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SR. VICE PRESIDENT
NUCLEAR POWER

December 2, 1983
Docket Nos. 50-277
50-278

Mr. Darrell G. Eisenhut
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Peach Bottom Atomic Power Station
HVAC Damper Program, Penetration Seal
Test Results and Exemption Requests

References.
1) Letter from S. L. Daltroff to D. G. Eisenhut, dated January 12, 1983
2) Letter from J. W. Gallagher to D. G. Eisenhut, dated February 25, 1983
3) Letter from V. S. Boyer to D. G. Eisenhut, dated May 2, 1983
4) Letter from V. S. Boyer to D. G. Eisenhut, dated May 27, 1983
5) Letter from V. S. Boyer to D. G. Eisenhut, dated September 16, 1983

Dear Mr. Eisenhut:

Philadelphia Electric Company, in Reference 5), proposed to submit exemption requests for fire dampers suitable for the hazard in the area, but qualified to less than 3 hours, and the results of our penetration seal fire tests run in cooperation with Factory Mutual Research.

This letter provides: (1) the exemption request associated with 32 existing dampers which are not qualified to a 3-hour fire rating; (2) the results of the penetration seal vertical wall and floor tests run on November 3 and 4, 1983, at Gold Bond Building Products, Buffalo, NY; (3) a summary of our cable encapsulation and re-routing program including exemption requests for specific system(s) portions requiring schedule

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extension beyond December 31, 1983; (4) a commitment date of January 16, 1984, for sending our next Modification Progress Report to include confirmation of the specific status of system cabling requiring schedule extensions as estimated in item (3); and (5) a summary of all exemption requests submitted since our Reference 1) letter.

I. HVAC Damper Program - III.M.

A) A procurement and installation program is underway to install 3-hour qualified dampers in 103 ducts penetrating newly defined safe shutdown fire barriers.

B) Pursuant to Section 50.12 of the Commission Regulations, we request an exemption from the requirements of 10CFR50, Appendix R, Section III.G.2, requiring separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a 3-hour rating.

Thirty-two heating and ventilating penetrations through safe shutdown barriers have been identified which contain fire dampers rated at less than 3 hours (see Attachment A). The installed dampers (Air Balance Model 119 Type A) are U.L. rated for 1 1/2 hour fire resistance and were installed during plant construction. The Air Balance Model 119 Type A dampers that were installed are identical in construction to Air Balance Model 319P 3-hour rated dampers; however, they do not meet the damper size restrictions. Manufacturer data sheets of the dampers and a letter of certification are attached (see Attachment B).

The maximum fixed fire resistance required in any of the areas as listed on Attachment A is 1 hour, 14 minutes. This area is the Cable Spreading Room which is protected by area smoke detection and an automatic carbon dioxide suppression system. The next largest fixed combustible loading equates to a 27-minute fire resistance requirement.

Twenty-eight of the dampers in question are installed 2-dampers in series, though only 1-damper is required in the wall for a 1 1/2 hour rating.

Four locations, numbers 12, 13, 31 and 32 on Attachment A, have only one damper installed in the wall. One of the four, Location Number 32, has only a single damper

qualified to 3-hour fire resistance where 2 dampers in series are required for a 3-hour rating. Each of these dampers is located in the cable spreading room which, as identified previously, is protected by area smoke detection and an automatic suppression system.

Therefore, we request an exemption to Appendix R, Section III.G.2 for the following reasons:

1. The fixed combustible loading in each area in question is comfortably lower than the rating of the damper.

2. The one marginal area, the Cable Spreading Room, is provided with automatic detection and suppression.

3. The similarity in 1 1/2 and 3-hour damper design.

4. The installation practice of generally installing 2 dampers in series.

C) During our review of damper upgrade requirements, a problem arose with circular ductwork. Installation of a rated 3-hour fire damper in the duct within the penetration was not practical due to substantially increased friction losses in the ventilation systems and major installation problems. To alleviate this problem, we have designed and submitted for your review (see Attachment C) a preliminary detail of a proposed installation method which "extends" the face of the wall or floor to allow installation of a circular fire damper. Otherwise, it would be necessary to chip out substantial amounts of reinforced concrete surrounding the circular penetration to accommodate installation of the rectangular damper frame. Approximately 30 dampers fit this category. We expect installation problems with the proposed design in some areas due to construction interferences. In each case, a design will be used which is similar, a new design will be developed, or an exemption will be requested if absolutely necessary.

II. Penetration Seal Upgrade Program - III.M

A) As of December 1, approximately 3150 penetration seals have been upgraded. The survey of safe shutdown

barriers is approximately 93% complete and 6300 penetrations requiring upgrading have been identified.

B) In order to reduce the number of penetration seals requiring upgrade, a vertical wall fire test was performed on May 23, 1983. The test included seal details which utilized a combustible material (polyurethane foam). The results of this test were reported to the NRC in the Reference 4) letter. The test produced favorable results with respect to Appendix R, Section III.M, criteria, and exemptions were requested in the May 27, 1983, letter to allow the use of a combustible material as part of a penetration seal. In subsequent discussions with the NRC staff, PECo agreed to run a floor test of the same details to establish correlation data to the previously completed wall test.

The floor test, along with another wall test, were performed November 3 and 4, 1983. The tests were performed at an industry recognized test facility (Gold Bond Building Products, Buffalo, New York) in cooperation with Factory Mutual Research. The results were as follows:

1. Floor Sleeve Penetrations

The floor test included 3 typical Control Room floor penetration seal details shown on Figures 1, 2 and 3 (see Attachment I). The tested details represent typical cable jacketing, cable loadings and sealing materials. Each detail successfully passed the 3-hour fire endurance and hose stream tests performed in accordance with the requirements of ASTM Standard E-814 "Fire Tests of Through-Penetration Fire Stops". No ignition of cable jacketing occurred on the unexposed side of the penetration and the cold side temperatures were below the ignition temperature of the cable jacketing. The final documented test report will be transmitted to PECo early 1984 and will be available for NRC review. Preliminary summaries of the test results are included as Attachments G and H. The key to the successful test results was the existence of a nominal 2 inches of mineral wool on the fire side of the penetration seals. Mineral wool was installed as a dam for the polyurethane.

This is typical of the seals installed at Peach Bottom and is detailed in PECo penetration seal installation specifications.

2. Wall Penetrations

Several typical wall penetration seal details were tested.

A. A cable tray configuration was tested which consisted of 12" of polyurethane foam with flame retardant board on both sides coated with a fire resistant material (see Figure 4 of Attachment I). The tested configuration was representative of the tray loadings, cable types and seal construction existing at the plant. The wall was tested in accordance with ASTM Standard E-814 and successfully passed the fire and hose stream tests for a 3-hour rating. No ignition of cables occurred on the unexposed side and the cold side temperatures were below the cable jacketing ignition temperature.

This configuration was not tested as a floor assembly; however, a correlation with the floor sleeve tests indicates that the tested wall assembly is suitable for use as a floor penetration seal. The thermal conductivity of the flame retardant board covered with a mastic that was installed on each side of the cable penetration seal was analyzed and proved to provide similar protection to the 2" of mineral wool used on the exposed side only of the tested floor sleeve. The cable penetration seal will contain a minimum of 12" of polyurethane foam (generally much more since the foam was installed the full depth of the wall and the majority of the barriers in the plant are 18" or thicker) versus the 10" used in the floor sleeve. Furthermore, the bottom half of the flame retardant board and mastic on the fire side of the tested cable tray penetration was lost within the first 30 minutes of the test. The concrete wall was cured for a sufficient time to gain its compressive strength; however, it was evident

as soon as the test started that the wall still contained a considerable amount of moisture which eventually caused spalling and loss of the flame retardant board. This will not be the case at Peach Bottom.

A comparison of the unexposed cold side temperatures attained in the floor test of the sleeve penetration seal assemblies with the wall test temperatures indicated approximately a 25% increase for the floor tests. Applying this increase to the cable tray penetration would still leave the unexposed side temperatures below the ignition temperature of the cable jacketing. It should be noted that the sleeve tests included one test with a conduit in the penetration which would produce cold side temperatures similar (probably worse) to those expected for a cable tray penetration.

B. Three details were tested which had mineral wool on the unexposed side (see Figures 5 and 6 of Attachment I). Each assembly successfully passed the 3-hour fire test, and temperatures on the unexposed surface were acceptable. Each, however, failed the hose stream test. This is attributable to the fact that the mineral wool was not on the exposure side and much of the polyurethane was lost during the test. The remaining polyurethane was not sufficient to withstand the hose stream test. We propose to use this configuration, if necessary, in walls separating fire areas having a fixed combustible loading on one side less than 1-hour. In these cases the mineral wool will be installed on the side of the barrier with the largest fixed combustible loading. For example, should a barrier have a fixed combustible loading of 20 minutes on Side A and 65 minutes on Side B, the mineral wool will be installed on Side B. Any barriers with fixed combustible loadings on both sides exceeding 1-hour will have mineral wool installed on both sides. Again, the walls are generally thicker than the 12" test wall and polyurethane is installed to full depth.

Conclusion:

Pursuant to Section 50.12 of the Commission Regulations, we request exemption from the requirements of 10CFR50, Appendix R, Section III.M, in the following areas:

a. The use of a combustible material, polyurethane foam, as part of a penetration seal based on test results which show compliance with the penetration seal qualification requirements of Appendix R, Section III.M, Subsections 1, 2 and 3 (see previous items 1. and 2.A.).

b. Installation of a penetration seal assembly rated at less than 3 hours due to an unsuccessful hose stream test (see previous item 2.B.).

These penetration seal exemptions replace those previously requested in the Reference 4) letter.

3. Penetration Seal Deviations

During the penetration seal upgrade program, penetrations have been identified which were not suitable for installation of a seal design in precise conformance with a tested configuration. The deviations from the tested configurations are generally considered to be minor. These deviations are attributable to as-built plant conditions such as interferences from existing construction and equipment location. A procedure is in use to control all deviations. Attached Figure 7 of Attachment I is a sample penetration seal deviation documentation form. All pertinent data is included on the form. Each revised seal design and justification receives two independent reviews. This documentation will be maintained with the seal program documentation and will be forwarded to the NRC as exemption requests at the completion of the penetration seal upgrade program.

III. Safe Shutdown - III.G.2

1. Encapsulation Program

Approximately 2750 linear feet of cable in raceways has been identified which require encapsulation. As of December 1, 1983, approximately 1200 linear feet have been encapsulated, with 300 additional linear feet expected to be encapsulated by December 31, 1983.

The remaining encapsulation work projected to be completed after December 31, 1983, is identified by system and cable number in Attachment D, which also includes the estimated completion date(s).

Pursuant to Section 50.12 of the Commission's Regulations, we request an exemption from our previously committed completion dates that were stated in Reference 2). The justification for the exemption for each of the items listed in Attachment D is as follows:

a) Two major lengths of raceway that require encapsulation have been deferred until the next Unit 2 refueling outage due to ALARA concerns.

b) The encapsulation work for junction boxes requires that mounting holes be drilled in the boxes. This work will require de-energizing the cables within these boxes. The majority of the boxes are associated with diesel-generators. The outage for the diesel-generators is scheduled for April/May of 1984.

c) Due to the labor intensive nature of the work and the impending Unit 2 outage, the Unit 3 encapsulation was given the higher priority for completion. The Unit 2 work was deferred to the next Unit 2 refueling outage, originally scheduled for the Fall, 1983. However, due to the Unit 2 recirculation pipe inspection program, the Unit 2 refueling outage, as well as the encapsulation work scheduled for that outage, has been delayed until the Spring of 1984.

d) Several of the encapsulations require individually engineered and fabricated hangers and supports. We

have experienced delays in obtaining some of these supports.

e) The field surveys in the radwaste building, elevations 116' and 135', identified several raceway peculiarities that would have made the installation of the proposed encapsulation extremely difficult. A preliminary construction estimate determined that the work to encapsulate a single raceway in these areas was in excess of 500 man-days. Therefore, other methods of safe shutdown were investigated. It was determined that a different method of shutdown could be used for these areas (depressurization and a low pressure injection system) that would not be as difficult to protect. The work remaining in Unit 3 is part of this method of shutdown and will require substantial equipment blocking to relocate a power feed to a motor control center.

A similar problem (difficult encapsulations) was found in Unit 2. Electrical blocking will be necessary to relocate a feed to permit the use of this method of safe shutdown.

2. Rerouting

75 cables in raceways have been identified as requiring rerouting. As of December 1, 1983, 27 cables have been rerouted. The remaining 48 cables are identified by system and cable number in Attachment E.

The first 28 cables listed on Attachment E are included for completeness. The commitment made in the June, 1982, submittal was for these cables to be rerouted during the next Unit 2 refueling outage. Due to the Unit 2 recirculation pipe inspection program, the start of the Unit 2 refueling outage has been delayed until Spring, 1984.

For the balance of the cables on Attachment E, we are requesting, pursuant to Section 50.12 of the Commission's Regulation, an exemption to our committed completion dates for the following reasons:

a) During the field surveys for encapsulation in the radwaste building, elevations 116' and 135', several raceways scheduled to be encapsulated were determined to be too difficult to encapsulate (see reason e. under Encapsulatons). To avoid these encapsulations, a new method of shutdown has been identified that can be used; however, this new method requires some valve feed relocations on both Unit 2 and Unit 3. Because considerable equipment blocking is required to change these feeds, this is preferably outage work. The lead time on the design for these relocations has extended the work beyond the last Unit 3 outage. The design information for the Unit 3 work will be available by 12/31/83, and the work is expected to be complete by March 15, 1984. The Unit 2 work will be done during the 1984 Unit 2 refueling outage.

b) One Unit 3 (HPCI) cable was found to be difficult to encapsulate. It was determined that it would be preferable to reroute the cable rather than encapsulate it. Again, the late addition of this cable and the lead time in design to reroute this cable have necessitated the need to request schedule relief from 12/31/83 to 3/15/84.

c) During the design review process, two Unit 2 (RCIC) cables were found to require changes in the design. The modification has now been redesigned and the work will be performed during the Unit 2 refueling outage.

IV. Alternative Shutdown - III.G.3

In Reference 2, we stated, "We will implement the alternative shutdown system during the first refueling outage commencing after January 1, 1984. In accordance with our current projection, this translates to the Fall of 1984 for Unit 3, and the Spring of 1985 for Unit 2".

We wish to call to your attention to the fact that, due to the delay of the Unit 2 refueling outage, to the current schedule of February 20, 1984, our projection must now be "the Fall of 1985 for Unit 2". However, for those modifications approved by NRC in time for design, completion and material delivery, an attempt will be made to do as many as possible during the Spring of 1984 refueling outage for Unit No. 2.

V. Summary of Exemption Requests

See Attachment F

Should you have any questions or require additional information, please do not hesitate to contact us.

Very truly yours,

W. S. Boyer

WCB:vdw

cc: A. R. Blough, Site Inspector
Site Inspector