

Backup Means for Alert and Notification Systems

A. Definition of the Regulatory Problem.

An alert and notification system (ANS) provides the capability to promptly alert the populace within the plume exposure pathway emergency planning zone (EPZ) of an accident and to inform the public of protective actions that need to be taken. The predominant method used around U.S. nuclear power plants for alerting the public of an accident is an ANS based on sirens to provide an acoustic warning signal. Some sites employ other means, such as tone alert radios and route alerting, as either primary or supplemental alerting methods. There have been several occurrences when all or a major portion of a nuclear power plant's ANS has been inoperable due to various factors, such as severe weather, loss of offsite alternating current (AC) power, equipment malfunction, or ANS hardware/software modifications. This is a regulatory problem because there is currently no requirement that a backup means to the primary ANS be in place for each facility. If a major portion of a facility's ANS system is unavailable and no backup means exists, then the public may not be alerted of an event at the facility and the protective actions to be taken, resulting in an adverse impact on public health and safety.

B. Existing Regulatory Framework.

Under Title 10, Section 50.47(b)(5), of the *Code of Federal Regulations* (10 CFR 50.47(b)(5)), the U.S. Nuclear Regulatory Commission (NRC) requires that nuclear power plant licensees have a means to provide early notification and clear instructions to residents and other members of the public in the plume exposure pathway EPZ if there is an emergency event. The NRC does not require licensees to have backup power or other backup alerting capabilities when the primary method is unavailable. Based on an informal survey of U.S. nuclear power plant sites in 2005, only 28 percent of licensees currently have backup power capabilities for their primary means of prompt notification, although 51 percent of the remaining 72 percent plan on adding backup power. Other factors indicating a need to address backup alerting requirements include the following:

1. There have been several events in which the primary ANS was inoperable and would have been unable to provide prompt notification and information during an emergency. Multiple NRC information notices (INs) document these circumstances, including IN 2002-25, "Challenges to Licensees' Ability to Provide Prompt Public Notification and Information During an Emergency Preparedness Event," dated August 26, 2002, and IN 2005-06, "Failure to Maintain Alert and Notification System Tone Alert Radio Capability," dated March 30, 2005. There have also been events involving the widespread loss of the electrical grid providing power to siren-based systems, such as the electrical blackout in several areas of the northeastern U.S. and portions of Canada in August 2003. The issue was also raised during post-September 11, 2001 reviews of the Nation's readiness to respond to possible terrorist attacks.
2. In House Report (HR) 107-740 (incorporated by reference into Public Law 108-7 regarding Fiscal Year 2003 appropriations), the House Committee on Appropriations directed the Federal Emergency Management Agency (FEMA) to

update its guidance on outdoor warning and mass notification systems, with a request that the new guidance require all warning systems be operable in the absence of an AC power supply. FEMA had previously taken the position that it was not necessary to specifically require backup power for siren systems (50 FR 43084, October 23, 1985, announcing the availability of FEMA-REP-10, "Guide for the Evaluation of Alert and Notification Systems for Nuclear Power Plants"). In HR 107-740, the House Committee on Appropriations also urged FEMA to consult with other relevant agencies and revise the national standard for outdoor warning and mass notification to reflect state-of-the-art technology.

3. NRC adjudicatory proceedings have pointed out that requirements for providing a backup means of notification if the primary means is unavailable are either lacking or unclear (Shoreham Atomic Safety and Licensing Board (ASLB) (27 NRC 85, 27 NRC 96)). The specific issue of siren backup power has been subject to varying interpretations in past licensing proceedings (Shoreham LBP-85-12 (21 NRC 644)), such as treating an accident and loss of offsite power as independent events. As discussed in Regulatory Guide 1.155, "Station Blackout," issued August 1988, although the likelihood of failure of the onsite AC power system coincidental with the loss of offsite power is small, station blackout events may be substantial contributors to core damage events for some plants.
4. The Energy Policy Act of 2005 directed the Commission to require backup power for the emergency notification system, including siren systems, "for any licensed nuclear power plants located where there is a permanent population, as determined by the 2000 decennial census, in excess of 15,000,000 within a 50-mile radius of the power plant." On January 31, 2006, the NRC issued a confirmatory order to Entergy Nuclear Operations, Inc., the Indian Point Units 2 and 3 licensee, to provide backup power for its emergency notification system. Indian Point Units 2 and 3 are the only reactor units that meet the population density criteria of the Energy Policy Act of 2005.

The NRC staff believes that identifying requirements for compensatory/backup alerting methods in the regulations is needed to maintain public health and safety and to provide reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency.

C. Preliminary Options Considered to Resolve the Problem.

1. Take no action (new ANS backup capabilities would be specified only in FEMA guidance documents).

FEMA guidance documents are not considered to be regulations; thus this option would maintain the status quo with respect to ambiguous regulatory requirements. It is also not clear how revised FEMA guidance would apply to previously approved ANS designs. Previous ASLB decisions (Shoreham ASLB-900 (28 NRC 275) and CLI-88-11 (28 NRC 603)) have determined that Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," is the only regulatory requirement for warning systems, and

as such, it is the standard with which warning systems must comply. This option would not revise the actual requirement for warning systems. Since the staff has determined that the regulatory requirement should be revised as explained in Section B above, it considered this option to be unacceptable.

2. Use a voluntary program.

While many licensees have already provided ANS backup power (for siren-based systems) or have indicated that they plan to do so in the future, allowing licensees to voluntarily install backup ANS capabilities does not address the lack of current regulations and guidance regarding backup warning capabilities, or the need for new sites to design warning systems with such capabilities. Therefore, the staff considered this option to be unacceptable.

3. Implement proposed regulation and/or guidance.

There are several variations to this option as described below:

a. Require backup power for ANS, including siren-based systems, in NRC regulations and/or guidance.

Although this option would apply to any type of ANS, the most common type of ANS used at nuclear power plants is based on sirens that are powered directly, or indirectly through batteries, by an AC power source. As noted in previous adjudicatory and other proceedings, there is a very low likelihood of a widespread power outage affecting most or all sirens at the same time prompt public alerting is needed. This option may not satisfy the backfit rule or regulatory analysis due to costs for those licensees that do not already have backup power in place. Adding backup power requirements to the guidance in NUREG-0654/FEMA-REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," issued November 1980, and other guidance documents does not make this a requirement and thus would not address the issue of having backup measures in place for licensees that choose not to follow this part of NUREG-0654/FEMA-REP-1. This approach also does not address ANS failures due to problems other than loss of power. Therefore, the staff considered this option to be unacceptable.

b. Require that the primary ANS be designed such that there is no common single failure mode for the system and therefore no need for a backup system.

This option would ensure that the entire ANS is designed and built to a very high level of reliability. Any equipment necessary for ANS activation and operation (e.g., computers, radio transmitters and radio towers plus the actual alerting devices) would have redundant components and power sources as necessary to eliminate any common single failure mode, such as a widespread power outage affecting a siren-based

system. The current NRC ANS performance indicator already requires relatively high reliability levels (above 94 percent) for the green response band, although these high levels do not mean that common single failure modes have been rigorously addressed. As in Option 3.a, this option may not satisfy the backfit rule or regulatory analysis due to costs for licensees that have not already addressed ANS common single failure vulnerabilities. Therefore, the staff considered this option to be unacceptable.

- c. Revise NRC regulations to require backup measures to be in place that would be implemented when the primary means of alerting and notification is unavailable.

This option would add a requirement that backup measures be identified and the means to implement backup measures be in place, without specifying what backup measures should be used. This will allow flexibility in the selection of the method that is best suited for each site and will also allow the use of newer technologies or other alternative methods. The NRC would also revise its guidance to clarify that backup warning measures do not need to be implemented within a 15-minute time frame (to ensure direct coverage of essentially 100 percent of the population within 5 miles of the site) or a 45-minute time frame (to ensure 100-percent coverage of the population who may not have received the initial notification, such as those in rural or recreational areas), because this would impose the same design objectives on the backup system as applied to the primary and compensatory alerting methods described in Appendix 3 to NUREG-0654/FEMA-REP-1 (reference Shoreham ASLB-88-2 (27 NRC 85)). The intent is not to have a duplicate primary ANS, but to have a means of backup notification in place so that offsite officials can still consider a range of protective actions for the public to take in the event of a severe accident with potential offsite radiological consequences.

The staff believes that implementation of this option is the best course of action, recognizing that, for most events, there will be adequate time available for State and local government officials to make a judgment as to whether or not to activate the public notification system and alert the public using a backup method. The staff will also work with FEMA to obtain buy-in on the changes to NRC regulations and guidance and to ensure FEMA documents, such as Guidance Memorandum (GM) AN-1, "FEMA Action to Qualify Alert and Notification Systems Against NUREG-0654/FEMA-REP-1 and FEMA-REP-10," and FEMA-REP-10, are revised accordingly.

4. Implement some other regulatory scheme.

There may be other regulatory schemes that would be more effective and efficient than the one proposed, but the staff is not currently aware of such schemes. The NRC rulemaking process offers the opportunity for public comment on proposed regulations. If another viable scheme is proposed during that process, the staff will review it and, if it could adequately protect public health and safety, propose its implementation to the Commission for consideration.

D. Technical References and Supporting Documents.

- 10 CFR 50.47(b)(5).
- 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities."
- NUREG-0654/FEMA-REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," Planning Standard E.6 and Appendix 3, November 1980.
- FEMA GM AN-1, "FEMA Action to Qualify Alert and Notification Systems Against NUREG-0654/FEMA-REP-1 and FEMA-REP-10," April 21, 1987.
- FEMA-REP-10, "Guide for the Evaluation of Alert and Notification Systems for Nuclear Power Plants," November 1985.
- Executive Order No. 13407, "Public Alert and Warning System," June 26, 2006.
- IN 96-19, "Failure of Tone Alert Radios to Activate When Receiving a Shortened Activation Signal," April 2, 1996.
- IN 2002-25, "Challenges to Licensees' Ability to Provide Prompt Public Notification and Information During an Emergency Preparedness Event," August 26, 2002.
- IN 2005-06, "Failure to Maintain Alert and Notification System Tone Alert Radio Capability," March 30, 2005.
- Regulatory Guide 1.155, "Station Blackout," August 1988.

E. Potential Responses from Stakeholders.

Licensees may desire specific guidance on what is required of a properly designed ANS, but would prefer some flexibility in addressing backup capabilities to take into account existing ANS hardware/software systems and the use of more modern notification methodologies. Licensees may also recommend that the NRC engage FEMA in accepting changes to ANS design guidance, and that a backfit analysis be performed. A number of public advocacy groups are

proponents of having backup power requirements for sirens and time requirements for route alerting. Some State and local governments expressed the view during the public meetings held by NRC that requirements for battery backup power supplies to sirens are not necessary. The Emergency Alert System (i.e., an alternative method for alerting the public using National Oceanic and Atmospheric Administration weather alert radios and a reverse call-out system) has been successfully used to notify populations living within the EPZs around certain plants.