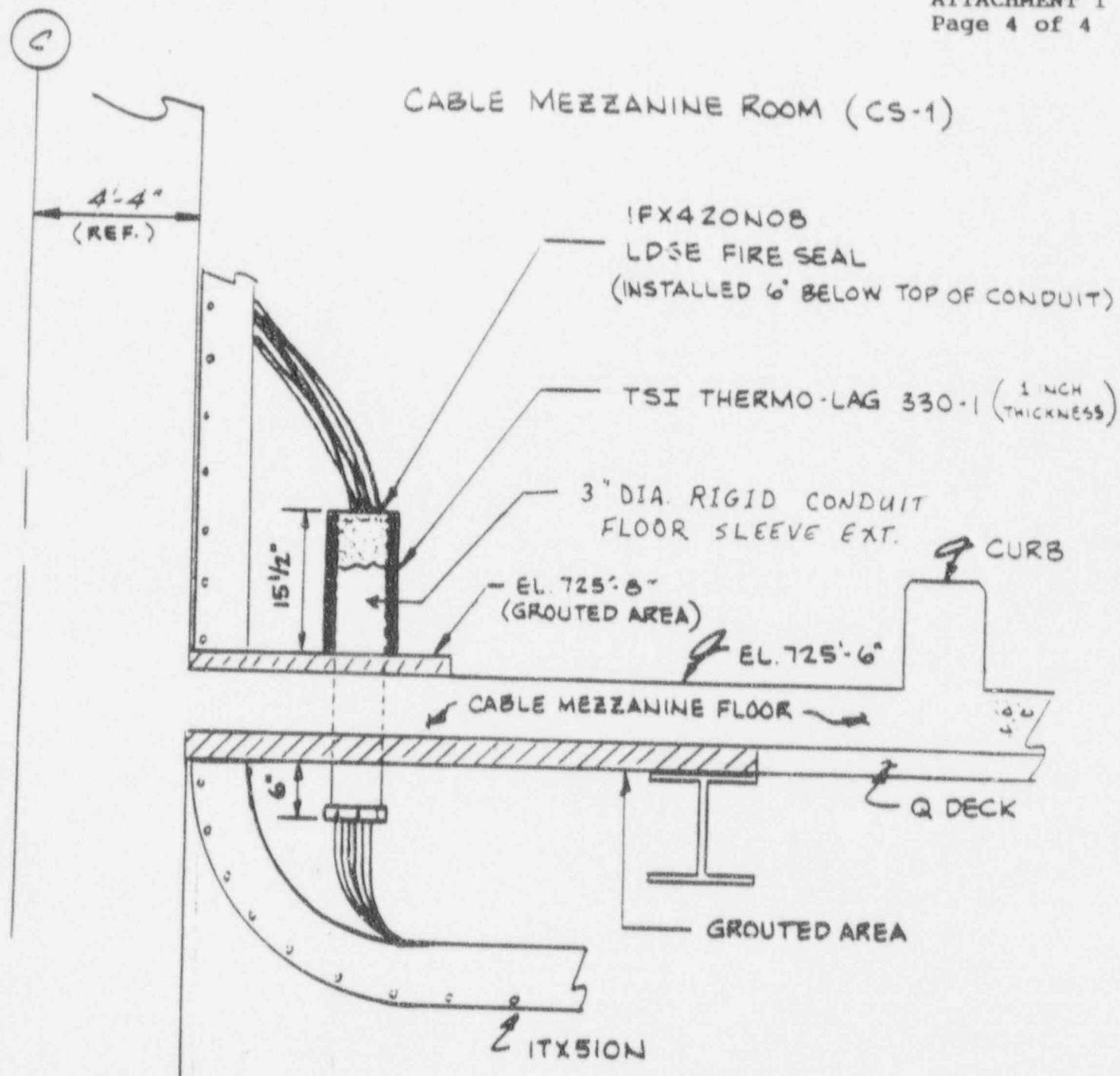
NOTE: NUMARC Phase 2 testing substantiates the above correlation.

6. The cables associated with this particular penetration seal are not required to be protected for Appendix R safe shutdown purposes.

Conclusion:

The configuration for the conduit sleeve extension 1FX420N08 effectively extends the fire barrier from the floor of the cable mezzanine area to the top of the conduit sleeve (15 1/2") and thus provides equivalent protection to that of the fire area boundary based on criteria and guidance provided in Generic Letter 86-10.

CABLE MEZZANINE ROOM (CS-1)



PROCESS PACK ROOM (CR-4)

SKETCH OF 3" CONDUIT EXTENSION SLEEVE
1FX420N08
(LOOKING EAST)
N.T.S.

Beaver Valley Power Station - Unit No. 1
Cable Mezzanine Area (CS-1)
Evaluation of 5" Conduit Sleeve Extension 1FC439002
Fire Area Boundary Penetration Configuration

Discussion:

The BVPS Unit No. 1 Cable Mezzanine Area was previously identified as an area utilizing Thermo-Lag fire barrier material in our response to Generic Letter 92-08, dated April 16, 1993. Thermo-Lag 330-1 pre-formed conduit sections are used to extend certain fire rated penetration seal configurations involving conduit sleeves for maintaining the integrity of the fire area boundary of the cable mezzanine floor. Engineering evaluations were conducted and the configurations were reviewed utilizing the criteria and guidance provided in Generic Letter 86-10 for providing equivalent protection to that of the fire area boundary.

Generic Letter 86-10 Enclosure 1 "Interpretations of Appendix R" provided guidance for fire area boundaries and stated the following:

"The term 'fire area' as used in Appendix R means an area sufficiently bounded to withstand the hazards associated with the area and, as necessary, to protect important equipment within the area from a fire outside the area. In order to meet the regulation, fire area boundaries need not be completely sealed floor-to-ceiling, wall-to-wall boundaries. However, all unsealed openings should be identified and considered when evaluating effectiveness of the overall barrier. Where fire area boundaries are not wall-to-wall, floor-to-ceiling boundaries with all penetrations sealed to the fire rating required of the boundaries, licensees must perform an evaluation to assess the adequacy of fire boundaries in their plants to determine if the boundaries will withstand the hazards associated with the area. This analysis must be performed by at least a fire protection engineer and, if required, a systems engineer. Although not required, licensees may submit their evaluations for staff review and concurrence..."

Based on the above guidance, the Unit No. 1 configuration involving the 5" conduit sleeve extension 1FC439002 was evaluated as a deviation from a tested fire seal configuration.

Description:

Conduit 1FC439002 is a 5" diameter rigid conduit sleeve which penetrates the 1 1/2 hour fire rated floor in an area where it is impossible to install a fire rated internal conduit seal within the plane of the barrier. The conduit extends to a junction box where it is sealed internally with a fire rated seal at the junction box approximately 18" above the floor. The conduit is wrapped with 1" nominal thick Thermo-Lag 330-1 pre-formed conduit sections from the floor to the junction box to maintain the integrity of the fire area boundary. The conduit has an 88% cable fill and the sleeve extends using flexible conduit approximately 6' below the floor (see included sketch, p. 4 of 4). The conduit is continuous from junction box JB-577-0 to junction box JB-576-0. Thermo-Lag barrier material is not used to protect the electrical cabling associated with this fire seal.

Evaluation:

The conduit is internally sealed with a low density silicone elastomer (LDSE) fire rated seal material in the conduit at the junction box. The Thermo-Lag pre-shaped conduit sections, which were installed to extend the fire seal from the top of the conduit sleeve down to the floor, were determined to be unnecessary to achieve a fire barrier at the floor penetration sleeve.

The fire area boundary for the 5" conduit configuration provides an adequate extension of the fire seal for the cable mezzanine fire area boundary based on the following:

1. Conduit 1FC439002 has an 88% cable fill and terminates in a non-ventilated junction box on both sides of the fire barrier. The fire seal in JB-577-0 provides a smoke and hot gas seal for the cable mezzanine. The 6' long flex conduit descending down from the seal to junction box JB-576-0 with the high cable fill will restrict the passage of smoke and hot gasses.
2. The Wisconsin study titled "Sealing of Conduits Penetrating Fire Barriers" demonstrated that high cable fills provide an adequate fire seal for internal conduits. The Wisconsin study also demonstrated that enclosures such as non-ventilated junction boxes will prevent the passage of smoke and hot gasses.
3. The cable mezzanine area is provided with an early warning smoke detection system and an automatic CO₂ fire suppression system.

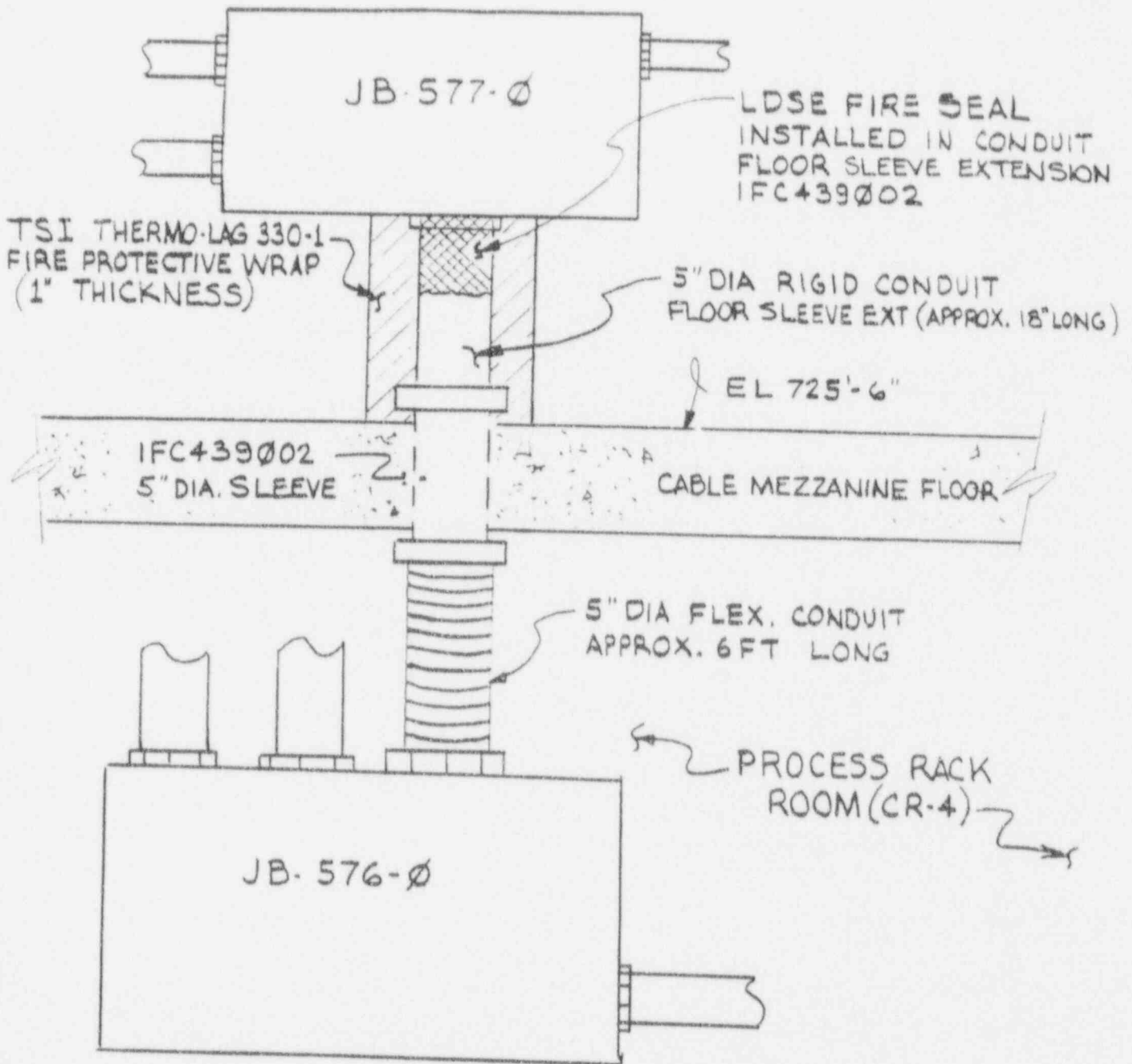
Evaluation: (Continued)

4. Thermo-Lag 330-1 fire barrier material was originally installed as an extension of the penetration seal. The Thermo-Lag was not intended to protect or fire wrap the electrical cables associated with the fire seal but to maintain the integrity of the fire area boundary.
5. The cables associated with this penetration seal are not required to be protected for Appendix R safe shutdown purposes.

Conclusion:

The configuration for the 5" conduit sleeve extension 1FC439002 is acceptable, without the Thermo-Lag material, for providing equivalent protection to that of the fire area boundary based on criteria and guidance provided in Generic Letter 86-10.

CABLE MEZZANINE ROOM (CS-1)



SKETCH OF 5" CONDUIT SLEEVE EXTENSION IFC439Ø02
WITH APPLICATION OF THERMO-LAG 330-1 FIRE PROTECTIVE WRAP