



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 30, 2011

Mr. Michael J. Pacilio
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION, UNIT NOS. 2 AND 3 -
EXEMPTION FROM TITLE 10 OF THE *CODE OF FEDERAL REGULATIONS*
PART 50, APPENDIX R, SECTION III.G FOR THE USE OF OPERATOR
MANUAL ACTIONS (TAC NOS. ME8055 AND ME8056)

Dear Mr. Pacilio:

The Commission has approved the enclosed exemption from specific requirements of Title 10 of the *Code of Federal Regulations*, Part 50, Appendix R, for Peach Bottom Atomic Power Station, Unit Nos. 2 and 3. This action is in response to your application dated March 6, 2009, as supplemented on February 12, 2010 (Agencywide Documents Access and Management System Accession Numbers ML090680141 and ML100470774, respectively). This application requested exemption from Appendix R, Section III.G, "Fire Protection of Safe Shutdown Capability," for the use of operator manual actions in lieu of the requirements specified in Section III.G.2. The original application, dated March 6, 2009, requested approval for the use of 31 manual operator actions. By letter dated February 12, 2010, 14 of the 31 operator manual actions were withdrawn from the request because your staff had determined that they were no longer needed. This exemption, therefore, reflects approval of the 17 remaining requested operator actions.

A copy of the exemption is enclosed. The exemption has been forwarded to the Office of the Federal Register for publication.

Please contact me at (301) 415-3204 if you have any questions on this issue.

Sincerely,


John D. Hughey, Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-277 and 50-278

Enclosure:
Exemption

cc w/encl: Distribution via Listserv

NUCLEAR REGULATORY COMMISSION

EXELON GENERATION COMPANY, LLC

DOCKET NOS. 50-277 AND 50-278

PEACH BOTTOM ATOMIC POWER STATION, UNIT NOS. 2 AND 3

EXEMPTION

[NRC-2011-xxxx]

1.0 BACKGROUND

Exelon Generation Company, LLC (the licensee, Exelon) is the holder of Renewed Facility Operating License Nos. DPR-44 and DPR-56, which authorizes operation of the Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3. The license provides, among other things, that the facility is subject to all rules, regulations, and orders of the Nuclear Regulatory Commission (NRC, the Commission) now or hereafter in effect.

The facility consists of two boiling-water reactors located partly in Peach Bottom Township, York County, partly in Drumore Township, Lancaster County, and partly in Fulton Township, Lancaster County, in southeastern Pennsylvania.

2.0 REQUEST/ACTION

Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.48(b), requires that nuclear power plants that were licensed before January 1, 1979, satisfy the requirements of 10 CFR Part 50, Appendix R, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979," Section III.G, "Fire protection of safe shutdown capability." PBAPS, Units 2 and 3 were licensed to operate prior to January 1, 1979. As such, the licensee's Fire Protection Program (FPP) must provide the established level of protection as intended by Section III.G of 10 CFR Part 50, Appendix R.

By letter dated March 6, 2009, "Request for Exemption from 10 CFR 50, Appendix R, Section III.G, 'Fire Protection of Safe Shutdown Capability'" available at Agencywide Documents Access and Management System (ADAMS), Accession No. ML090680141, and supplemented by letter dated February 12, 2010, "Response to Request for Additional Information Request for Exemption from 10 CFR 50, Appendix R, Section III.G, 'Fire Protection of Safe Shutdown Capability'" (ADAMS Accession No. ML100470774), the licensee requested an exemption for PBAPS, Units 2 and 3, from certain technical requirements of 10 CFR Part 50, Appendix R, Section III.G.2 (III.G.2) for the use of operator manual actions (OMAs) in lieu of meeting the circuit separation and protection requirements contained in III.G.2 for Fire Areas 2, 6N, 6S, 13N, 26, 30, 36, 37, 43, 50, and 58 at the plant.

3.0 DISCUSSION

Pursuant to 10 CFR 50.12, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR Part 50 when: (1) the exemptions are authorized by law, will not present an undue risk to public health or safety, and are consistent with the common defense and security; and (2) when special circumstances are present. The licensee has stated that special circumstances are present in that the application of the regulation in this particular circumstance is not necessary to achieve the underlying purpose of the rule, which is consistent with the language included in 10 CFR 50.12(a)(2)(ii).

In letters dated March 6, 2009, and February 12, 2010, the licensee discussed financial implications associated with plant modifications that may be necessary to comply with the regulation. 10 CFR 50.12(a)(2)(iii) states that if such costs have been shown to be significantly in excess of those contemplated at the time the regulation was adopted, or are significantly in

excess of those incurred by others similarly situated, this may be considered a basis for considering an exemption request. However, financial implications were not considered in the regulatory review of the request since no substantiation was provided regarding such financial implications. Even though no financial substantiation was provided, the licensee did submit sufficient regulatory basis to support a technical review of the exemption request in that the application of the regulation in this particular circumstance is not necessary to achieve the underlying purpose of the rule.

In accordance with 10 CFR 50.48(b), nuclear power plants licensed before January 1, 1979, are required to meet Section III.G, of 10 CFR Part 50, Appendix R. The underlying purpose of Section III.G of 10 CFR Part 50, Appendix R, is to ensure that the ability to achieve and maintain safe shutdown is preserved following a fire event. The regulation intends for licensees to accomplish this by extending the concept of defense-in-depth to:

- 1) prevent fires from starting;
- 2) rapidly detect, control, and extinguish promptly those fires that do occur;
- 3) provide protection for structures, systems, and components important to safety so that a fire that is not promptly extinguished by the fire suppression activities will not prevent the safe shutdown of the plant.

The stated purpose of 10 CFR Part 50, Appendix R, Section III.G.2 (III.G.2) is to ensure that one of the redundant trains necessary to achieve and maintain hot shutdown conditions remains free of fire damage in the event of a fire. III.G.2 requires one of the following means to ensure that a redundant train of safe shutdown cables and equipment is free of fire damage, where redundant trains are located in the same fire area outside of primary containment:

- a. Separation of cables and equipment by a fire barrier having a 3-hour rating;
- b. Separation of cables and equipment by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards and with fire detectors and

- an automatic fire suppression system installed in the fire area; or
- c. Enclosure of cables and equipment of one redundant train in a fire barrier having a 1-hour rating and with fire detectors and an automatic fire suppression system installed in the fire area.

Exelon has requested an exemption from the requirements of III.G.2 for PBAPS, Units 2 and 3 to the extent that one of the redundant trains of systems necessary to achieve and maintain hot shutdown is not maintained free of fire damage in accordance with one of the required means, for a fire occurring in Fire Areas 2 (Radwaste Building), 6S (Unit 2 Reactor Building), 6N (Unit 2 Reactor Building, North side), 13N (Unit 3 Reactor Building), 26 (Unit 3 Motor-Generator (MG) Set Ventilation Equipment Room), 30 (Unit 3 B/D Battery Room), 36 (E42 Switchgear Room), 37 (E22 Switchgear Room), 43 (E-4 Emergency Diesel Generator Room), 50 (Turbine Building), and 58 (Unit 3 MG Set Room).

In its submittals, the licensee described elements of the FPP that provide justification that the concept of defense-in-depth that is in place in the above fire areas is consistent with that intended by the regulation. To accomplish this, the licensee utilizes various protective measures. Specifically, the licensee stated that the purpose of its request was to credit the use of OMAs, in conjunction with other defense-in-depth features, in lieu of the separation and protective measures required by III.G.2 for a fire in the fire areas stated above.

3.1 Fire Prevention

In its March 6, 2009, and February 12, 2010, letters, the licensee provided an analysis that described how fire prevention is addressed for each of the fire areas for which the OMAs may be required. Unless noted otherwise in Section 3.4 below, all of the fire areas included in this exemption have a combustible fuel load that is considered to be low with fuel sources consisting primarily of fire retardant cable insulation and limited floor-based combustibles.

Unless noted otherwise, there are no high energy ignition sources located in the areas. The fire areas included in the exemption are not shop areas so hot work activities are infrequent with administrative control programs (e.g., hot work permits, fire watch, and supervisory controls). The administrative control programs are described in the PBAPS FPP, which is incorporated into the Updated Final Safety Analysis Report.

3.2 Detection, Control and Extinguishment

PBAPS has been divided into fire areas, as described in the PBAPS FPP. Three-hour fire barriers are normally used to provide fire resistive separation between adjacent fire areas. In some cases, barriers with a fire resistance rating of less than 3 hours are credited but exemptions have been approved or engineering evaluations performed in accordance with Generic Letter 86-10, "Implementation of Fire Protection Requirements," to demonstrate that the barriers are sufficient for the hazard. Walls separating rooms and zones within fire areas are typically constructed of concrete. In addition to these boundaries, the licensee provided a hazard analysis that described how detection, control, and extinguishment of fire are addressed for each of the fire areas for which the OMAs may be required.

Unless noted otherwise below, fire areas are provided with ionization smoke detectors in various locations within a particular fire area. Although not installed in accordance with a recognized standard with regard to spacing, the detectors are located near equipment such that they are likely to adequately detect a fire. Upon detecting smoke, the detectors initiate an alarm in the Control Room enabling fire brigade response. The licensee stated that in most cases, no automatic fire suppression systems are provided in the areas included in this exemption but that fire suppression systems are installed in plant areas with significant fire hazards, such as lube oil. Suppression systems have also been installed in areas with 1-hour barrier walls and 1-hour rated electrical raceway encapsulation.

The automatic suppression systems are not credited in reducing fire exposure to redundant equipment unless they are indicated as being full-area or specifically described as being effective for redundant equipment. Equipment operators are trained fire brigade members and would likely identify and manually suppress or extinguish a fire using the portable fire extinguishers and manual hose stations located throughout the fire areas.

3.3 Preservation of Safe Shutdown Capability

Each OMA included in this review consists of a sequence of tasks that occur in various fire areas. The OMAs are initiated upon confirmation of a fire in a particular fire area. The licensee stated that the postulated fire events that may require the use of the OMAs would include multiple failures of various components or equipment. In most cases, it is considered highly unlikely that the sequence of events required to necessitate the OMAs would fully evolve because of the fire prevention, fire protection, and physical separation features in place. However, in the event that the sequence does evolve, the OMAs are available to provide assurance that safe shutdown can be achieved.

This analysis postulates that OMAs may be needed to assure safe shutdown capability in addition to the traditional fire protection features described above. For each of the fire areas included in this exemption, the licensee evaluated the OMAs against the criteria of NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire," October 2007, in the March 6, 2009, submittal. A Fire Hazards Analysis was provided for each of the OMAs in the licensee's February 12, 2010, supplement.

3.3.1 Licensee's Bases for Establishing Feasibility and Reliability

The licensee's analysis addresses factors such as environmental concerns, equipment functionality and accessibility, available indications, communications, portable equipment, personnel protection equipment, procedures and training, staffing and demonstrations.

In its March 6, 2009, submittal, and further supported by its February 12, 2010, supplement, the licensee stated that environmental considerations such as radiological concerns, emergency lighting, temperature and humidity conditions and smoke and toxic gases were evaluated and found to not represent a negative impact on the operators' abilities to complete the OMA. The licensee stated that the dose limits contained in 10 CFR Part 20 are never challenged at any point along the travel path of any of the OMAs included in this exemption.

The licensee confirmed that each of the OMA locations addressed by this exemption is provided with emergency lighting that illuminates both the location where the manual action is performed and the access route to the manual action location. Where travel is required to buildings outside of the power block, portable lights are staged in the fire safe shutdown equipment locker which is inventoried and maintained by performance of a periodic routine test. The emergency lights are periodically checked for operation and aim at the target location.

The licensee also confirmed that temperature and humidity conditions will not challenge the operators performing the OMAs. Additionally, the licensee indicated that heat and smoke or gas generation from a fire will not impact the operator performing the OMAs. This is further supported by the fact that the locations of the postulated fire events are in different fire areas than the locations for where the actions are performed. In most cases, the initiating fire area and manual action location fire area are in separate buildings and have separate ventilation systems. Other than smoke, CO₂ is another toxic gas that could present a hazard. However, all of the CO₂ fire suppression systems at PBAPS are manually actuated to prevent an inadvertent discharge of a system.

The licensee stated that the equipment to be operated as part of the OMAs will be functional and maintained free of fire damage and will be accessible to the operators performing

the action. Additionally, PBAPS maintains Transient Response Implementing Plan procedures and T-300 Fire Guides. T-300 Fire Guides provide the operators with specific instructions in the event of a fire in a specific fire area. The T-300 Fire Guides provide a list of the key protected instruments available for a fire in the fire area and list any "prompt" actions that are needed to restore an instrument for a fire in that area (i.e., those that need to be performed within 30 minutes). The applicable T-300 Fire Guide lists the "prompt" actions at the front of the document. In addition, the licensee stated that where specific indications may be lost due to a postulated event, the applicable T-300 Fire Guide for that fire area identifies which indications may be lost and how to recover the loss of that indication. Most required shutdown parameter indications are provided by multiple instruments; therefore, even with the loss of certain instruments or power supplies, redundant instruments are available to provide indications to assist operators.

With regard to communications, the licensee stated that PBAPS has radios and phones available as part of the normal communications between the Control Room and the operators. Although the communication system is not specifically hardened for post-fire survivability, the radio and phone systems are robustly designed such that they will be available following most fire scenarios. In the event that the radio and phone systems are inoperable, face-to-face communication, and adequate time, is available to dispatch the safe shutdown operators from the Control Room to perform the tasks and return to the Control Room for reassignment when the task is complete. With the exception of Action H, none of the operator manual actions addressed by this exemption require immediate or concurrent coordination with the Control Room while performing the task.

The licensee stated that if any keys, tools or equipment are required to perform the OMAs, the T-300 Fire Guides provide instructions on where to find them and how to use them.

In addition, the licensee stated that operators are provided with standard personal protective equipment (PPE) (i.e., hardhat, safety glasses, hearing protection, gloves, etc.) and that additional PPE is not required for any of the OMAs, with the exception of actions that require that an electrical enclosure be opened to manipulate an insulated handle of a manual transfer switch. For these tasks, a PBAPS corporate safety procedure requires the use of additional electrical safety PPE when performing this task.

The licensee stated that the T-300 Fire Guides provide in-depth safe shutdown direction for fires in specific fire areas and that the procedures included in the guides include specific instructions on assessing plant indications and events as well as instructions on how to perform each of the OMAs. The procedures are then used to train the operators on the OMAs, which consist primarily of activities that are considered to be similar to those performed as part of typical work activity and are considered straightforward with minimal training demands. In addition, the licensee stated that licensed operators are trained biennially on the use of the T-300 Fire Guides using simulator scenarios that start with a fire in a specific fire area.

With regard to staffing, the licensee stated that PBAPS maintains a minimum of three operators on each shift to perform safe shutdown duties in the event of a fire, which may be comprised of equipment operators, reactor operators or senior reactor operators. Additionally, the licensee stated that PBAPS performed several demonstrations using what is considered to be the most challenging initiating fire area, the Turbine Building (Fire Area 50), because it encompasses both Unit 2 and Unit 3, includes an action that is a prompt action in other fire areas, and includes a number of OMAs to perform within the first 60 minutes.

3.3.2 NRC Staff Evaluation of Feasibility

The NRC staff has determined that the licensee's analysis demonstrates that, for the expected scenarios, the OMAs can be diagnosed and executed within the amount of time

necessary to complete them. The licensee's analysis also demonstrates that various factors, as discussed above, have been considered to address uncertainties in estimating the time available. Therefore, the NRC staff finds that the OMAs included in this review are feasible because there is adequate time available for the operator to perform the required OMAs to achieve and maintain hot shutdown following a postulated fire event. The following table summarizes the "required" versus "allowable" times for each OMA. Where a diagnosis time has been identified, it is included as part of the required time for a particular action. Where an action has multiple times or contingencies associated with the "allowable" completion time, the lesser time is used. This approach is considered to represent a conservative approach to analyzing the timelines associated with each of the OMAs with regard to the feasibility and reliability of the actions included in this exemption. In some cases, the margin between the required time and allowable time is small. Specifically actions D, U, V, and X, have 20 percent or less margin. This limited margin is based on using the most limiting information from the licensee. For example, if the licensee postulated up to 30 minutes for diagnosis, the higher value of the required time range noted in the table below includes the time to complete the action plus the full 30 minutes.

Finally, these numbers should not be considered without the understanding that the manual actions are a fall back in the unlikely event that the fire protection defense-in-depth features are insufficient. In most cases, there is no credible fire scenario that would necessitate the performance of these OMAs. The licensee provided a discussion of the times and circumstances associated with each of the actions in its March 6, 2009, and February 12, 2010, correspondence.

Fire Area of Fire Origin	OMA	Required Time (min)	Allowable Time (min)
Fire Area 2 (Radwaste Building)	Action B	15 - 45*	120
	Action C	15	25 **
	Action D	18 - 48*	60
Fire Area 6S (Unit 2 Reactor Building)	Action G	14 - 44*	60
Fire Area 6N (Unit 2 Reactor Building, North Side)	Action H	7	25 **
Fire Area 13N (Unit 3 Reactor Building)	Action J	12 - 42*	60
Fire Area 26 (Unit 3 MG Set Ventilation Equipment Room)	Action K	12 - 42*	60
Fire Area 30 (Unit 3 B/D Battery Room)	Action M	9 - 39*	60
Fire Area 36 (E42 Switchgear Room)	Action R	12 - 42*	60
Fire Area 37 (E22 Switchgear Room)	Action S	12 - 42*	60

Fire Area of Fire Origin	OMA	Required Time (min)	Allowable Time (min)
Fire Area 43 (E-4 Emergency Diesel Generator Room)	Action T	9 - 39*	60
Fire Area 50 (Turbine Building)	Action U	26 - 56*	60
	Action V	26 - 56*	60
	Action X	24 - 54*	60
	Action Y	15 - 45*	120
Fire Area 58 (Unit 3 MG Set Room)	Action BB	12 - 42*	60
	Action CC	12	25 **

* The higher value of the required time range accounts for a generic 30-minute diagnosis time to assess the need for OMAs.

** Prompt actions are those having allowable completion times of 30 minutes or less.

3.3.3 NRC Staff Evaluation of Reliability

The completion times noted in the table above provide reasonable assurance that the OMAs can reliably be performed under a wide range of conceivable conditions by different plant crews. This is because the completion time, in conjunction with the time margins associated with each action and other installed fire protection features, account for sources of uncertainty such as variations in fire and plant conditions, factors unable to be recreated in demonstrations and human-centered factors. Therefore, the NRC staff finds that the OMAs included in this review are reliable because there is adequate time available to account for uncertainties not only in estimates of the time available, but also in estimates of how long it takes to diagnose a

fire and execute the OMAs (i.e., as based, at least in part, on a plant demonstration of the actions under non-fire conditions).

For each of the fire areas included in this exemption, the postulated fire scenarios and pertinent details are summarized in Section 3.4 below.

3.4 NRC Staff Fire Area Evaluations

3.4.1 Fire Area 2 (Radwaste Building)

Fire Prevention

The licensee stated that the floor-based combustibles include health physics cleaning supplies, such as mops, vacuums and other Class A combustibles as well as several steel carts containing new resins in paper or plastic bags. The total weight of the plastic bags is estimated to be less than 5 pounds and empty resin bags are immediately removed.

Detection, Control, and Extinguishment

The licensee stated that Fire Area 2 has fire suppression systems installed within the fire area but not within the rooms containing redundant cables. The licensee has further stated that the detection systems in the rooms containing redundant cables are not code compliant in terms of overall spacing in the fire area. However, a smoke detector is located within 5 feet of redundant cable ZA2B1021A. There is also a smoke detector located within 15 feet of both cables ZD3A1806A and ZD3A1321A. The licensee also stated that the Radwaste Control Room is located directly adjacent to these three rooms and that it is normally occupied by an equipment operator. Because of this, it is likely that any fire would be quickly identified by an operator in the area. Additionally, the licensee stated that a fully trained on-site fire brigade is provided, which is dispatched via plant page in the event of a fire. The fire brigade is composed of plant operators that are separate from operators assigned safe shutdown duties and are instructed to provide information about a fire event over the operations radio to assist in

mitigating the event. Fire Area 2 is provided with manual fire fighting equipment such as portable fire extinguishers and manual hose stations throughout the area.

Preservation of Safe Shutdown Capability

The licensee stated that Fire Area 2 is a large fire area containing a number of rooms on several elevations and that spatial separation of redundant cables is provided as discussed below.

OMAs Credited for a Fire in This Area

Action B

The licensee stated that the redundant cables located in Fire Area 2 (cables ZA2B1021A and ZD3B1321A or ZD3A1806A) are located a minimum of approximately 30 feet from each other and that no intervening combustibles are present between the two trains of cables. This physical separation with the available fire detection system will provide the site fire brigade an opportunity to extinguish the fire before redundant trains are damaged. The licensee also stated that the cables are located a minimum of approximately 9 feet above the floor and that they are enclosed in rigid conduit, such that transient fire exposures and self-ignited cable fires are unlikely to affect the circuits.

In the unlikely event that both trains of cable are lost due to a fire in Fire Area 2, an OMA (Action B) is available to restore or maintain the necessary function to the effected equipment (SU-25 Breaker). Action B directs an operator to transfer SU-25 breaker auxiliary equipment from the normal power source to its alternate power source, by operating manual transfer switch 00S306, which is located in the Unit 2 Startup Building. The Unit 2 Startup Building is located in the exterior yard area.

Action C

The potential need to perform this action is low since this action is only needed if two of three off-site power sources are unavailable, power to the 2SU transformer tap changer is lost, and the tap changer is in the wrong position. The licensee stated that offsite power is provided to each of the 4kV Class 1E switchgear by two of three redundant sources (2SU, 3SU, and 343SU) and that control cables for the sources have been physically separated by rerouting selected cables, such that one of the redundant sources remains free of fire damage for fires in most plant areas. In particular, the licensee stated that cables associated with the 2SU source have been relocated out of the Turbine Building (Fire Area 50), and portions of the Radwaste Building (Fire Areas 2 and 58).

The licensee stated that balance of plant (BOP) cables are routed through Fire Area 2, but that the routing of the cables was not part of the analysis. In the licensee's February 12, 2010, supplement, the licensee described the circumstances that would determine the availability of the safe shutdown equipment located in this area; namely the 2SU power source, which includes a transformer tap changer that is powered by BOP power. Since the BOP cable routing was not part of the analysis, the loss of BOP power was assumed for a fire in these three fire areas. The licensee's analysis also assumed that the transformer tap changer, which is powered by the BOP and responsible for maintaining power to the 4kV Bus, was not in the correct position. When the tap changer is not in the correct position, the voltage could vary resulting in actuation of the 4kV trip relays.

In the unlikely event that all of the conditions discussed above exist and fire damage occurs to the redundant cables, Action C can be utilized, which directs operators to pull the fuse blocks for the degraded voltage trip relays to ensure that the 4kV busses remain available. Action C is a "prompt" action, with an allowable completion time of 30 minutes or less, however,

the licensee stated that its analysis assumed that the redundant cables were lost regardless of their location and that the tap changer was not in the correct position. The licensee stated that the loss of certain equipment in a fire area due to a fire will result in a Control Room alert. Off Normal procedure ON-114, "Actual Fire Reported in the Power Block, Diesel Generator Building, Emergency Pump, Inner Screen or Emergency Cooling Tower Structures," is immediately entered upon confirmation of a fire condition. Procedure ON-114 directs immediate entry into the Fire Guide for the affected fire area. The licensee also stated that a note is provided in the applicable safe shutdown fire guide series (T-300 Fire Guides) providing guidance on how to determine whether the 2SU transformer tap changer has lost power using indications within the Control Room. Therefore, the Control Room will know immediately if this action is required and a generic diagnosis time is not necessary.

The licensee's T-300 Fire Guides also provide the following guidance to assist operators in evaluating a postulated event, "If 2SU is the only off-site power source available, and a loss of power to the 2SU Transformer Tap Change has occurred, then perform the manual action to remove the fuses." Additionally, the 2SU transformer and associated auxiliaries are located in the yard area and would not be exposed by a fire in Fire Area 2. Lastly, the location of the OMA to remove the fuses in the 4kV Switchgear Rooms is in a separate fire area, with ventilation systems that are separate from Fire Area 2.

Action D

The licensee stated that this action would only be required if the conduit containing cable, which is located above the suspended ceiling with the only exposing combustible being a tray with fire retardant cables, is damaged by fire. There is a lack of ignition sources and a relatively short length (approximately 6 feet) of cable that passes through Fire Area 2. In

addition, there is a smoke detector located within 5 feet of the conduit containing the cable, which would result in rapid plant notification of an exposure fire.

In the unlikely event that a fire in Fire Area 2 damages cable ZA2B1014A, normal power to the 2AD003 battery charger could be lost, which is needed to maintain long term DC power through the station batteries. A loss of ZA2B1014A would necessitate a manual action to transfer battery charger 2AD003 to an alternate power source within 60 minutes since the batteries can operate for 60 minutes prior to the initiation of recharging. The alternate power source is routed in separate fire areas so a single fire cannot damage both the normal and alternate power feed. Action D is available to transfer the alternate power supply to the battery charger 2AD003. The action entails closing a breaker located in the E13 4kV Switchgear Room (Fire Area 33) and then operating a manual transfer switch located in the E32 4kV Switchgear Room (Fire Area 38), both of which are separate fire areas from Fire Area 2.

NRC Staff Evaluation

Given the limited amount of combustible materials and ignition sources, it is unlikely that a fire would occur and go undetected by the smoke detection system noted above or unsuppressed by personnel, and damage the safe shutdown equipment. Even if such circumstances exist, Actions B, C, and D are available to provide additional assurance that safe shutdown capability is maintained.

3.4.2 Fire Area 6S (Unit 2 Reactor Building)

Fire Prevention

The licensee stated that conduits are routed primarily through a transient combustible-free zone where a permit and review are required prior to the placement of combustibles in this area.

Detection, Control, and Extinguishment

The licensee stated that Fire Area 6S has ionization smoke detectors installed in the overhead area but that these smoke detectors do not have code compliant spacing due to ceiling height and beam pockets. However, there are three smoke detectors located above the general routing of the redundant cable conduits, which would be expected to activate in the event of a fire occurring in close proximity to the redundant cables. Additionally, the licensee stated that a fully trained on-site fire brigade is provided, which is dispatched via plant page in the event of a fire. The fire brigade is composed of plant operators that are separate from operators assigned safe shutdown duties and are instructed to provide information about a fire event over the operations radio to assist in mitigating the event.

Preservation of Safe Shutdown Capability

The licensee stated that Room 403 in Fire Area 6S has a ceiling height of approximately 29' and an approximate floor area of 6,848 square feet so it is unlikely that smoke and heat would accumulate at the height of the safe shutdown equipment and cause a failure due to fire damage.

OMAs Credited for a Fire in This Area

Action G

The licensee stated that recent plant experience with faults and malfunctions in similar load centers has been that even when energetic failures have occurred, its damage has been contained within the breaker cubicle, with some heat and smoke damage to immediately adjacent cubicles. Therefore, it is considered unlikely that the cables routed above the load centers would be affected by a fault within the load centers since there is not a credible fire scenario that would be capable of damaging the cables within the conduits.

A fire in Fire Area 6S has the potential to damage cables ZA2B1014A, ZA2A1505A, and

ZA2B1021A. The licensee stated that there are three 480V load centers in the room containing the redundant cables and that the cables are routed to one of the load centers. As a result, each cable is routed over a 480V load center and in two cases the conduit passes over two load centers prior to entering the third load center. The conduits are located above the two adjacent load centers, which consist of a 4kv to 480v sealed gas cooled step-down transformer and a 480v switchgear.

The loss of these cables could result in a loss of the normal power supply to the 2AD003 battery charger, which is needed to maintain long term DC power through the station batteries. A loss of ZA2B1014A, ZA2A1505A, and ZA2B1021A would necessitate a manual action to transfer battery charger 2AD003 to an alternate power source within 60 minutes since the batteries can operate for 60 minutes prior to the initiation of recharging. The alternate power source is routed in separate fire areas so a single fire cannot damage both the normal and alternate power feed. Action G is available to transfer the alternate power supply to the battery charger 2AD003. The action entails closing a breaker located in the E13 4kV Switchgear Room (Fire Area 33) and then operating a manual transfer switch located in the E32 4kV Switchgear Room (Fire Area 38), both of which are separate fire areas from Fire Area 6S.

NRC Staff Evaluation

Given the limited amount of combustible materials, ignition sources, and the large volume of the space, it is unlikely that a fire would occur and go undetected by the smoke detection system noted above or unsuppressed by personnel, and damage the safe shutdown equipment. Even if such circumstances exist, Action G is available to provide additional assurance that safe shutdown capability is maintained.

3.4.3 Fire Area 6N (Unit 2 Reactor Building, North side)

Fire Prevention

The licensee stated that the only floor-based combustibles in this area are trash cans and cables. Trash can lids are designed to provide self-extinguishing capability to the trash cans. Cables in the area are qualified to the Institute of Electrical and Electronics Engineers, Inc. Standard-383, "IEEE Standard For Qualifying Class 1E Electrical Cables And Field Splices for Nuclear Power Generating Stations" (IEEE 383), or equivalent.

Detection, Control, and Extinguishment

The licensee stated that Fire Area 6N has a smoke detection system installed, but that the spacing is not in compliance with National Fire Protection Association Code 72, "National Fire Alarm and Signaling Code" (NFPA 72), due to deep beam pockets at the ceiling of this area. However, there is a smoke detector within the vicinity (approximately 25 feet) of each of the cases where cable ZA2Q1280B and a "B" residual heat removal (RHR) cable intersect, which would be expected to activate in the event of a fire in close proximity to the redundant equipment. There is also an automatic water curtain on the west side of the Unit 2 Reactor Building that separates Fire Area 6N from Fire Area 6S, thus reducing any anticipated exposure from Fire Area 6S. Additionally, the licensee stated that a fully trained on-site fire brigade is provided, which is dispatched via plant page in the event of a fire. The fire brigade is composed of plant operators that are separate from operators assigned safe shutdown duties and are instructed to provide information about a fire event over the operations radio to assist in mitigating the event.

Preservation of Safe Shutdown Capability

The licensee stated that Fire Area 6N is the Unit 2 Reactor Building 135' elevation, north side, which is in a separate building from the Cable Spreading Room, Fire Area 25, which is the location of the OMA.

OMAs Credited for a Fire in This Area

Action H

The licensee stated that the cables associated with "B" RHR are located in trays and in conduit and that cables for both "A" and "B" RHR trains cross within 2 feet of each other. However, there are no high energy ignition sources where cable ZA2Q1280B and a "B" RHR train cable cross and only a small amount of combustibles in the area overall. Therefore, it is unlikely that a single fire could damage both the "A" train RHR cable and "B" RHR cables and necessitate the use of Action H. Action H, which requires coordination with the control room, directs an operator to insert a plug-in test switch into Panel 20C032, located in the Cable Spreading Room (Fire Area 25), to bypass the reactor low pressure permissive for opening MO-2-025A.

In the unlikely event that a fire does damage the pressure permissive instrumentation circuit for opening MO-2-025A, operators will be aware of the condition, either by electronic indications in the Control Room, a smoke detection alarm annunciation in the Control Room, or physical observation by operators, and will initiate Action H, which is the only OMA required to achieve hot shutdown for a fire in Fire Area 6N. Therefore, the Control Room will know immediately if this action is required and a generic diagnosis time is not necessary.

A fire in Fire Area 6N has the potential to damage cable ZA2Q1280B. This cable is associated with the pressure permissive circuit needed to open valve MO-2-10-025A. This valve needs to open to permit injection of Low Pressure Core Injection ("A" train RHR) following

depressurization. Fire Area 6N also contains a number of cables associated with the "B" train of RHR. Any number of "B" RHR train cables could be damaged as a result of a fire in Fire Area 6N, so the licensee's analysis assumed that the "B" RHR was considered to be unavailable for a fire in Fire Area 6N.

NRC Staff Evaluation

Given the limited amount of combustible materials and ignition sources, it is unlikely that a fire would occur and go unsuppressed by personnel, and damage the safe shutdown equipment. Even if such circumstances exist, Action H is available to provide additional assurance that safe shutdown capability is maintained.

3.4.4 Fire Area 13N (Unit 3 Reactor Building)

Fire Prevention

The licensee stated that limited amounts of Class A combustible materials, including step-off pads, are present in this area. The three cables addressed in this area are routed such that they terminate at either a 480V load center or a motor control center (MCC) cabinet or both.

Detection, Control, and Extinguishment

The licensee stated that both elevations containing redundant equipment within Fire Area 13N have smoke detection systems installed that produce an alarm in the Control Room, but that due to the room height and steel beams at the ceiling, the spacing of the smoke detectors on both elevations does not meet the spacing listed in NFPA 72. Although not entirely compliant with NFPA 72, this system is considered to provide adequate coverage to detect a fire and alert operators of a fire. Additionally, the licensee stated that a fully trained on-site fire brigade is provided, which is dispatched via plant page in the event of a fire. The fire brigade is composed of plant operators that are separate from operators assigned safe shutdown duties

and are instructed to provide information about a fire event over the operations radio to assist in mitigating the event.

Preservation of Safe Shutdown Capability

The licensee stated that the 135' elevation of Fire Area 13N has a ceiling height of approximately 29' and an approximate floor area of 4,033 square feet and the 165' elevation has a ceiling height of approximately 29' and an approximate floor area of 6,848 square feet so it is unlikely that smoke and heat would accumulate at the height of the safe shutdown equipment and cause a failure due to fire damage.

OMAs Credited for a Fire in This Area

Action J

The licensee stated that while it is possible that any one of the three redundant cables located in Fire Area 13N could potentially be damaged as a result of a fault or failure within its associated 480V load center or MCC, the impact of a fire on the ability to perform this action is low since Fire Area 13N is in a separate building with a separate ventilation system from the E43 4kV Switchgear Room and ample time is available to complete the action. However, the other installed fire protection features such as the smoke detection system, cable conduit, and fire brigade response would likely minimize the impact of a fire on the cables themselves.

A fire in Fire Area 13N has the potential to damage cables ZD3B1313A, ZD3A1806A, and ZD3B3983A. The loss of any of these cables could result in a loss of the normal power supply to the 3DD003 battery charger. A loss of ZD3B1313A, ZD3A1806A, or ZD3B3983A, would necessitate a manual action to transfer battery charger 3DD003 to an alternate power source to within 60 minutes since the batteries can operate for 60 minutes prior to the initiation of recharging. Battery charger 3DD003 can also be fed from an alternate power source, which is routed in separate fire areas so a single fire cannot damage both the normal and alternate

power feed. Action J is available to transfer the alternate power supply to the battery charger 3DD003. The action entails first closing a breaker and then operating a manual transfer switch. The breaker and manual transfer switch are located in the E43 4kV Switchgear Room (Fire Area 34).

NRC Staff Evaluation

Given the limited amount of combustible materials, ignition sources, and the large volume of the space, it is unlikely that a fire would occur and go undetected by the smoke detection system noted above or unsuppressed by personnel, and damage the safe shutdown equipment. Even if such circumstances exist, Action J is available to provide additional assurance that safe shutdown capability is maintained.

3.4.5 Fire Area 26 (Unit 3 MG Set Ventilation Equipment Room)

Fire Prevention

The licensee stated that the primary combustible material in Fire Area 26 is fire retardant cable insulation and that there are no in situ ignition sources in the vicinity of the cables.

Detection, Control, and Extinguishment

The licensee stated that in Fire Area 26, there are two ionization smoke detectors located in the portion of the room containing the cables of concern, but that the overall detector placement for the fire area as a whole does not comply with the layout and spacing requirements of NFPA 72; however, the two smoke detectors are located in the immediate vicinity of the cables and would provide an alarm of a fire condition. Additionally, the licensee stated that a fully trained on-site fire brigade is provided, which is dispatched via plant page in the event of a fire. The fire brigade is composed of plant operators that are separate from operators assigned safe shutdown duties and are instructed to provide information about a fire event over the operations radio to assist in mitigating the event.

Preservation of Safe Shutdown Capability

The licensee stated that Fire Area 26 has a ceiling height of approximately 25' and an approximate floor area of 2,100 square feet so it is unlikely that smoke and heat would accumulate at the height of the safe shutdown equipment and cause a failure due to fire damage.

OMAs Credited for a Fire in This Area

Action K

The licensee stated that it is unlikely that Action K will be necessary because there is reasonable assurance that both of the cables would not be damaged in the event of a fire in Fire Area 26 since there are no in situ ignition sources in Fire Area 26 in the vicinity of the cables, there are no combustible materials, other than fire retardant cable insulation exposing the two cables, and there are two smoke detectors provided in the area to notify operators of a fire. In the event that the action is necessary, the impact of a fire on the ability to perform this action is low since Fire Area 26N is in a separate building with a separate ventilation system from the E43 4kV Switchgear Room and ample time is available to complete the action.

A fire in Fire Area 26 has the potential to damage cables ZD3B1313A, ZD3A1806A, and ZD3B3983A. The loss of any of these cables could result in a loss of the normal power supply to the 3DD003 battery charger. A loss of ZD3B1313A, ZD3A1806A, or ZD3B3983A, would necessitate a manual action to transfer battery charger 3DD003 to an alternate power source within 60 minutes since the batteries can operate for 60 minutes prior to the initiation of recharging. Battery charger 3DD003 can also be fed from an alternate power source, which is routed in separate fire areas so a single fire cannot damage both the normal and alternate power feed. Action K is available to transfer the alternate power supply to the battery charger 3DD003. The action entails first closing a breaker and then operating a manual transfer switch.

The breaker and the manual transfer switch are located in the E43 4kV Switchgear Room (Fire Area 34).

NRC Staff Evaluation

Given the limited amount of combustible materials, ignition sources, and the large volume of the space, it is unlikely that a fire would occur and go undetected by the smoke detection system noted above or unsuppressed by personnel, and damage the safe shutdown equipment. Even if such circumstances exist, Action K is available to provide additional assurance that safe shutdown capability is maintained.

3.4.6 Fire Area 30 (Unit 3 B/D Battery Room)

Fire Prevention

The licensee stated that the combustible loading in this area is considered to be low with the primary combustible material in this area being liquid filled plastic battery cases and that there are no cables in trays in this fire area. Additionally, the potential for hydrogen buildup due to the battery charging process is mitigated by the ventilation system in the room. The ventilation system is monitored, alarmed, and programmatically controlled. The licensee also stated that there are no significant ignition sources in this area.

Detection, Control, and Extinguishment

The licensee stated that for Fire Area 30 there are three smoke detectors located in the room and that the spacing of the detectors is compliant with NFPA 72 with regard to ceiling height, beam configuration and air flow. Additionally, two of the three smoke detectors are located directly above the encapsulated conduits that contain redundant cables. Additionally, the licensee stated that a fully trained on-site fire brigade is provided, which is dispatched via plant page in the event of a fire. The fire brigade is composed of plant operators that are

separate from operators assigned safe shutdown duties and are instructed to provide information about a fire event over the operations radio to assist in mitigating the event.

Preservation of Safe Shutdown Capability

The licensee stated that Fire Area 30 has a ceiling height of approximately 14' and an approximate floor area of 525 square feet so it is unlikely that smoke and heat would accumulate at the height of the safe shutdown equipment and cause a failure due to fire damage.

OMAs Credited for a Fire in This Area

Action M

The licensee stated that it is unlikely that both of the redundant cables located in Fire Area 30 would be damaged in the event of a fire in Fire Area 30 since the conduits containing cables ZA3B1014A and ZA3A1505A are both encapsulated in abandoned Thermo-Lag, the primary combustible material in the room is liquid filled plastic battery cases, there are no cable trays or high voltage components located in the fire area, there are three smoke detectors located in close proximity to the cables, and the potential for hydrogen release from the battery charging process is mitigated by the ventilation system that is monitored for operation and addressed by the Technical Requirements Manual.

A fire in Fire Area 30 has the potential to damage cables ZA3B1014A and ZA3A1505A, which the licensee stated are located approximately 16 inches from one another at their closest location. The loss of either of these cables could result in a loss of the normal power supply to the 3AD003 battery charger (located in Fire Area 32). A loss of ZA3B1014A or ZA3A1505A would necessitate a manual action to transfer battery charger 3AD003 to an alternate power source within 60 minutes since batteries can operate for 60 minutes prior to the initiation of recharging. Battery charger 3AD003 can also be fed from an alternate power source, which is

routed in separate fire areas so a single fire cannot damage both the normal and alternate power feed. Action M is available to transfer the alternate power supply to the battery charger 3AD003. The action entails operating a manual transfer switch located in the E33 4kV Switchgear Room (located in a different fire area).

NRC Staff Evaluation

Given the ventilation system located in the room, limited amount of combustible materials, lack of ignition sources, and the volume of the space, it is unlikely that a fire would occur and go undetected by the smoke detection system noted above or unsuppressed by personnel, and damage the safe shutdown equipment. Even if such circumstances exist, Action M is available to provide additional assurance that safe shutdown capability is maintained.

3.4.7 Fire Area 36 (E42 Switchgear Room)

Fire Prevention

The licensee stated that the cables in this area are qualified to IEEE 383, or equivalent. The licensee also indicated that there are several sections of Thermo-Lag in the room. Thermo-Lag is a fire barrier material that is also considered a combustible. The licensee determined that this material does not create a credible fire exposure to the conduit and that the overall combustible material loading for the area is low. Additionally, Fire Area 36 contains 4kV switchgear which can create a high energy fault in the event of a failure and is considered an ignition source. However, the conduit containing the cables of concern is routed 4 feet horizontally from the front of the switchgear cabinet, not routed over the switchgear, and is not expected to be damaged in the event of a switchgear failure. Conduit containing four cables of concern is routed over two battery chargers, which convert 480 volt AC into 125 volt DC for the batteries. However, these chargers are not anticipated to provide a sustained fault current like a

4kV switchgear, but heat from a failure could expose the conduit and, therefore, represent an ignition source.

Detection, Control, and Extinguishment

The licensee stated that Fire Area 36 has an NFPA 72-compliant smoke detection system installed, comprised of six smoke detectors, and that the room is also provided with a pre-action sprinkler system designed in accordance with NFPA Standard 13, "Standard for the Installation of Sprinkler Systems" (NFPA 13). Additionally, the licensee stated that a fully trained on-site fire brigade is provided, which is dispatched via plant page in the event of a fire. The fire brigade is composed of plant operators that are separate from operators assigned safe shutdown duties and are instructed to provide information about a fire event over the operations radio to assist in mitigating the event.

Preservation of Safe Shutdown Capability

The licensee stated that Fire Area 36 has a ceiling height of approximately 14' and an approximate floor area of 525 square feet so it is unlikely that smoke and heat would accumulate at the height of the safe shutdown equipment and cause a failure due to fire damage.

OMAs Credited for a Fire in This Area

Action R

The licensee stated that while it is possible that the redundant cables located in Fire Area 36 could potentially be damaged by heat resulting from a battery charger failure, it is unlikely that the cables within the conduits would be damaged since Fire Area 36 has full area smoke detection and pre-action sprinkler systems, the conduit is not routed directly above the 4kV switchgear, the combustible loading in the room is low consisting primarily of fire retardant cable insulation and Thermo-Lag, and there are no cable trays routed below the conduit.

A fire in Fire Area 36 has the potential to damage cables ZA2A1501E, ZA2A1501F, ZA2A1508E, and ZA2A1508F, which the licensee stated are routed together in a single conduit, located approximately 9 feet above the floor, for their entire length in Fire Area 36. The loss of these cables could result in the loss of power to the E12 bus from the E1 Emergency Diesel Generator. Since Fire Area 36 is the E42 4kV Switchgear Room, the switchgear in this room is primarily associated with the B and D electrical trains. Therefore, a fire in this room is assumed to result in the loss of the components associated with the B and D trains. In the event that these are lost due to a fire in Fire Area 36, Action R is available, which directs an operator to enter the E12 Switchgear Room (located in Fire Area 39) and pull two fuse blocks, open two breakers by depressing the mechanical breaker trip button and taking a Main Control Room breaker control switch to "Close."

NRC Staff Evaluation

Given the limited amount of combustible materials and the volume of the space, it is unlikely that a fire would occur and go undetected by the smoke detection system noted above or unsuppressed by personnel, and damage the safe shutdown equipment. Even if such circumstances exist, Action R is available to provide additional assurance that safe shutdown capability is maintained.

3.4.8 Fire Area 37 (E22 Switchgear Room)

Fire Prevention

The licensee stated that the cables in this area are qualified to IEEE 383, or equivalent. Thermo-Lag is also present, but does not create a credible fire exposure to the conduit. The licensee determined that this material does not create a credible fire exposure to the conduit and that the overall combustible material loading for the area is low. Fire Area 37 also contains 4kV switchgear which can create a high energy fault in the event of a failure and is considered

an ignition source. However, the conduit containing the cables of concern is routed 4 feet horizontally from the front of the switchgear cabinet, not routed over the switchgear, and is not expected to be damaged in the event of a switchgear failure. Additionally, a bank of 480V MCCs exposes conduit containing four cables of concern to an exposure hazard in the event that an MCC fails.

Detection, Control, and Extinguishment

The licensee stated that Fire Area 37 has an NFPA 72-compliant smoke detection system installed, comprised of three smoke detectors, and that the room is also provided with a pre-action sprinkler system designed in accordance with NFPA 13. Additionally, the licensee stated that a fully trained on-site fire brigade is provided, which is dispatched via plant page in the event of a fire. The fire brigade is composed of plant operators that are separate from operators assigned safe shutdown duties and are instructed to provide information about a fire event over the operations radio to assist in mitigating the event.

Preservation of Safe Shutdown Capability

The licensee stated that Fire Area 37 has a ceiling height of approximately 14' and an approximate floor area of 525 square feet so it is unlikely that smoke and heat would accumulate at the height of the safe shutdown equipment and cause a failure due to fire damage.

OMAs Credited for a Fire in This Area

Action S

The licensee stated that while it is possible that the redundant cables located in Fire Area 37 could potentially be damaged by failure of the bank of 480V MCCs located below the conduit, it is unlikely that the cables within the conduits would be damaged since Fire Area 37 has full area smoke detection and pre-action sprinkler systems, the conduit is not routed directly

above the 4kV switchgear, the combustible loading in the room is low consisting primarily of fire retardant cable insulation and Thermo-Lag, and there are no cable trays routed below the conduit.

A fire in Fire Area 37 has the potential to damage cables ZA2A1501E, ZA2A1501F, ZA2A1508E, and ZA2A1508F, which the licensee stated are routed together in a single conduit, located approximately 9 feet above the floor, for their entire length in Fire Area 37. The loss of these cables could result in the loss of power to the E12 bus from the E1 Emergency Diesel Generator. Since Fire Area 37 is the E22 4kV Switchgear Room, the switchgear in this room is primarily associated with the B and D electrical trains, so a fire in this room is assumed to result in the loss of the components associated with the B and D trains. In the event that these are lost due to a fire in Fire Area 36, Action R is available, which directs an operator to enter the E12 Switchgear Room (located in Fire Area 39) and pull two fuse blocks, open two breakers by depressing the mechanical breaker trip button and taking a Main Control Room breaker control switch to "Close."

NRC Staff Evaluation

Given the limited amount of combustible materials and the volume of the space, it is unlikely that a fire would occur and go undetected by the smoke detection system noted above or unsuppressed by personnel, and damage the safe shutdown equipment. Even if such circumstances exist, Action S is available to provide additional assurance that safe shutdown capability is maintained.

3.4.9 Fire Area 43 (E-4 Emergency Diesel Generator Room)

Fire Prevention

The licensee stated that other than the diesel fuel and lube oil in the EDG Rooms, the combustible material loading is considered to be low. The fuel oil day tank is located within the

fire area, but in a separate room with heavy concrete walls and a 3-hour Underwriters Laboratory (UL)-listed fire door. Additionally, failure of an operating diesel generator represents a significant ignition source. There are also high voltage electrical components associated with the generator in the room. However, these ignition sources are only credible when the diesel is in operation. During routine diesel operations, an equipment operator is stationed in the room to monitor the diesel and would be available to immediately suppress any small fires that occurred, or to secure the diesel if a significant malfunction occurred.

Detection, Control, and Extinguishment

The licensee stated that Fire Area 43 has eight heat detectors installed that annunciate an alarm in the Control Room and that the room also has a manually-actuated carbon dioxide (CO₂) fire suppression system installed. Additionally, the licensee stated that a fully trained on-site fire brigade is provided, which is dispatched via plant page in the event of a fire. The fire brigade is composed of plant operators that are separate from operators assigned safe shutdown duties and are instructed to provide information about a fire event over the operations radio to assist in mitigating the event.

Preservation of Safe Shutdown Capability

The licensee stated that the emergency diesel generator rooms are located in a separate building from the rest of the plant and that each of the emergency diesel generators are separated from one another with a three-hour rated fire barrier. Additionally, the OMA for this area is performed in the E42 Switchgear room, Fire Area 36, which is located in the turbine building.

OMAs Credited for a Fire in This Area

Action T

The licensee stated that while it is possible that the redundant cables in Fire Area 43 could potentially be damaged by a lube or fuel oil fire, it is unlikely that the cables within the conduits would be damaged since they are located in conduit that is embedded in the floor slab for much of the length they are in Fire Area 43, and there would have to be a sufficient amount of oil present on the floor which then spreads across the floor to expose the control panels. Even if these two circumstances occur, a manually-actuated CO₂ fire suppression system is available to extinguish any fires in the area.

A fire in Fire Area 43 has the potential to damage cables ZD2A1807E or ZD2A1807H, which the licensee stated are located in conduits embedded in the concrete floor slab, control panels, and a junction box. Failure of these cables via a hot short could cause the Unit 2 emergency diesel generator breaker to close into the E42 bus, either out of phase or not running, which would cause a protective trip of the E42 bus. This could result in a loss of the normal power supply to the 2DD003 battery charger. The battery charger is needed to maintain long term DC power through the station batteries. The batteries can operate for 60 minutes prior to the initiation of recharging. Battery charger 2DD003 can also be fed from an alternate power source, which is routed in separate fire areas so a single fire cannot damage both the normal and alternate power feed. Action T is available to transfer the alternate power supply to the battery charger 2DD003 (located in Fire Area 36). The action entails operating a manual transfer switch located in the E42 4kV Switchgear Room which is a separate fire area in a separate building.

NRC Staff Evaluation

Given the limited amount of combustible materials and monitoring of credible ignition sources in this area, it is unlikely that a fire would occur and go undetected by the heat detection system or unsuppressed by the suppression system noted above or by personnel, and damage the safe shutdown equipment. Even if such circumstances exist, Action T is available to provide additional assurance that safe shutdown capability is maintained.

3.4.10 Fire Area 50 (Turbine Building)

Fire Prevention

The licensee stated that limited amounts of Thermo-Lag and various Class A combustible materials are present in the fire area. The licensee also stated that the room containing the cables of concern contains two rows of 13kV switchgear cabinets, which would be capable of exposing the cables in the event of a 13 kV switchgear failure.

Detection, Control, and Extinguishment

The licensee stated that Fire Area 50 includes most of the Unit 2 and Unit 3 Turbine Building and as such is a large fire area including several rooms located on multiple elevations. However, the cables of concern with regard to the associated OMA are only routed through Room 126. This room contains a full room smoke detection system with spacing in accordance with NFPA 72. In addition, a full room pre-action sprinkler system is provided in Room 126 with sprinkler head placement in accordance with NFPA 13. There is also an automatic sprinkler system in the adjacent open areas of the Turbine Building. The remainder of the Turbine Building is separated from Room 126 by heavy concrete radiation barriers and a water curtain (which is part of the Room 126 pre-action system) at the doorways. Additionally, the licensee stated that a fully trained on-site fire brigade is provided, which is dispatched via plant page in the event of a fire. The fire brigade is composed of plant operators that are separate from

operators assigned safe shutdown duties and are instructed to provide information about a fire event over the operations radio to assist in mitigating the event.

Preservation of Safe Shutdown Capability

The primary basis for preserving safe shutdown capability is included in the discussion of prevention, detection, suppression, and control above or included in the OMAs discussed below.

OMAs Credited for a Fire in This Area

Action U

The licensee stated that while it is possible that one of the redundant cables located in Fire Area 50 could potentially be damaged by failure of the 13kV switchgear, it is unlikely that additional redundant cables would be damaged since the conduit containing cable ZD2A1807E runs above the 13kV switchgear, there is approximately 5 feet of separation between it and the next closest conduit which contains cable ZA2A1503E, and this conduit is not located above the 13kV switchgear. The area is also provided with a smoke detection system and a pre-action sprinkler system and the presence of abandoned, but intact, Thermo-Lag to protect the cables that are needed to ensure power to the "A" and "C" train switchgear to power credited shutdown components.

There is a cable associated with each of the four 4kV busses routed through Fire Area 50. There is the potential for any of the four diesel generator output breakers to spuriously close, rendering the bus unavailable until the diesel generator breaker is opened and lockouts are reset. The four cables associated with the Unit 2 4kV busses are: bus E12 breaker cable ZA2A1503E; bus E22 breaker cable ZB2A1606E; bus E32 breaker ZC2A1704E; and bus E42 breaker cable ZD2A1807E. Loss of any one of these cables will only affect the associated 4kV bus and all four cables are routed in separate conduits. Cables ZA2A2503E and ZC2A1704E

are routed in conduits that remain encapsulated in abandoned Thermo-Lag for their entire routing through Fire Area 50 while cables ZB2A1606E and ZD2A1807E are routed in conduit that is not encapsulated. The conduit containing cable ZB2A1606E is located within 5 feet of the conduits containing cables ZA2B1503E and ZD2A1807E.

Only cables ZA2A1503E and ZC2A1704E are necessary to power the busses credited for safe shutdown. However, Action U would restore power to all four busses. Only three of the four busses would require restoration within 60 minutes and only one bus is assumed to require restoration, since only one bus is assumed to spuriously operate. Nevertheless, a 26-minute performance time is credited for restoration of all four Unit 2 busses.

In the unlikely event that a fire does occur and goes undetected by the smoke detection system or unsuppressed by the suppression system and damages multiple redundant cables, Action U is available to restore power to the busses, which entails tripping the breaker and pulling a fuse block for each of the busses. The location of Action U is in the associated Switchgear Room for each associated bus. Additionally, the Switchgear Rooms are separate fire areas from the Turbine Building and from each other and have separate ventilation systems from the Turbine Building. Therefore, a fire in Fire Area 50 would not impact the location of the action.

Action V

Action V is the same as Action U above but for Unit 3. There is a cable associated with each of the four 4kV busses routed through Fire Area 50. There is the potential for any of the four diesel generator output breakers to spuriously close, rendering the bus unavailable until the diesel generator breaker is opened and lockouts are reset. The four cables associated with the Unit 3 4kV busses are: bus E13 breaker cable ZA3A1503E; bus E23 breaker cable ZB3A1606E; bus E33 breaker cable ZC3A1704E; and bus E43 breaker cable ZD3A1807E. Loss of any one

of these cables will only affect the associated 4kV bus and all four cables are routed in separate conduits. Cables ZA3A1503E and ZC3A1704E are routed in conduits that remain encapsulated in abandoned Thermo-Lag for their entire routing through Fire Area 50 while cables ZB3A1606E and ZD3A1807E are routed in conduit that is not encapsulated. The conduit containing cable ZB3A1606E is located within 5 feet of the conduits containing cables ZA3A1503E and ZC3A1704E.

Only cables ZA3A1503E and ZC3A1704E are necessary to power the busses credited for safe shutdown. However, Action V would restore power to all four busses. Only three of the four busses would require restoration within 60 minutes and only one bus is assumed to require restoration, since only one bus is assumed to spuriously operate. Nevertheless, a 26-minute performance time is credited for restoration of all four Unit 3 busses. The licensee stated that while it is possible that one of the cables could potentially be damaged by failure of the 13kV switchgear since the conduit containing cable ZD2A1807E runs above the 13kV switchgear, there is approximately 5 feet of separation between it and the next closest conduit which contains cable ZA2A1503E, and this conduit is not located above the 13kV switchgear. Therefore, it is unlikely that the cables required for safe shut down would be damaged by a fire resulting from failure of the 13kV switchgear since the area is also provided with a smoke detection system and a pre-action sprinkler system and the presence of abandoned, but intact, Thermo-Lag to protect the cables that are needed to ensure power to the "A" and "C" train switchgear to power credited shutdown components.

In the unlikely event that a fire does occur and goes undetected by the smoke detection system or unsuppressed by the suppression system and damages multiple redundant cables, Action V is available to restore power to the busses, which entails tripping the breaker and pulling a fuse block for each of the busses. The location of Action U is in the associated

Switchgear Room for each associated bus. Additionally, the Switchgear Rooms are separate fire areas from the Turbine Building and from each other and have separate ventilation systems from the Turbine Building. Therefore, a fire in Fire Area 50 would not impact the location of the action.

Action X

The potential need to perform this action is low since this action is only needed if two of three other off-site power sources are unavailable, power to the 2SU transformer tap changer is lost, and the tap changer is in the wrong position. The licensee stated that offsite power is provided to each of the 4kV Class 1E switchgear by two of three redundant sources (2SU, 3SU, and 343SU) and that control cables for the sources have been physically separated by rerouting selected cables, such that one of the redundant sources remains free of fire damage for fires in most plant areas. In particular, the licensee stated that cables associated with the 2SU source have been relocated out of the Turbine Building (Fire Area 50), and portions of the Radwaste Building (Fire Areas 2 and 58).

The licensee stated that BOP cables are routed through Fire Area 50 but that the routing of the cables was not part of its analysis. In its February 12, 2010, supplement, the licensee described the circumstances that would determine the availability of the safe shutdown equipment located in this area; namely the 2SU power source, which includes a transformer tap changer that is powered by BOP power. Since the BOP cable routing was not part of the analysis, the loss of BOP power was assumed for a fire in these three fire areas. The licensee's analysis also assumed that the transformer tap changer, which is powered by the BOP and responsible for maintaining power to the 4kV Bus 2SU, was not in the correct position. When the tap changer is not in the correct position, the voltage could vary resulting in 4kV trip relays actuating.

In the unlikely event that all of the conditions discussed above exist and fire damage occurs to the redundant cables, Action X can be utilized, which directs operators to pull the fuse blocks for the degraded voltage trip relays to ensure that the 4kV busses remain available.

The licensee's T-300 Fire Guides provide the following guidance to assist operators in evaluating a postulated event, "If 2SU is the only off-site power source available, and a loss of power to the 2SU Transformer Tap Change has occurred, then perform the manual action to remove the fuses."

A note is also provided in the Fire Guide for this step providing guidance on how to determine if the 2SU transformer tap changer has lost power using indications within the Control Room. Therefore, the Control Room will know if this action is required. Additionally, the 2SU transformer and associated auxiliaries are located in the yard area and would not be exposed by a fire in Fire Area 50. Lastly, the location of the OMA to remove the fuses in the 4kV Switchgear Rooms is in a separate fire area, with separate ventilation systems, from Fire Area 50.

Action Y

The licensee stated that while it is possible that the redundant cables in Fire Area 50 could potentially be damaged by a fire resulting from a 13kV switchgear failure, it is unlikely that both of the cables within the conduits would be damaged since the conduit containing cable ZA2B1021B remains encapsulated in Thermo-Lag for the entire length above the 13kV switchgear, the cable ZA2B1021B is not located within the same conduit as cables ZD3B1321B and ZD3B1321D. In addition, the area is provided with a smoke detection system, as well as a pre-action sprinkler system.

The licensee stated that the redundant cables located in Fire Area 50 (cables ZA2B1021B and ZD3B1321B or ZD3A1321D) are located approximately 5 feet from each other

and that no intervening combustibles are present between the two trains of cables. Additionally, the conduit containing cable ZA2B1021B remains encapsulated in abandoned Thermo-Lag for the entire routing through Fire Area 50. The licensee also stated that the conduits containing the cables associated with this OMA are routed directly above (approximately 5 feet) the 13kV switchgear cabinets in the room and that the conduits are assumed to be located within the anticipated heat plume in the event of a 13kV switchgear failure.

In the unlikely event that a fire does occur and goes undetected by the smoke detection system or unsuppressed by the suppression system and both trains of cable are lost, an OMA (Action V) is available to restore or maintain the necessary function to the effected equipment (SU-25 Breaker). Action V directs an operator to transfer SU-25 breaker auxiliary equipment from the normal power source to its alternate power source, by operating manual transfer switch 00S306, which is located in the Unit 2 Startup Building, which is located in the exterior yard area.

NRC Staff Evaluation

Given the limited amount of combustible materials and the volume of the space, it is unlikely that a fire would occur and go undetected by the smoke detection system noted above or unsuppressed by the suppression systems noted above or by personnel, and damage the safe shutdown equipment. Even if such circumstances exist, Actions U, V, X, and Y are available to provide additional assurance that safe shutdown capability is maintained.

3.4.11 Fire Area 58 (Unit 3 MG Set Room)

Fire Prevention

The licensee stated that the combustible loading in Fire Area 58 is considered to be moderate and consists primarily of lube oil from the MG set. Other combustible materials in the

area include fire retardant cable insulation and Thermo-Lag. Additionally, the MG set and the MCCs located in the room represent ignition sources.

Detection, Control, and Extinguishment

The licensee stated that Fire Area 58 has a pre-action sprinkler system installed that is designed to provide localized protection of the MG set with sprinkler heads located over the MG set itself and not at the ceiling. Although this is not considered to be an area-wide system and does not comply with NFPA 13, this system was an original plant installation designed to provide localized protection of the MG set. The pre-action system is actuated automatically by any one of the six smoke detectors in the room, which are also located directly above the MG set and not at the ceiling. Since the detectors are not located at the ceiling level, the smoke detection system does not comply with NFPA 72, but still provides some smoke detection capability for the area as a whole and would be expected to alert operators of the credible fire scenarios for this area. Additionally, the licensee stated that a fully trained on-site fire brigade is provided, which is dispatched via plant page in the event of a fire. The fire brigade is composed of plant operators that are separate from operators assigned safe shutdown duties and are instructed to provide information about a fire event over the operations radio to assist in mitigating the event.

Preservation of Safe Shutdown Capability

The licensee stated that Fire Area 58 has a ceiling height of approximately 29' and an approximate floor area of 3,525 square feet so it is unlikely that smoke and heat would accumulate at the height of the safe shutdown equipment and cause a failure due to fire damage.

OMAs Credited for a Fire in This Area

Action BB

The licensee stated that while it is possible that the two redundant cables in Fire Area 58 associated with the normal power supply to the 3DD003 battery charger could potentially be damaged by a lube oil or MG set fire, it is unlikely that the cables within the conduits would be damaged since the conduit containing cable ZD3B3983A is not located above the MG set. In addition, there is a smoke detection system provided in the area, as well as a pre-action sprinkler system located above the MG set. In the unlikely event that both cables are lost, the location of the action is in a different fire area from Fire Area 58.

A fire in Fire Area 58 has the potential to damage cables ZD3A1806A and ZD3B3983A, which the licensee stated are located in conduits embedded in the concrete floor slab, control panels, and a junction box. The loss of either of these cables could result in a loss of the normal power supply to the 3DD003 battery charger. The battery charger is needed to maintain long term DC power through the station batteries. The batteries can operate for 60 minutes prior to the initiation of recharging. Battery charger 3DD003 can also be fed an alternate power source, which is routed in separate fire areas so a single fire cannot damage both the normal and alternate power feed.

In the unlikely event that a fire does occur and goes undetected by the smoke detection system or unsuppressed by the suppression system and the cables are damaged, Action BB is available to transfer the alternate power supply to battery charger 3DD003. The action entails closing a breaker and then operating a manual transfer switch, both located in the E43 4kV Switchgear Room (Fire Area 34), which is a separate fire area from Fire Area 58.

Action CC

The potential need to perform this action is low since this action is only needed if two of three other off-site power sources are unavailable, power to the 2SU transformer tap changer lost, and the tap changer is in the wrong position. The licensee stated that offsite power is provided to each of the 4kV Class 1E switchgear by two of three redundant sources (2SU, 3SU, and 343SU) and that control cables for the sources have been physically separated by rerouting selected cables, such that one of the redundant sources remains free of fire damage for fires in most plant areas. In particular, the licensee stated that cables associated with the 2SU source have been relocated out of the Turbine Building (Fire Area 50), and portions of the Radwaste Building (Fire Areas 2 and 58).

The licensee stated that BOP cables are routed through Fire Area 58 but that the routing of the cables was not part of its analysis. In its February 12, 2010, supplement, the licensee described the circumstances that would determine the availability of the safe shutdown equipment located in this area; namely the 2SU power source, which includes a transformer tap changer that is powered by BOP power. Since the BOP cable routing was not part of the analysis, the loss of BOP was assumed for a fire in these three fire areas. The licensee's analysis also assumed that the transformer tap changer, which is powered by the BOP and responsible for maintaining power to the 4kV Bus 2SU, was not in the correct position. When the tap changer is not in the correct position, the voltage could vary resulting in the actuation of the 4kV trip relays.

In the unlikely event that a fire does occur and goes undetected by the smoke detection system or unsuppressed by the suppression system and fire damage occurs to the redundant cables, Action CC can be utilized, which directs operators to pull the fuse blocks for the degraded voltage trip relays to ensure that the 4kV busses remain available.

Action CC is a “prompt” action, however, the licensee stated that its analysis assumed that the redundant cables were lost regardless of their location and that the tap changer was not in the correct position. The licensee also stated that a note is provided in the applicable T-300 Fire Guide providing guidance on how to determine whether the 2SU transformer tap changer has lost power using indications within the Control Room. Therefore, the Control Room will know immediately if this action is required and a generic diagnosis time is not necessary.

The licensee’s T-300 Fire Guides also provide the following guidance to assist operators in evaluating a postulated event, “If 2SU is the only off-site power source available and a loss of power to the 2SU Transformer Tap Changer has occurred, then perform the manual action to remove the fuses.”

Additionally, the 2SU transformer and associated auxiliaries are located in the yard area and would not be exposed by a fire in Fire Area 58. Lastly, the location of the OMA to remove the fuses in the 4kV Switchgear Rooms is in a separate fire area, with separate ventilation systems, from Fire Area 58.

NRC Staff Evaluation

Given the moderate amount of combustible materials, ignition sources, and the large volume of the space, it is unlikely that a fire would occur and go undetected by the smoke detection system noted above or unsuppressed by the suppression system noted above or by personnel, and damage the safe shutdown equipment. Even if such circumstances exist, Actions BB and CC are available to provide additional assurance that safe shutdown capability is maintained.

3.5 Summary of Defense-in-Depth and Operator Manual Actions

In summary, the NRC staff finds that the defense-in-depth concept for a fire in the fire areas discussed above provides a level of safety that results in the unlikely occurrence of fires,

rapid detection, control and extinguishment of fires that do occur and the protection of structures, systems and components important to safety. As discussed above, the licensee has provided preventative and protective measures in addition to feasible and reliable OMAs that together demonstrate the licensee's ability to preserve or maintain safe shutdown capability in the event of a fire in the analyzed fire areas.

Authorized by Law

This exemption would allow PBAPS to rely on OMAs, in conjunction with the other installed fire protection features, to ensure that at least one means of achieving and maintaining hot shutdown remains available during and following a postulated fire event, as part of its FPP, in lieu of meeting the requirements specified in III.G.2 for a fire in the analyzed fire areas. As stated above, 10 CFR 50.12 allows the NRC to grant exemptions from the requirements of 10 CFR Part 50. The NRC staff has determined that granting of this exemption will not result in a violation of the Atomic Energy Act of 1954, as amended, or the Commission's regulations. Therefore, the exemption is authorized by law.

No Undue Risk to Public Health and Safety

The underlying purpose of 10 CFR Part 50, Appendix R, Section III.G is to ensure that at least one means of achieving and maintaining hot shutdown remains available during and following a postulated fire event. Based on the above, no new accident precursors are created by the use of the specific OMAs, in conjunction with the other installed fire protection features, in response to a fire in the analyzed fire areas. Thus, the probability of postulated accidents is not increased. Also, based on the above, the consequences of postulated accidents are not increased. Therefore, there is no undue risk to public health and safety.

Consistent with Common Defense and Security

The proposed exemption would allow PBAPS to credit the use of the specific OMAs, in conjunction with the other installed fire protection features, in response to a fire in the analyzed fire areas, discussed above, in lieu of meeting the requirements specified in III.G.2. This change, to the operation of the plant, has no relation to security issues. Therefore, the common defense and security is not diminished by this exemption.

Special Circumstances

Pursuant to 10 CFR 50.12(a)(2)(ii) special circumstances are present whenever application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. The underlying purpose of 10 CFR Part 50, Appendix R, Section III.G is to ensure that at least one means of achieving and maintaining hot shutdown remains available during and following a postulated fire event. Therefore, since the underlying purpose of Appendix R, Section III.G is achieved, the special circumstances for granting an exemption from 10 CFR Part 50, Appendix R, Section III.G exist, as required by 10 CFR 50.12(a)(2)(ii).

4.0 CONCLUSION

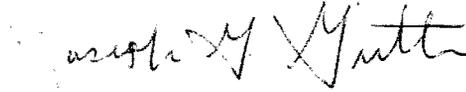
Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12(a), the exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security. Also, special circumstances are present. Therefore, the Commission hereby grants Exelon an exemption from the requirements of Section III.G.2 of Appendix R of 10 CFR Part 50, to utilize the OMAs discussed above at PBAPS.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of this exemption will not have a significant effect on the quality of the human environment (75 FR 58445).

This exemption is effective upon issuance.

Dated at Rockville, Maryland, this 30th day of March 2011.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in black ink, appearing to read "Joseph G. Giitter". The signature is written in a cursive style with a large initial "J" and "G".

Joseph G. Giitter, Director
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

March 30, 2011

Mr. Michael J. Pacilio
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION, UNIT NOS. 2 AND 3 -
EXEMPTION FROM TITLE 10 OF THE *CODE OF FEDERAL REGULATIONS*
PART 50, APPENDIX R, SECTION III.G FOR THE USE OF OPERATOR
MANUAL ACTIONS (TAC NOS. ME8055 AND ME8056)

Dear Mr. Pacilio:

The Commission has approved the enclosed exemption from specific requirements of Title 10 of the *Code of Federal Regulations*, Part 50, Appendix R, for Peach Bottom Atomic Power Station, Unit Nos. 2 and 3. This action is in response to your application dated March 6, 2009, as supplemented on February 12, 2010 (Agencywide Documents Access and Management System Accession Numbers ML090680141 and ML100470774, respectively). This application requested exemption from Appendix R, Section III.G, "Fire Protection of Safe Shutdown Capability," for the use of operator manual actions in lieu of the requirements specified in Section III.G.2. The original application, dated March 6, 2009, requested approval for the use of 31 manual operator actions. By letter dated February 12, 2010, 14 of the 31 operator manual actions were withdrawn from the request because your staff had determined that they were no longer needed. This exemption, therefore, reflects approval of the 17 remaining requested operator actions.

A copy of the exemption is enclosed. The exemption has been forwarded to the Office of the Federal Register for publication.

Please contact me at (301) 415-3204 if you have any questions on this issue.

Sincerely,

/ra/

John D. Hughey, Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-277 and 50-278

Enclosure:

Exemption

cc w/encl: Distribution via Listserv

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Accession Nos.: Letter: ML102430566, Exemption : ML102440041 *via e-mail

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