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Nuclear

10 CFR 50.12

June 15, 2001

Docket Nos. 50-277 50-278

Exelon

License Nos. DPR-44 DPR-56

U.S. Nuclear Regulatory Commission Attention: Document Control Desk Washington, D.C. 20555

Subject:Peach Bottom Atomic Power Station, Units 2 and 3Request for Exemption from 10 CFR 50, Appendix R,
Section III.F, "Automatic Fire Detection" for Specific Plant Locations

References:

- 1) Letter dated December 31, 1998, from PECO Energy to USNRC, Peach Bottom Atomic Power Station, Units 2 and 3, Revision for Exemption Request from Certain Requirements of 10CFR50, Appendix R, Section III.F, "Automatic Fire Detection."
- Letter dated January 14, 2000, from PECO Energy to USNRC, Peach Bottom Atomic Power Station, Units 2 and 3, Additional Information Concerning Exemption Request From the Provisions of 10CFR50 Appendix R, Section III.F
- Letter dated August 18, 2000, from USNRC to PECO Energy, Peach Bottom Atomic Power Station, Unit 2 and 3, RE: Exemption From 10CFR Part 50, Appendix R, Section III.F, Fire Detection Requirements.

Dear Sir/Madam:

In accordance with 10 CFR 50.12, Exelon Generation Company, LLC (Exelon) hereby requests an exemption from the provisions of 10 CFR 50 Appendix R, Section III.F, "Automatic Fire Detection," in two specific rooms (rooms 222 and 429) within the turbine building. These two rooms were included as part of an earlier exemption request (reference 1). In an NRC Safety Evaluation Report dated August 18, 2000, (reference 3) all related exemption requests were granted with the exception of these two rooms. The concerns cited by the NRC Staff in the Safety Evaluation Report as the basis for denying the exemption request for these two rooms can be summarized based on excerpts from the SER as follows:

Room 222. "The control cables for 343-SU offsite power source to 4kV switchgear are routed through this area. This area contains three open vertical cable trays. The fire hazard associated with the vertical cable trays warrants some type of fire protection system to provide reasonable assurance of safety. Therefore, the staff concludes that automatic detection should be provided in this area to provide prompt notification to the control room of a fire in this area during its incipient stages to allow a rapid response from the plant fire brigade."

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PBAPS Units 2 & 3 Appendix R Exemption Request June 15, 2001 Page 2

Room 429. "The Laydown Area (room 429) is not provided with automatic sprinkler protection or automatic fire detection. This room contains several turbine bearing oil lift pumps, motor control centers and a maintenance office. This is a significant fire hazard that warrants some fire protection system to provide reasonable assurance of safety. The circuits in this room are associated with offsite power and the Unit 2 reactor pressure and level indication.

Therefore the staff concludes that automatic detection should be provided in this room to provide prompt notification to the control room of a fire in this area during its incipient stages to allow a rapid response from the plant fire brigade to a fire in this room."

Exelon is resubmitting an exemption request for rooms 222 and 429 based on mitigating actions that have been taken and those that will be taken. Additionally, more detailed information regarding fire hazards in each room is provided.

Exelon believes the enclosed exemption request demonstrates that the fire protection configuration, enhanced by several additional actions described in the Attachments, will satisfy the underlying purpose of 10 CFR 50, Appendix R for these two rooms. This exemption will not result in undue risk to the public health and safety because a sufficient level of fire protection of safety related and safe shutdown equipment is maintained. Implementing the methods required for strict compliance with 10 CFR 50, Appendix R, Section III.F, would not serve the underlying purpose of the Rule, would not increase the level of fire protection currently provided at Peach Bottom Atomic Power Station, and would result in costs significantly in excess of those considered when the Rule was adopted. Thus, the criteria for issuance of this exemption are met in accordance with 10 CFR 50.12.

Information supporting this Exemption Request is contained in Attachment 1 to this letter. If you have any questions, please do not hesitate to contact us.

In order to support the schedule for the associated plant modifications, we request approval of this Exemption Request by December 31, 2001.

Very truly yours,

D. G. Helher / For

James A. Hutton Director - Licensing

Enclosures: Attachments
cc: H. J. Miller, Administrator, Region I, USNRC
A. C. McMurtray, USNRC Senior Resident Inspector, PBAPS
J. Boska, Senior Project Manager, USNRC
R. R. Janati, PA Bureau of Radiological Protection

ATTACHMENT 1

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PEACH BOTTOM ATOMIC POWER STATION UNITS 2 and 3

DOCKET NOS.	50-277 50-278
LICENSE NOS.	DPR-44 DPR-56

Exemption Request From Requirements of 10 CFR Part 50 Appendix R, Section III

Supporting Information for Change - 13 Pages

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Background:

By letter dated December 31, 1998, Peach Bottom Atomic Power Station (PBAPS) requested an exemption from the requirements of 10CFR 50, Appendix R, Section III.F. Approximately 20 plant rooms containing either fire safe shutdown (FSSD) or safety related (SR) components were identified as not having installed fire detection systems. By letter dated August 18, 2000, the NRC approved the exemption request for all but two rooms, room 222 and room 429. After review of the SER, Exelon Fire Protection technical staff determined information in the original submittal needed clarification to improve the description of the configuration of these two rooms. Several new actions are also being proposed for these two rooms to help mitigate the need for fire detection. The additional information and actions addressing each of the concerns that the NRC Staff raised in the SER are provided in detail below.

Fire Hazards Analysis for Room 429

Room 429 is the Turbine Building, 165' elevation, operating floor in the vicinity of the hatch, between the shield walls. The concern listed by the NRC Staff in the Safety Evaluation for this room is the presence of turbine lift pumps, motor control centers and a maintenance office in this area. Additionally, the NRC Staff noted that the cables of concern were associated with offsite power and Unit 2 reactor pressure and level indication. This fire hazards analysis will consider each of the fire hazards in the area in relation to the cables of concern.

Cables of Concern in Room 429

The first issue to address is the safe shutdown cables located in the area. The original exemption submittal identified cables associated with offsite power to 4kV Switchgear and Unit 2 reactor pressure and level indication as being located in Room 429. Initial review of the cables that were previously identified as associated with Unit 2 reactor pressure and level indication determined that these cables could be eliminated from further consideration. These cables are "associated circuits" (as defined by Generic Letter 81-12) to the instrument power supply and not with the Unit 2 Reactor Pressure and Level indication instrument loops themselves. An analysis will be performed to ensure that these associated circuits have correct breaker/fuse coordination. If correct breaker/fuse coordination is found then the analysis will be documented in the Peach Bottom Fire Safe Shutdown Analysis. If the breaker/fuse coordination is found to be incorrect a physical plant change will be made to change the breaker/fuse and again, the results will be documented in the Peach Bottom Fire Safe Shutdown Analysis. This activity will be completed by the end of Peach Bottom outage 2R14, currently scheduled for October 2002. Correct breaker/fuse coordination of these associated circuits can eliminate them from further consideration as safe shutdown components, since their failure will no longer impact the operation of the instrument loops. Therefore, the safe shutdown cables of concern are now limited to those for the #343-SU offsite power to 4kV Switchgear.

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The cables associated with #343-SU routed in room 429 are located in conduits 2B1562, 2S933 and 2S934, which are located along the west wall of room 429 (this is the exterior wall of the control room). Conduit 2B1562 is a 3 inch conduit that comes out of a floor penetration and rises to a junction box approximately 16 feet above the floor. At that junction box 2 conduits (2S933 and 2S934) emerge and are routed north horizontally approximately 11 feet and 7 feet, respectively. These conduits then drop down approximately 4 feet into wall penetrations on the west wall of room 429. These conduits are located slightly north of the centerline of the turbine building, which puts them on the Unit 3 side of the operating floor. Figures 1, 2, 3 and 4 provide the relative location of these conduits in relation to other equipment within the room.

The location of these conduits, along the exterior wall of the control room, provides spatial separation from the major fire hazards in the area. Approximate distances from the conduits and the specific hazards are described below. In addition, these conduits do not rise more than 16 feet above the floor. The ceiling height in the operating floor area exceeds 40 feet, so heat and smoke from any potential fire in room 429 will rise up into the high ceiling area away from the conduits. The conduits in which the cables are installed will provide some protection to the cables from fire and heat exposure.

These conduits are located directly outside of the door to the main control room. Since the control room is constantly manned, there are personnel passing through this area 24 hours per day. Any fire in the vicinity of these conduits would be quickly identified. Given the open nature of the operating floor area in room 429 and the fact that the only entrance to the control room is through this area, it is likely personnel would quickly identify any fire in this area.

Specific Fire Hazards in Room 429

Peach Bottom provides detection and suppression capability for specific fire hazards on the turbine deck. This approach provides the necessary degree of protection for the hazards in the area. The ceiling height of the turbine deck (in excess of 40 feet) would result in a delay in alarm annunciation and suppression actuation as compared to fire protection systems installed directly at the hazard. A description of the fire protection features for the specific fire hazards in room 429 is provided below, particularly as they relate to potential exposure to the cables of concern.

<u>Turbine/Generator Lube Oil</u>. The turbine/generator lube oil represents the primary hazard to the operating floor area while the units are operating. Each turbine is effectively separated from room 429 by a shield wall approximately 16 feet tall. This shield wall is designed for radiation shielding, but will provide an effective fire barrier as well. This wall is located in such a way that all of the turbine bearings and one generator bearing are located on the far side of the shield wall, outside of room 429. Thus, these bearings do not create an exposure threat to the cables. The bearing of concern is the generator end bearing which is located within room 429.

The turbine/generator bearings have sprinkler protection. The bearings for the generator end, which are located on the room 429 side of the shield wall, have wet pipe sprinkler protection. This system has an alarm check valve, with a pressure switch that annunciates an alarm to the control room in the event of water flow. This sprinkler system, in effect, provides both detection and suppression capability for the turbine/generator bearings and the associated lube oil hazard. These bearings are located in excess of 30 feet from the cables. The exciter bearings do not have sprinkler protection. However, the exciter and the associated bearings are located within an enclosure. This enclosure is provided with a lip around its base, which will provide containment for oil. The enclosure will also confine fire and heat in the event of fire involving the exciter bearings. This enclosure will preclude exposure from the exciter bearings to the cables.

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<u>Generator Hydrogen</u>. The generator is filled with hydrogen while operating and as such the hydrogen represents a possible fire exposure hazard to the conduits. Hydrogen leaking from the generator would immediately migrate up to the ceiling and into the ventilation path. If the hydrogen were to ignite at the leakage point, both the distance from the generator to the conduits (over 30 feet) and the height of the turbine hall (over 40 feet) would preclude exposure to the conduits. Loss of hydrogen pressure within the generator, and loss of hydrogen concentration within the generator are both alarms that annunciate to the control room. This indication would provide the control room with an indication of a potential hydrogen leak. Operator rounds also include periodic checks of hydrogen pressure that could provide early indication of a potential hydrogen leak. Based on the physical properties of hydrogen, the distance from the potential hydrogen leakage points, and the alarms that would provide an indication of potential hydrogen leaks, a hydrogen fire does not represent a credible fire exposure threat to the conduits.

<u>Turbine Bearing Lift Pumps</u>. The initial exemption request (Reference 1) stated that there were several turbine bearing lift pumps in this area. Specifically, there are two turbine bearing lift pumps (one per unit) located in room 429. These pumps only operate during the start-up and shutdown sequences. Therefore, under operating conditions, the lift pumps do not present a fire hazard to the area. There is a spot smoke detector located over each of the lift pumps. This detector, which annunciates an alarm in the control room, will provide a warning in the unlikely event of a fire or overheat condition involving the lift pump. The lift pumps are located in excess of 50 feet from the conduits. In addition, the shield wall described above and the generator housing itself provide physical obstructions between the lift pumps and the conduits. Thus, the turbine bearing lift pumps do not represent a credible fire exposure threat to the conduits.

<u>Maintenance Offices/Shops</u>. The initial exemption request (Reference 1) indicated that there was a maintenance office in room 429. Specifically, there are two enclosed office/shop structures located in room 429. Both of these enclosures are protected by wet pipe sprinkler systems. Should a sprinkler head in either of these shop areas open; an alarm will be annunciated in the control room. Approximately 50 feet of separation exists between the shop area and the conduits. Additionally, the shield wall and generator housing itself, provide physical obstructions between these structures and the conduits. Thus, neither of these two shop areas represents a credible fire exposure threat to the conduits.

<u>Motor Control Centers</u>. The initial exemption request (Reference 1) was not specific in the location of the motor control centers in relation to room 429. There are no motor control centers in room 429.

<u>Other Nearby Hazards</u>. There are low voltage instrument cabinets associated with the reactor feed system located in the general vicinity of the cables. These instrumentation cabinets do not represent a credible exposure hazard to the cables in the conduits. A small cable tray is routed from one of the instrument cabinets. This tray contains IEEE 383 rated cables. Both the instrument cabinet and the associated cables in the tray are low-voltage instrumentation and control circuits, and as such do not represent a credible ignition source. There are several feet of horizontal separation and no vertical interaction between the tray and conduits. Heat from a fire involving the cables in the tray would rise up and away from the conduit. Thus, the instrument cabinets and cable tray do not represent a credible fire exposure threat to the conduits.

<u>Physical Considerations.</u> The physical configuration of room 429 is also significant in terms of how a fire would impact the conduit. Room 429 is the turbine/generator operating floor. The ceiling height above the operating deck exceeds 40 feet. Therefore, heat and smoke from a fire will rise

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up and away from the conduits. A fire on the turbine deck will be identified prior to exposure to the conduit. As a result of this configuration, installation of detection systems in turbine buildings above the operating floor is not a normal industry practice. Industry guidance documents such as NFPA 803-1993 and International Guidelines for the Fire Protection of Nuclear Power Plants (Revised 1997 edition) do not call for detection above the operating floor.

Safe Shutdown Considerations.

The cables routed in room 429 are associated with controls for the #343-SU offsite power supply to the 4kV safeguard switchgear. The 4kV safeguard switchgear is provided with two redundant sources of offsite power, and the controls to select between either of the two sources. Room 429 has been analyzed as part of fire area 50. The Appendix R analysis already assumes the loss of #343-SU offsite power feed for a fire in fire area 50. The #2-SU offsite power source will be available to supply power to the 4kV safeguard switchgear in the event of a fire in fire area 50. The power and controls for the #2-SU offsite power source were routed outside of fire area 50, as part of the Thermo-Lag resolution project, completed in October 1999, and as such will not be affected by a fire in room 429. The 4kV safeguard switchgear is capable of automatically selecting the #2-SU offsite power source should the #343-SU offsite power supply become unavailable. (The cables for Unit 2 reactor pressure and level indication have been removed from consideration as described above.)

Other Considerations

Installation of fire detection to cover such a large area (~17,000 ft²), with such a high ceiling would not only be a design challenge (due to ceiling height, air flow, upper layer stratification) but very expensive to install. The original estimate of \$750,000, provided in the initial exemption request (reference 1), was based on use of spot detection, and is still considered a reasonable estimate. Other detection options, such as a smoke sampling type system or an infrared beam type system would result in similar estimated costs.

Conclusion:

The installation of fire detection in room 429 to provide early warning of a fire condition in order to protect the cables associated with the #343-SU offsite power source to 4kV is not necessary to satisfy the intent of 10CFR50, Appendix R, Section III.F. The existing configuration of hazards in the room and the room itself will ensure that a fire will be detected prior to fire exposure to the cables. The bases that support this conclusion can be summarized as follows:

- Each of the significant fire hazards in room 429 has suppression or detection for the specific hazard. This will ensure prompt identification of a fire condition long before exposure to the cable will occur.
- The ceiling height above the operating floor in room 429 exceeds 40 feet. The conduit containing the cables is only 16 feet off the floor. Heat from a fire will rise above the conduit providing time for personnel to identify a fire condition prior to exposure to the conduit.
- The physical distance from the conduits to the significant fire hazards exceeds 30 feet.
- The location of the conduits, directly outside of the main control room door will ensure prompt personnel detection of a fire condition that could expose the conduits.

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In the event the cables within the conduits are lost, a separate offsite power source and control power, independent of room 429 and fire area 50 is available to power the 4kV safeguard switchgear.

Fire Hazards Analysis for Room 222

Room 222 is a feedwater heater room located on the 135' elevation of the Unit 2 Turbine Building. This room contains the third and fourth Unit 2 feedwater heaters. The concern listed by the NRC Staff in the Safety Evaluation Report (reference 3) for the exemption request was the presence of three open vertical trays in this room. The only combustible hazards in room 222 are the cables in three cable trays located along the north wall of the room. Examination of these trays during the last refueling outage (2R13) completed in October 2000, found that these are not completely open trays as described in the original exemption request submittal, but a combination of conduits, metal enclosures, covered trays, and a small section (approximately 24 inches) of open tray. Figures 5, 6 and 7 illustrate the configuration of these trays.

Cable of Concern in Room 222

The safe shutdown cable located in room 222 is a control cable for the #343-SU offsite power source to the 4kV safeguard switchgear. The cable is routed through tray 2BV080, which passes vertically through the room.

Cable Trays in Room 222

In the initial exemption request, the three cable trays in room 222 were described as open trays. Since room 222 is a locked high radiation area during plant operation, the first opportunity to actually view these trays was during the Unit 2 refueling outage, 2R13. The inspection of the trays found that the cables were actually located in conduit or metal enclosures for a portion of the routing in room 222. Additionally, the cable trays were provided with metal covers for their length except for approximately the last 24 inches.

Each of the three trays will be provided with cable tray covers to eliminate the remaining section of open tray. These tray covers will serve two purposes. First, in the unlikely event of a fire in the room, the tray covers will protect the cables within the tray from exposure by direct flame impingement. Second, in the equally unlikely event a cable in a tray is the source of the fire, the tray covers will prevent the fire from leaving the tray and exposing adjacent trays. The additional cable tray covers will be installed during outage 2R14 scheduled for September 2002.

Beyond the addition of the remaining sections of cable tray cover needed to provide complete coverage of each tray, other features in the room make it unlikely that a fire will occur or the cable of concern will be exposed by fire. The trays are physically separated from each other by at least two feet. Given the relatively light loading of the trays as shown in the attached figures the trays do not represent a credible fire exposure hazard to each other. There are no other fire hazards in the room that could create a fire exposure to the cables. This feedwater heater room is a locked high radiation area while the unit is operating, which restricts access. In the unlikely event that hot work is performed in the room, plant procedures require a continuous fire watch both during the work and for a minimum of 30 minutes following the completion of hot work.

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The cable insulation used at Peach Bottom is either IEEE-383 qualified or if part of original installation (which pre-dated the establishment of IEEE-383), the cable was qualified to a test similar to the one adopted by IEEE-383. Information regarding this test was provided in a letter dated January 14, 2000 (reference 2). Tray 2BV080 contains instrumentation and control cables, including control cables for the #343 SU offsite power source to 4kV safeguard switchgear. Industry experience has found that this type of cable has not been susceptible to self-ignition. Therefore, there are no credible fire hazards that could expose this cable.

Safe Shutdown Considerations

The cable routed in room 222 is a control cable for the #343-SU offsite power supply to the 4kV safeguard switchgear. The 4kV safeguard switchgear is provided with two redundant sources of offsite power, and the controls to select between either of the two sources. Room 222 has been analyzed as part of fire area 50. The Appendix R analysis already assumes the loss of #343-SU offsite power feed for a fire in fire area 50. The #2-SU offsite power source will be available to supply power to the 4kV safeguard switchgear in the event of a fire in fire area 50. The #2-SU power supply and controls were rerouted outside of fire area 50 as part of the Thermo-Lag resolution project, completed in October 1999, and as such will not be affected by a fire in room 222. The 4kV safeguard switchgear is capable of automatically selecting the #2-SU offsite power source should the #343-SU offsite power supply become unavailable.

Other Considerations

Installation, testing and maintenance of detection in room 222 will be hampered by the inability to access this room while the plant is operating, since the room is a locked High Radiation Area. Maintenance and testing of the detection while on-line will result in considerable dose for the workers.

Conclusion

The installation of fire detection in room 222 to provide early warning of a fire condition in order to protect the control cable associated with the #343-SU offsite power source to 4kV safeguard switchgear is not necessary to satisfy the intent of 10CFR50 Appendix R Section III.F. There is no credible fire threat to the safe shutdown cable in the room. The bases that support this conclusion can be summarized as follows:

- The only combustible hazards in room 222 are the cables in trays 2BV070, 2BV080, and 2BV090. There are no other fire hazards that expose the cable trays.
- The cable within the trays is covered or enclosed for all but 24 inches of its length in the room. Tray covers will be added during 2R14 (September 2002) to this remaining section to enclose the cable tray for its entire length.
- The cables in the trays are either IEEE 383 qualified or were tested in a manner consistent with IEEE 383. Experience has shown that these cables will not self ignite and propagate a fire without outside fire exposure.
- Room 222 is a locked high radiation area and access is restricted during plant operation.
- An offsite power source to the 4kV safeguard switchgear remains available independent of room 222 and fire area 50 in the event the #343 SU source is lost. Installation, testing and maintenance of a fire detection system in room 222 would be difficult since the room is a locked high radiation area.

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Figure 1

Plan View of Room 429 Turbine Building 165" elevation Laydown area

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Figure 2

View (looking northwest) of the three conduits that contain the #343 SU 4kV control cables.

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View of Unit 3 T/G bearing lift pump and smoke detector (looking northeast). Also the sprinkler piping to the shop area and the water flow switch. Note the wall on the left side. This is the shield wall that provides additional separation between these hazards and the conduits.

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Figure 4

View of operating floor looking west and north. Exciter housing is at right. Further to the right and out of the picture is the Unit 3 T/G bearing lift pump and the shop building. The Unit 2 T/G bearing lift pump is behind the photographer.

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Figure 5

Elevation sketch of room 222 looking north. The trays are located directly against the north wall.

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Figure 6

View of trays 2BV080 and 2BV090 looking at the north wall of room 222. Tray 2BV080 contains the control cable for #343SU offsite power source.

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Figure 7

View of the relationship of the three trays along the north wall of room 222. Tray 2BV070 and Tray 2BV080 are separated by about 96". Trays 2BV080 and 2BV090 are separated by just over 24".