

September 4, 2002

Mr. David A. Lochbaum
Nuclear Safety Engineer
Washington Office
Union of Concerned Scientists
1707 H Street NW, Suite 600
Washington DC 20006-3819

Dear Mr. Lochbaum:

The U. S. Nuclear Regulatory Commission (NRC) staff has reviewed your petition dated March 11, 2002, and your supplemental letters dated March 21, March 22, and March 27, 2002. The petition, as supplemented (the Petition), was submitted on behalf of the Union of Concerned Scientists, and others listed in the petition (the Petitioners), pursuant to Section 2.206 of Title 10 of the *Code of Federal Regulations* of the Commission's regulations. The NRC staff's proposed Director's Decision on the Petition is enclosed.

I request that the Petitioners provide comments to me on any parts of the proposed decision that they believe to be erroneous, or any issues from the Petition that they believe we have not fully addressed. The NRC staff will review any comments provided by the Petitioners and consider them in preparing the final version of the Director's Decision. The Petitioners will have no further opportunity to comment.

Please provide your comments by October 4, 2002.

Sincerely,

/RA/

John A. Zwolinski, Director
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Enclosure: Proposed Director's Decision

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Dated: September 4, 2002

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referred to in this Director's Decision, the reference is also applicable to Oconee's on-site emergency power supply. The NRC should also "cease and desist issuing NOEDs [Notices of Enforcement Discretions] that allow nuclear reactors to operate for longer periods of time with broken emergency diesel generators." This requested action would apply to the facilities listed in Attachment 1 to your March 11, 2002, petition.

- (2) The NRC should "impose a minimum 24-hour time-to-boil for the spent fuel pool [SFP] water. This limit would be applicable at all times." This requested action would apply to the facilities listed in Attachment 1 to your March 11, 2002, petition.

As a basis for the requests described above, the Petitioners cite the need to reduce the risk from sabotage of irradiated fuel.

The Petitioners also requested that the NRC hold a public meeting to precede "the Petition Review Board (PRB) non-public meeting regarding this petition."

On March 26, 2002, in lieu of a public meeting, the Petitioners accepted and participated in a teleconference with the NRC's PRB to discuss the Petition. After the teleconference, the PRB discussed the Petition. The PRB considered the contributions of the Petitioners to the teleconference in deciding on the requests for immediate action and in setting the schedule for the review of the Petition. The PRB concluded that the Petition satisfied the criteria for review under Title 10 of the *Code of Federal Regulations* (10 CFR) Subsection 2.206.

By an acknowledgment letter dated May 8, 2002, the NRC staff formally notified the Petitioners that the Petition met the criteria for review under 10 CFR 2.206, and that the NRC staff would act on the request within a reasonable time. The acknowledgment letter further provided the bases for the NRC's denial of the Petitioner's request for immediate action.

The Petition is available in the NRC's Agencywide Documents Access and Management System (ADAMS) for inspection at the Commission's Public Document Room (PDR), located at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland. Publicly available records are also accessible from the ADAMS Public Electronic Reading Room on the NRC Web site <http://www.nrc.gov/reading-rm/adams.html>. Persons who do not have access to ADAMS or have problems in accessing the documents located in ADAMS should contact the NRC PDR reference staff by telephone at 1-800-397-4209 or 301-415-4737 or by e-mail to pdr@nrc.gov.

II. Discussion

The Petitioners request that the NRC take specific measures to reduce the risk from sabotage of irradiated fuel, which is part of the larger concern associated with protecting our nation's nuclear power plants from terrorism. In this regard, long before the terrorist attacks of September 11, 2001, the Commission had recognized the need for strict safeguards and security measures at these facilities. When Congress authorized the civilian use of atomic power by enacting the Atomic Energy Act of 1954, Congress realized that its primary duty was to ensure that public health and safety would be protected. Title 42, Chapter 23, Subchapter IX, Section 2133 of the United States Code (42 USC 2133) states that the NRC may issue commercial licenses only to those "who are equipped to observe and who agree to observe such safety standards to protect health and to minimize danger to life or property as the Commission may by rule establish," and that the Commission was to "promote the common defense and security and to protect the health and safety of the public." The NRC was, therefore, given the responsibility and authority to determine the requirements (including security requirements), that are necessary to ensure that public health and safety are protected when commercial nuclear power plant licenses are issued.

The regulations for protecting all nuclear power plants are provided in 10 CFR Part 73, "Physical Protection of Plants and Materials." These regulations represent an important cornerstone of the NRC's regulatory oversight responsibilities and include detailed and specific requirements that are designed to protect nuclear power plants against acts of radiological sabotage, prevent the theft of special nuclear material, and protect safeguards and classified information against unauthorized release by:

- Permitting only authorized activities and conditions within established protected areas, material access areas, and vital areas by using controls and procedures, defined boundaries, detection, communication and surveillance subsystems, and by establishing schedules of authorized operations;
- Preventing unauthorized access of persons, vehicles, and materials into material access areas and vital areas by using detection and barrier systems;
- Providing for authorized access, and assuring detection of and response to unauthorized penetrations of the protected area;
- Permitting only authorized control and movement of special nuclear material; and
- Providing response capabilities to assure that NRC requirements are achieved.

These performance capabilities for nuclear power plant physical protection systems are further defined in 10 CFR 73.55, "Requirements for physical protection of licensed activities in nuclear power reactors against radiological sabotage," which requires licensees to:

- (1) Maintain a well-equipped and highly trained security organization.
- (2) Install physical barriers to protect vital equipment and material access areas.
- (3) Install detection, surveillance, and alarm systems with the capability to sense unauthorized penetration of the isolation zone and to permit response action.

- (4) Have access authorization programs and procedures (e.g., background checks, routine worker screening, badging, etc.).
- (5) Ensure that all guards and armed response individuals can communicate with a continuously manned alarm station.
- (6) Establish an effective testing and maintenance program to verify that all physical barriers, and detection and alarm systems meet NRC requirements.

Security Organization

All operating nuclear power plant licensees are required to establish and maintain a site security organization. The site security organization includes its management staff, the guard force, worker background investigation and badging personnel, access control, and response procedures. To be a member of the security organization at a nuclear power plant, an individual must pass a Federal Bureau of Investigation (FBI) criminal records search and perform initial and requalification training. These and other security organizational requirements are designed to provide an effective deterrent against potential terrorist activities directed at nuclear power plants.

Protection of Vital Equipment

Paragraph (a)(1) of 10 CFR 73.1 requires licensees to protect against a determined violent external assault, attack by stealth, or deceptive actions by several persons using a four-wheel drive land vehicle for the transport of personnel and their hand-carried equipment to the proximity of vital areas. The rule requires licensees to assume that the potential terrorists (1) are dedicated and well-trained (including military training and skills); (2) have inside assistance, which may include a knowledgeable individual who attempts to participate in a passive role (e.g., provide information), an active role (e.g., facilitate entrance and exit, disable alarms and communication systems, participate in violent attack), or both; (3) possess suitable

weapons, up to and including hand-held automatic weapons equipped with silencers and having effective long-range accuracy; (4) possess hand-carried equipment, including incapacitating agents and explosives; and (5) have a four-wheel drive land vehicle available for transporting personnel and their hand-carried equipment to the proximity of vital areas.

Licensees must also protect against a land vehicle bomb. NRC regulations require all licensees to (1) establish vehicle control measures, including vehicle barriers, to protect against the use of a land vehicle as a means of transportation to get close to vital areas; (2) compare the vehicle control measures established in accordance with 10 CFR 73.55(c)(7) to the Commission's design goals and criteria for protection against a land vehicle bomb; and (3) develop a process to use alternative measures for protection against a land vehicle bomb (e.g., for those licensees with a particularly difficult site configuration). The alternative measures must provide substantial protection against a land vehicle bomb and must be supported by a licensee's analysis.

In brief, Congress understood the inherent need for strict security measures at commercial nuclear power plants, and NRC regulations have ensured that these are among the most hardened and secure industrial facilities in our nation. The many layers of protection offered by robust plant design features, sophisticated surveillance equipment, a professional security force, and regulatory oversight are an effective deterrent against potential terrorist activities targeting equipment vital to nuclear safety.

Therefore, on September 11, 2001, U.S. nuclear power plants already possessed a strong capability to prevent and respond to the most likely terrorist acts that could be directed at them. Consequently, the NRC deemed that certain actions, such as the immediate closure of nuclear power plants or implementation of more restrictive TSs, were not necessary to provide adequate protection of the public health and safety. However, the NRC advised all nuclear

power plants to go to the highest level of security, which they promptly did. The NRC also issued over 30 threat advisories to address specific concerns or vulnerabilities in the aftermath of September 11, and NRC security specialists performed numerous onsite physical security vulnerability assessments at licensed facilities to evaluate the effectiveness of the enhanced security measures that had been put into place. To this day, all nuclear power plant facilities continue to be at an appropriate and heightened security level.

The NRC quickly recognized the need to reexamine the basic assumptions underlying the current civilian nuclear facility security and safeguards programs. Chairman Richard A. Meserve, with the full support of the rest of the Commission, directed the staff to undertake a comprehensive review of the NRC's security regulations and programs. The security review includes the NRC's participation with the Office of Homeland Security, the FBI, Department of Transportation, Department of Energy, and others, to keep the agency advised of the current threat environment. The NRC's participation with these agencies allows the agency to communicate its actions to other Federal agencies to ensure an appropriate and balanced response throughout the nation's entire critical energy infrastructure.

On February 25, 2002, the NRC issued Orders to all 104 operating power reactor facilities to require that certain interim compensatory measures be taken beyond those called for by current regulations. These requirements will remain in effect pending notification from the Commission that a significant change in the threat environment has occurred, or until the Commission determines that other changes are needed following the more comprehensive reevaluation of current safeguards and security programs. The Orders were effective immediately upon issuance. For the most part, the Orders formalized measures that NRC advised nuclear power plant licensees to take in the aftermath of September 11. The Orders also imposed certain additional security enhancements. The details of specific security

requirements cannot be made public, but they include such things as additional personnel access controls; enhanced requirements for guard forces; increased stand-off distances for searches of vehicles approaching nuclear facilities; and heightened coordination with local, State, and Federal authorities.

If the NRC identifies a significant vulnerability during the ongoing reevaluation, the staff will determine physical protection, material control, or other appropriate requirements. The NRC will continue to assist the Office of Homeland Security and other Federal agencies to evaluate threats beyond the feasibility and capability of NRC licensees. In this regard, on April 7, 2002, the Office of Nuclear Security and Incident Response (NSIR) was established which will improve timeliness and consistency of communications among NRC's employees and with NRC's external stakeholders. The consolidation also integrates NRC management of classified and sensitive safeguards information and secure communication facilities.

The Petitioners' concerns also extend beyond the limits of the protected areas associated with individual nuclear power sites. The electric power grid, as the Petitioners note, is virtually unprotected. The NRC staff notes that, in the past, the electric power grid has been disrupted by natural and man-made events. The electric power grid, however, has proven to be a reliable source of off-site power for safety functions associated with nuclear power facilities. Thus far, sabotage has not proved to be a significant source of electric power grid unreliability.

With regard to the Petitioners' request to limit the allowed outage time (AOT) for EDGs, General Design Criterion (GDC) 17, "Electric Power Systems," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plants," requires, in part, that nuclear power plants have onsite and offsite electric power systems to permit the functioning of structures, systems, and components that are important to safety. The onsite system is required to have sufficient independence, redundancy, and

testability to perform its safety function, assuming a single failure. The offsite power system is required to be supplied by two physically independent circuits that are designed and located so as to minimize, to the extent practical, the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. In addition, GDC-17 requires provisions to minimize the probability of losing electric power from the remaining electric power supplies as a result of loss of power from the unit, the offsite transmission network, or the onsite power supplies.

GDC-18, "Inspection and Testing of Electric Power Systems," requires that electric power systems that are important to safety be designed to permit appropriate periodic inspection and testing. Pursuant to 10 CFR 50.36, "Technical specifications," a licensee's TSs must establish LCOs, which include AOTs for equipment that is required for safe operation of the facility. In addition, 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," requires that preventive maintenance activities not reduce the overall availability of the systems, structures, and components. Regulatory Guide (RG) 1.93, "Availability of Electric Power Sources," provides guidance with respect to operating restrictions (i.e., AOTs) if the number of available alternating current (AC) sources is less than that required by the TSs LCOs. In particular, this guide prescribes a maximum AOT of 72 hours for an inoperable AC source. In the case of EDGs, these AOTs have been extended to up to 14 days for some licensees by considering the impact on overall plant risk in what is often referred to as a "risk-informed" licensing action.

With regard to the Petitioners' request to establish a minimum time to boil to 24 hours in SFPs, the primary mode of storage at this time is in the spent fuel storage pools located at the sites of nuclear power reactors. GDC-61, "Fuel Storage and Handling and Radioactivity Control," requires the following:

The fuel storage and handling, radioactive waste, and other systems which may contain radioactivity shall be designed to assure adequate safety under normal and postulated accident conditions. These systems shall be designed (1) with a capability to permit appropriate periodic inspection and testing of components important to safety, (2) with suitable shielding for radiation protection, (3) with appropriate containment, confinement, and filtering systems, (4) with residual heat removal capability having reliability and testability that reflects the importance to safety of decay heat and other residual heat removal, and (5) to prevent significant reduction in fuel storage coolant inventory under accident conditions.

The requirements of GDC-61 are reflected in the design of SFPs, which are substantial concrete structures typically lined with welded steel plates, and their associated auxiliary systems. SFPs have dedicated cooling systems that remove the spent fuel decay heat and maintain the water level in the pool to provide adequate radiation shielding. Heat exchangers, which remove the decay from the SFP, utilize cooling water whose source may be outside the plant. In addition to these dedicated systems, SFPs typically are designed to use auxiliary sources of cooling, such as residual heat removal systems, and may be capable of utilizing one or more water sources for cooling (e.g. fire water system) in the event of an emergency. SFPs are typically well-instrumented to alert plant operators to low pool level or high pool temperature conditions. In the event that SFP cooling is lost, boiling in the SFP would be expected to occur, absent corrective measures¹, within hours or days, depending upon the heat load in the SFP.

¹ Reactor operators, utilizing established procedures, can respond to a wide range of potential failures to prevent or mitigate spent fuel pool boiling.

III. Evaluation

Petitioners' First Concern

The Petitioners are concerned that a terrorist attack on the electric power grid will result in a loss of offsite power (LOOP) resulting in the need for the EDGs to function to prevent a station blackout (SBO) event. The Petitioners are concerned that the longer that the EDGs are out of service, the greater the risk that there will be a SBO resulting in reactor core damage.

NRC Response

During the teleconference of March 26, 2002, with the Petitioners, prior to the decision of the PRB to accept the Petition, the Petitioners clarified that the first measure, limiting the EDG AOT to 72 hours, was intended to minimize the threat to reactor safety by sabotage or terrorist activities by limiting the amount of time that the EDGs could be out of service when the reactor was operating. The Petitioners also clarified during the teleconference that, in their opinion, the NRC Office of Nuclear Regulatory Research's (RES) final report on the regulatory effectiveness of 10 CFR 50.63², "Loss of all alternating current power," (the SBO rule) seemed to refute the industry statement that it was safer at many plants to perform the EDG extended maintenance during power operations rather than during an outage, and that the Petitioners had considered this finding when the Petition was developed.

The Petitioners cited the September 11, 2001, terrorist attacks as demonstrating the capability of terrorists to carry out coordinated attacks on American soil and stated that the transmission lines and substations that constitute the electrical grid for a nuclear power plant are virtually unprotected targets for terrorists. The Petitioners also stated that the switchyard at a nuclear power plant is a relatively softer target than the nuclear plant itself and concluded that

² William S. Raughley, Office of Nuclear Reactor Research, U.S. Nuclear Regulatory Commission, "Final Report: Regulatory Effectiveness of the Station Blackout Rule," August 15, 2000, referred to herein as the "NRC RES Report."

there is no reason to consider the normal supply of AC power (i.e., the normal offsite AC power sources) to nuclear power plants resistant to or immune from terrorist attacks.

If a terrorist attack succeeds in disabling these normal offsite power sources, the emergency AC power sources (e.g., onsite EDGs) must function to prevent an SBO event. The Petitioners recognized that these EDGs are located behind security fences and protected by armed security guards so that it would be hard for terrorists to attack these sources of emergency AC power. However, the Petitioners raised a concern about the potential for the EDGs to not be functional (e.g., unavailable due to maintenance) if the normal offsite power sources are disabled by a terrorist attack. The Petitioners stated that the longer an EDG is out of service, the higher the likelihood that a successful terrorist attack against the electrical grid could cascade to an SBO and eventually reactor core damage. The Petitioners stated that reimposing a maximum AOT of 72 hours for EDGs would reduce risk by preventing the removal of EDGs for long periods of maintenance.

The Petitioners concluded that, since little can be done quickly to provide better protection of the electrical grid, the NRC should swiftly reimpose the 72-hour LCO on all on-site emergency power supplies to increase the likelihood that they will be available to provide power to safety equipment in the event of a successful terrorist attack against the electrical grid and, thus, reduce the risk of SBO and reactor core damage. The Petitioners recognized that this issue did not apply to those operating reactors that already have a TS containing the 72-hour LCO for an inoperable EDG.

The Petitioners identified the following facts as their bases for the requested actions:

- (A) Removing EDGs from service would increase the risk from SBO events. Citing the NRC RES Report, the Petitioners stated that plants that committed to a 0.975 minimum

individual target reliability for their EDGs were having difficulty achieving their goal when maintenance out of service (MOOS) was incorporated into the reliability calculation.

- (B) The Petitioners, citing the NRC RES Report, asserted that a decrease in EDG reliability of 0.025 could increase the SBO core damage frequency (CDF) by $1.0E-5$ /reactor-years or more for some plants. The Petitioners further asserted that the EDG reliability reduction is a function of the plant's capacity factor because the LCO only applies when the plant is running, and that the EDG reliability reduction could be even larger when plants have a lower annual capacity factor. These assertions were used to support the conclusion that allowing EDG extended AOTs increased SBO CDF and reduced EDG reliability to a level where the safety benefits of the SBO rule are negated.
- (C) NOEDs that allow nuclear reactors to operate for longer times undermine the increase in safety gained by reimposing the 72-hour limit.
- (D) In addition, the Petitioners requested that NRC should provide an equivalent protection for Oconee since this plant does not rely on EDGs for its emergency AC power supply. Because transmission lines, substations, and switchyards are vulnerable to weather-related events, each nuclear power plant is designed to have an emergency power system to enable the plant to withstand a LOOP, as specified by either GDC-17 or equivalent requirements in the plant licensing basis. These specifications recognize that offsite power systems are not designed as safety-related (Class 1E) systems. Consequently, most licensees rely on onsite redundant Class 1E EDGs to provide this emergency AC power source.

GDC-17 requires, in part, that the onsite power supplies and electric distribution systems have sufficient independence, redundancy, and testability to perform their safety functions, assuming a single failure. The redundant Class 1E EDGs, switchgear, load centers, and motor control centers must also be located in separate rooms of seismic Category I buildings to protect them against the effects of natural phenomena and missiles. In addition, 10 CFR 50.63 requires that all nuclear power plants have the capability to withstand a loss of all AC power for an established period. As a result of the SBO rule, all licensees have established SBO coping and recovery procedures, implemented any necessary modifications to cope with an SBO, and ensured they have the capability to cope with an SBO for four or eight hours, depending on a number of site-specific parameters. One of the factors used to arrive at coping capability is EDG reliability. To provide additional SBO coping capability, some licensees installed an alternate AC power source, such as a non-class 1E diesel generator.

Although the NRC has granted some licensees AOT extensions (typically ranging from 7 to 14 days for the total AOT) for their EDGs, the licensees use the extensions primarily to perform infrequent (i.e., once every 18 or 24 months) manufacturer-recommended inspections and preventive or corrective maintenance activities that cannot be accomplished during the 72-hour AOT; most licensees use only half of this AOT. These recommended inspections and maintenance activities are intended to improve EDG reliability (i.e., increase the likelihood that the EDG will function throughout its required operational period). Performing testing and maintenance at-power also improves EDG availability during shutdown (i.e., increases the likelihood that the EDG will be available to operate when required).

The NRC staff reviews each risk-informed EDG AOT extension request from both deterministic and probabilistic risk assessment (PRA) perspectives in accordance with the following guidance:

- Regulatory Guide (RG) 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications" and Standard Review Plan (SRP) Section 16.1
- RG 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," and SRP Chapter 19.

From a deterministic perspective, the staff considers whether (1) the current regulations and applicable requirements will continue to be met, (2) the extended EDG AOT will reduce entries into the LCO and thereby reduce the number of EDG starts required for major EDG maintenance activities, (3) an available alternate AC (AAC) source (i.e., extra power source such as a diesel generator) or excess power capacity from the existing EDGs supplied through bus cross-ties could be temporarily used to compensate for an EDG in an extended AOT, and (4) the licensee will take compensatory measures during an extended EDG AOT to increase the probability that the remaining sources of power will be available and minimize the potential for creating an SBO. In addition, the staff verifies that the plant's TSs allow only one EDG to be tested or taken out of service at a time and that the current TSs establish controls to ensure that, in the event an EDG is inoperable, the redundant systems that rely on the remaining EDG are verified to be operable. These required actions will minimize the probability that a LOOP event will result in a complete loss of safety function of critical systems for the period during which one of the EDGs is inoperable.

From a PRA perspective, risk-informed extended EDG AOT requests are approved on a plant-specific basis only if they can be shown to be acceptable in terms of risk (i.e., CDF and large early release frequency), as described in RG 1.177 and RG 1.174. In conducting this assessment, the staff may consider the capability and availability of all AC power sources, including non-safety-related equipment, and plant-specific performance of the EDGs, which

includes the impact of implementing the proposed extended EDG AOT. In addition, the NRC staff expects that extended EDG AOT applicants have implemented a risk management program in accordance with the requirements of the Maintenance Rule (specifically, 10 CFR 50.65(a)(4)) to ensure that, during the extended EDG outage, a proceduralized risk-informed process is in place that assesses and manages the overall impact of plant maintenance on plant risk of entering the LCO Action Statement for planned activities.

The staff's response to the facts identified by the Petitioners as their bases for the requested action is presented below:

- (A) Primarily based on the NRC RES Report, the Petitioners stated that removing the EDGs from service for extended maintenance during at-power conditions would increase the risk from SBO events. The staff notes that the NRC RES Report did not explicitly address EDG extended maintenance during shutdown operations or the risk tradeoffs between shutdown and full-power operations associated with performing this maintenance. With the extended AOTs, the EDG extended maintenance outages will occur during full-power operations instead of during shutdown operations, which may have the beneficial result of lowering the overall plant risk profile, compared to performing this maintenance during shutdown operations. This will clearly be the case for licensees that have an additional source made available (i.e., AAC or temporary diesel generator) during the extended EDG maintenance outage, since the full-power operational risk profile for these licensees would be essentially unaffected by the outage and this risk contributor during shutdown operations would be eliminated. Therefore, though there may be a small increase in risk from SBO events during at-power

conditions due to the EDG extended maintenance, depending on the specific measures taken by the licensee, there will be a reduction in risk from SBO events during shutdown, and this may reduce the overall plant risk profile.

The Petitioners also stated that the NRC RES Report indicated that plants that had committed to a 0.975 minimum individual target reliability for their EDGs were having difficulty achieving a 0.975 goal when MOOS was factored into the reliability calculation. However, the staff notes that the EDG reliability values used for the purpose of determining the coping duration for an SBO event did not include the contribution from MOOS. The selected target EDG reliability values for each nuclear power plant were established for plant-specific coping analysis in accordance with the requirements of the SBO rule. The selected EDG reliability performance criteria or goals selected for implementing the requirements of SBO rule are tracked by each licensee in accordance with the requirements of 10 CFR 50.65. In addition, the maintenance rule requires licensees to monitor the unavailability of the EDGs due to maintenance against established goals to ensure that acceptable EDG unavailability is maintained. If the EDGs do not meet their preestablished reliability and unavailability performance criteria for a given plant, the licensee must take the appropriate actions specified by 10 CFR 50.65(a)(1), including increased management attention and goal setting, to restore EDG performance to an acceptable level. The maintenance rule requires licensees to evaluate these goals at least once per refueling cycle. In addition, the NRC monitors EDG unavailabilities of all plants through its Reactor Oversight Process to ensure that all licensees take appropriate actions if these goals are not met. Also, during the reviews of AOT extensions, the staff ensures that the licensees who request an EDG

AOT extension meet their individual EDG target reliability goals in accordance with the SBO rule. Thus, existing requirements and regulations ensure that the EDG-established reliability and unavailability are maintained. The staff notes that the same NRC RES Report cited by the Petitioners also states that the demand reliability (i.e., failure-to-start and failure-to-run) was consistent with the SBO rule, and that the average failure-to-start unreliability was 0.01 and the average failure-to-run unreliability was 0.004, indicating that the population of EDGs is achieving a demand reliability of over 98 percent.

- (B) The staff agrees with the Petitioners that if MOOS is included in the EDG reliability calculations, the calculated EDG reliability would decrease when an EDG is taken out of service for maintenance, and this reliability reduction could be even larger when plants have a lower annual capacity factor. However, the purpose of the infrequently performed maintenance is to improve the overall reliability of the EDGs, and increase the availability of the EDGs during shutdown operations. Extending the EDG AOT, for the purpose of infrequently performed maintenance during plant operation decreases the time pressure to complete the maintenance and thus reduces the likelihood of human error during maintenance, thus, further increasing EDG reliability. Further, as stated above, the EDG reliability calculations performed to determine the coping duration for an SBO did not include the contribution from MOOS, and the maintenance rule implementation assures that the reliability and unavailability of EDGs is maintained as expected, consistent with ensuring that coping capabilities remain the same.

The risk-informed extended EDG AOTs are approved on a plant-specific basis only if they can be shown to be acceptable, as described in RG 1.177 and RG 1.174. In

conducting this assessment, the staff may consider the capability and availability of all AC power sources, including non-safety-related equipment, and plant-specific performance of the EDGs, which includes the impact of implementing the proposed extended EDG AOT. The increase in CDF due to the implementation of a 14-day AOT for EDGs is typically estimated to be less than $1.0E-6$ /yr. This represents a very small increase in CDF, well within the RG 1.174 acceptance guidelines, and is an order of magnitude less than the value cited by the Petitioners from the NRC RES Report. Thus, these very small increases in CDF and/or LERF during plant operation, which do not include the benefits achieved by removing this maintenance activity from shutdown operations, are not eroding the safety benefits achieved by the SBO rule. Further, based on the quarterly data reported by licensees to our Reactor Oversight Process, the industry average EDG unavailability is about 1.5 percent (90 hours/yr), which indicates that the EDG unavailability at plants is reasonably controlled by the licensees. Also, the staff notes that the Nuclear Energy Institute (NEI) 99-02, Revision 2, "Regulatory Assessment Performance Indicator Guideline," which was endorsed by the NRC in Regulatory Issue Summary 2001-25, "NEI 99-02, Revision 2, Voluntary Submission of Performance Indicator Data," allows licensees to exclude unavailability hours for planned EDG overhauls provided the licensees demonstrate, using the criteria of RG 1.177, that the increased risk to the plant is small due to the EDG AOT extension. The staff recognizes that planned maintenance activities carried out during extended AOTs can have a net beneficial effect by reducing unplanned unavailable hours to ensure that the EDGs are available when required.

(C) The Petitioners requested that the NRC cease and desist issuing NOEDs that allow nuclear reactors to operate for longer times than allowed by the reimposing of a 72-hour LCO with an EDG unavailable. Accepting the Petitioners' request to limit EDG AOTs to 72 hours would potentially increase the likelihood of an SBO by requiring a nuclear power plant to undergo a transition to shutdown with an EDG unavailable whenever there is insufficient time to complete the required maintenance or repair of an EDG. The staff notes that the same NRC RES Report cited by the Petitioners also states that "plant shutdown with one or more offsite or onsite power supplies unavailable could exacerbate the grid condition or remove redundant sources to operate decay heat removal systems, increasing the likelihood of an SBO." The NRC RES Report further suggests that instead of potentially increasing the likelihood of an SBO event by requiring a transition to shutdown for the extended unavailability of one or more offsite or onsite power supplies, it "...should prompt an alternate approach, such as assuring the immediate availability of coping systems, reducing power, or assuring availability of adequate electric grid reserves." The potential for creating an SBO event by requiring a plant to transition to shutdown with an EDG unavailable is one of the factors considered, as well as the plant conditions and implications of allowing the plant to remain at power, in determining the appropriateness of issuing an NOED. The NRC requires, as part of the NOED process that licensees provide the safety basis for the request, including an evaluation of the safety significance and potential consequences of the proposed course of action. This evaluation should include at least a qualitative risk assessment using both risk insights and informed judgements, as appropriate. Therefore, it is prudent and appropriate for the staff to continue to follow the existing guidance (i.e., NRC Inspection

Manual, Part 9900, "Technical Guidance") for determining on a case-by-case basis when it is appropriate to issue an NOED.

- (D) The staff has reviewed the TSs for Oconee and has determined that the time limitations in the Oconee TSs related to the emergency AC power sources are equivalent to the TSs of plants having a 72-hour EDG AOT. Therefore, consistent with the Petitioners' statement that those operating reactors that already have a 72-hour EDG AOT do not need to address this issue, the staff has determined that this specific issue also does not apply to Oconee.

Based on the above rationale, the staff denies the Petitioners' request. Thus, the staff will not reduce previously approved license applications requesting the extension of EDG AOTs and will continue to follow the existing regulatory guidance (i.e., RG 1.177 and RG 1.174) in evaluating future licensee risk-informed requests to extend EDG AOTs. In addition, the staff will continue to perform deterministic assessments and follow the guidance (i.e., NRC Inspection Manual, Part 9900) for determining, on a case-by-case basis, when it is appropriate to issue an NOED.

Petitioners' Second Concern

The Petitioners seek to reduce the risk of damage to irradiated fuel in the SFP due to sabotage. The Petitioners are concerned that terrorist actions outside a nuclear power plant fence could disrupt offsite power and/or the water intake system for cooling water, resulting in loss of SFP cooling. Restricting the time-to-boil to a minimum of 24 hours reduces the

likelihood that terrorist actions will result in damage to irradiated fuel in the SFP and release of radioactivity to the environment.

NRC Response

The basis of the Petitioners' request, restricting the time-to-boil to a minimum of 24 hours, is that a longer time-to-boil would provide additional time for plant workers to restore forced cooling to the SFP or provide makeup water to maintain adequate coolant inventory. When forced cooling systems have been running, the minimum time-to-boil is about four hours after a loss of forced cooling. The unambiguous nature of external sabotage that results in a loss-of-cooling ensures the prompt identification of the problem. Additionally, operating experience indicates that even hidden initiators of a loss-of-cooling would be identified well before the onset of pool boiling. If cooling cannot be promptly restored, the remaining time would likely be adequate to align one of the diverse makeup water sources to maintain normal coolant inventory.

Existing design features and capabilities already provide sufficient time for plant workers to restore forced cooling and/or provide makeup water. All plants have makeup sources independent of the intake structure (e.g., the primary makeup water) and power (e.g., the diesel fire pump), and sites with spray ponds or air-cooled diesel generators have makeup (and often forced cooling) capability independent of facilities outside the protected area. The normal coolant inventory provides at least an additional 20 hours before evaporative loss of the coolant would result in radiation levels that would preclude access to the areas adjacent to the SFP.³

³ In cases where direct operator access to the spent fuel pool area is required for remedial actions, habitability concerns due to elevated temperature, humidity, and radiation levels could occur sooner than 20 hours depending upon the heat-up rate of the spent fuel pool. Specialized protective equipment such as heat-resistant suits and respirators can effectively extend the time over which direct access to the spent fuel pool can be maintained.

Short-term evaporative cooling can generally be accommodated with no adverse effects on essential systems. Furthermore, given the large water inventory in the SFP and the relatively straightforward and multiple means of providing makeup to the SFP, there would be no safety benefit from keeping the fuel in the reactor pressure vessel compared to the SFP while waiting for the time-to-boil to reach 24 hours.

The safety of SFP events is also considered by each licensee from a security perspective. Security contingency measures to address these specific events during a radiological sabotage attack are documented by each licensee in their site security plans. These contingency measures and the ability for the licensee to carry out these contingency measures are inspected by the NRC. The NRC's comprehensive safeguards and security program reevaluation includes the consideration of potential consequences of terrorist attacks on SFPs. The Commission continues to evaluate the need for additional interim compensatory measures to augment the enhanced security put in place after September 11.

To the extent that additional measures are being implemented by the licensees in response to the February 25, 2002, Orders, the NRC has partially granted the Petitioners' request that action be taken to reduce the risk from sabotage of irradiated fuel.

IV. Conclusion

The Petitioners' first request is to: "Impose a 72-hour limit for operation when the number of operable onsite alternating current power sources (i.e., emergency diesel generators) is one less than the number in the Technical Specification limiting condition for operation. This 72-hour limit would be applicable when the nuclear plant is in any mode of operation other than hot shutdown, cold shutdown, refueling, or defueled." Oconee does not rely on EDGs, but "equivalent protection for its emergency power supply" should be provided.

The NRC should also "cease and desist issuing NOEDs that allow nuclear reactors to operate for longer periods of time with broken emergency diesel generators." These requests are denied. For the reasons discussed above, the NRC staff concludes that the actions requested are not necessary. Specifically, the staff concludes that the NRC's reviews performed for plant-specific license amendments to extend AOTs for EDGs are appropriate and are consistent with existing staff guidance (i.e., RG 1.174 and RG 1.177, and SRP Section 16.1 and Chapter 19) in considering deterministic, traditional engineering factors and probabilistic risk factors. Further, the staff concludes that the existing staff guidance (i.e., NRC Inspection Manual, Part 9900) for determining, on a case-by-case basis, when an NOED should be issued is appropriate, and the staff will continue to consider the potential benefit and risk of unnecessary shutdowns that could result in an SBO event by requiring a plant to transition to shutdown with an EDG unavailable, as well as the plant conditions and implications of allowing the plant to remain at power.

The Petitioners' second request is that the NRC "impose a minimum 24-hour time-to-boil for the spent fuel pool water. This limit would be applicable at all times." This request is partially granted by staff actions already taken. However, for the reasons discussed above, the NRC staff concludes that the actions specifically requested by the Petitioners are not necessary. Specifically, SFPs have adequate alternate sources of cooling such that spent fuel cooling and radiation shielding can be maintained during interruption of normal, forced SFP cooling. To the extent that additional measures are being implemented by the licensees, however, in response to the February 25, 2002, Orders, the NRC has partially granted the Petitioners' request that action be taken to reduce the risk from sabotage of irradiated fuel.

As provided in 10 CFR 2.206(c), a Director's Decision will be filed with the Secretary of the Commission for the Commission to review. As provided for by this regulation, the decision

will constitute the final action of the Commission 25 days after the date of the decision unless the Commission, on its own motion, institutes a review of the decision within that time.

Dated at Rockville, Maryland, this day of 2002.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Samuel J. Collins, Director
Office of Nuclear Reactor Regulation