



NUREG-XXXX

Technical Basis for the Emergency Preparedness Rulemaking

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Technical Basis for the Emergency Preparedness Rulemaking

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ABSTRACT

The purpose of this NUREG is to establish the technical basis for the emergency preparedness (EP) rulemaking. The goal of this document is to provide information about each of the rulemaking initiatives. For each initiative, the technical basis presents the following information:

- Background and definition of the regulatory problem;
- Existing regulatory framework; and
- Preliminary options considered to resolve the problem.

The issues discussed in this technical basis are all part of the EP regulations in Title 10, Part 50 of the *Code of Federal Regulations* (10 CFR Part 50). 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," codifies a set of EP planning standards in 10 CFR 50.47(b) and supporting requirements in Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," to 10 CFR Part 50. In addition, the rulemaking would impact the requirements in 10 CFR 50.54, "Conditions of licenses," specifically 10 CFR 50.54(q).

The EP rulemaking would provide an opportunity for the Nuclear Regulatory Commission (NRC) to propose to codify some of nuclear power industry's voluntary EP enhancements to nuclear power plant emergency plans, which included many lessons learned as a consequence of the terrorist attacks of September 11, 2001. In addition, this rulemaking would be an opportunity to propose to codify clarifications to the regulations to enable consistent emergency plan implementation throughout the industry. The NRC staff believes that the state of EP is adequate to protect public health and safety. In light of the lessons learned from September 11, 2001, however, and decades of experience regulating EP for nuclear power plants, the staff believes that codifying the enhancements discussed in this technical basis would enhance public health and safety.

FOREWORD

Following the terrorist attacks of September 11, 2001, the U.S. Nuclear Regulatory Commission (NRC) staff reviewed the emergency preparedness (EP) planning basis in the context of the new threat environment and concluded that the EP planning basis remains valid. However, the staff recognized that security events differ from accident-initiated events and that the EP regulations and guidance could be enhanced to better reflect certain security elements. In addition to these security issues, the staff determined that other aspects of the EP regulations could be enhanced as well.

In a staff requirements memorandum (SRM) dated December 20, 2004, the Commission directed the staff to conduct a review of EP regulations and guidance to assess the need for regulatory enhancements. In SECY-06-0200, "Results of the Review of Emergency Preparedness Regulations and Guidance," dated September 20, 2006, the staff provided the Commission with the results of its review of the NRC's EP program and its recommendations for proposed enhancements to the EP regulations and guidance.

In the January 8, 2007, SRM to SECY-06-0200, the Commission approved the staff's recommendation to develop a rulemaking plan to enhance EP regulations and guidance. This NUREG report provides the technical basis for the proposed rulemaking that the staff has initiated under the Commission's direction.

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ACRONYMS AND ABBREVIATIONS

AC	Alternating Current
ANS	Alert and Notification System
ASLAB	Atomic Safety and Licensing Appeal Board
CEOF	Centralized Emergency Operations Facility
CFR	Code of Federal Regulations
COL	Combined License
ComEd	Commonwealth Edison
DBT	Design Basis Threat
DEP	Drill and Exercise Performance
EAL	Emergency Action Level
EAS	Emergency Alert System
EBS	Emergency Broadcast System
ECL	Emergency Classification Level
EOF	Emergency Operations Facility
EP	Emergency Preparedness
EPPOS	Emergency Preparedness Position
EPZ	Emergency Planning Zone
ESP	Early Site Permit
FEMA	Federal Emergency Management Agency
FOF	Force-On-Force
FR	Federal Register
FSAR	Final Safety Analysis Report
HP Tech	Health Physics Technician
HR	House Report
IC	Initiating Condition
ICM	Interim Compensatory Measure
IMC	Inspection Manual Chapter
IN	Information Notice
KI	Potassium Iodide
LGS	Limerick Generating Station
LLEA	Local Law Enforcement Agency
LPZ	Low-Population Zone
MOU	Memorandum of Understanding
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NOAA	National Oceanic and Atmospheric Administration
NPP	Nuclear Power Plant
NRC	Nuclear Regulatory Commission
ORO	Offsite Response Organization
OSC	Operations Support Center
OSCC	Operations Support Center Coordinator
PAR	Protective Action Recommendation
PBAPS	Peach Bottom Atomic Power Station
PI	Performance Indicator
PS	Planning Standard
REP	Radiological Emergency Preparedness
RG	Regulatory Guide

ACRONYMS AND ABBREVIATIONS (continued)

RIS	Regulatory Issue Summary
ROP	Reactor Oversight Process
RSPS	Risk-Significant Planning Standard
SDP	Significance Determination Process
SOC	Statements of Consideration
SRM	Staff Requirements Memorandum
STA	Shift Technical Advisor
TMI	Three Mile Island
TSC	Technical Support Center

1. Introduction

The issues discussed in this technical basis are all part of the emergency preparedness (EP) regulations in Title 10, Part 50 of the *Code of Federal Regulations* (10 CFR Part 50), "Domestic Licensing of Production and Utilization Facilities." Part 50 contains a set of EP planning standards in 10 CFR 50.47(b) and supporting requirements in Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," to 10 CFR Part 50. Following the terrorist attacks of September 11, 2001, the U.S. Nuclear Regulatory Commission's (NRC) staff reviewed the EP planning basis in the context of the new threat environment and concluded that the EP planning basis remains valid. However, the staff recognized that security events differ from accident-initiated events and that the EP regulations and guidance could be enhanced to better reflect the security elements. In addition to these security issues, the NRC staff determined that other aspects of the EP regulations could be enhanced as well. During a December 14, 2004, briefing to the Commission on EP program initiatives, the NRC staff informed the Commission of its intent to conduct a comprehensive review of EP regulations and guidance.

The Commission directed this review in a staff requirements memorandum (SRM) dated December 20, 2004. The staff reviewed 21 EP issues, including several security-related issues that were the subject of Bulletin 2005-02, "Emergency Preparedness and Response Actions for Security-Based Events" (BL-05-02), dated July 18, 2005. BL-05-02 requested information from licensees about the integration of security enhancements into emergency response functions at power reactors. The 21 issues were divided into two categories: (1) hostile action EP elements; and (2) other EP issues. The staff evaluated each issue and assigned it a priority of high, medium, or low based on an analysis of the issue's relationship to reactor safety, physical security, EP, NRC strategic goals of openness and effectiveness, and stakeholder impact. As part of the EP review, the staff met with internal and external stakeholders, including Federal Emergency Management Agency (FEMA) managers, on many occasions to discuss the elements of the EP review and plans to update EP regulations and guidance. In SECY-06-0200, "Results of the Review of Emergency Preparedness Regulations and Guidance," dated September 20, 2006, the NRC staff provided the Commission with the results of its review of the NRC's EP program and its recommendations for proposed enhancements to the EP regulations and guidance.

In a January 8, 2007, SRM responding to SECY-06-0200, the Commission approved the staff's recommendation to develop a rulemaking plan to enhance EP regulations and guidance. On April 17, 2007, the staff provided a rulemaking plan to the Commission, which described the content and schedule for completion of the enhancements to the EP regulations and guidance and incorporated the Commission's comments and clarifications consistent with the SRM. The rulemaking plan addresses the 12 issues assigned a high priority by the staff in SECY-06-0200. These 12 issues are the subject of the current rulemaking effort to enhance EP regulations. The staff added another issue to the rulemaking to fulfill Commission direction to ensure licensees incorporated varied and challenging exercises into their drill and exercise programs. Therefore, the 13 rulemaking issues are:

- (1) Protection for onsite personnel;
- (2) Licensee coordination with offsite response organizations during hostile action events;

- (3) Emergency action levels for hostile action events;
- (4) Emergency response organization augmentation and alternative facilities;
- (5) Hostile action based drills and exercises;
- (6) Challenging drills and exercises;
- (7) Shift staffing and augmentation;
- (8) On-shift multiple responsibilities;
- (9) Backup means for alert and notification systems;
- (10) Emergency operations facility – performance based approach;
- (11) Evacuation time estimate updating;
- (12) Reduction in effectiveness; and
- (13) Emergency classification timeliness.

The NRC developed this technical basis to support the EP rulemaking. The goal of this document is to provide information about each of the rulemaking issues. For each issue in this technical basis, the staff provides the following information:

- Background and definition of the regulatory problem;
- Existing regulatory framework; and
- Preliminary options considered to resolve the problem.

In an effort to organize the 13 issues, the staff categorized them in this report as follows:

- Security issues
 - Protection of onsite personnel
 - Licensee coordination with offsite response organizations during hostile action events
 - Emergency action levels for hostile action events
 - Emergency response organization augmentation and alternative facilities
- Exercise issues
 - Hostile action based drills and exercises
 - Challenging drills and exercises
- Staffing issues
 - Shift staffing and augmentation
 - On-shift multiple responsibilities
- Facility and equipment issues

- Backup means for alert and notification systems
- Emergency operations facility – performance based approach
- Emergency plan issues
 - Evacuation time estimate updating
 - Reduction in effectiveness
 - Emergency classification timeliness

The staff subsequently decided to combine the two exercise issues into one for the proposed rulemaking. Additionally, the staff determined that the “Shift staffing and augmentation” issue would not be included in this rulemaking. It was intended to be a voluntary program that could be incorporated into guidance. Therefore, the proposed rulemaking package consists of 11 issues.

The staff has engaged counterparts from FEMA in a working group to address the components of the rulemaking that have the potential to impact offsite response agencies such as State and local governments. In addition, NRC and FEMA are co-owners of NUREG-0654/FEMA-REP-1, “Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants” (herein referred to as NUREG-0654), and the NRC staff anticipates that there may be a need to make changes to NUREG-0654 in concert with the rulemaking. NUREG-0654 is the joint NRC/FEMA guidance, which provides the criteria through which NRC licensees and State and local governments can develop radiological emergency plans and improve EP. It is used by reviewers to determine the adequacy of State, local and nuclear power plant licensee emergency plans and preparedness. NUREG-0654 provides guidance for each of the planning standards found in 10 CFR 50.47(b) and it is the key guidance document that would be impacted as a result of the rulemaking. Therefore, the staff is making every effort to involve FEMA early in the process.

Overall, this rulemaking would provide an opportunity for the staff to codify some of the voluntary enhancements as a result of BL-2005-02, which included many lessons learned from the terrorist attacks of September 11, 2001. In addition, the rulemaking would present an opportunity to codify clarifications to the regulations that would provide consistent emergency plan implementation throughout the industry. The NRC staff believes that the state of EP is adequate to protect public health and safety, as it would be without these enhancements. However due to the lessons learned since September 11, 2001, and the decades of experience regulating EP for nuclear power plants, codifying the enhancements to the EP regulations would also enhance public health and safety.

2. Security Issues

On February 25, 2002, the NRC issued Order EA-02-26, "Interim Safeguards and Security Compensatory Measures," to all license holders for the 104 commercial nuclear power plant (NPP) reactors in the United States. This order required licensees to implement interim compensatory measures (ICMs) for the post-September 11, 2001 threat environment and take actions such as: (1) review the security and emergency plans to maximize compatibility; (2) assess the adequacy of staffing plans at emergency response facilities, and for licensees with an onsite emergency operations facility (EOF), identify alternative facilities capable of supporting emergency response; (3) develop plans, procedures and training regarding notification (including employees responding), activation, and coordination between the site and offsite response organizations (OROs); (4) conduct a review to ensure that collateral duties are not assigned to responders that would prevent effective emergency response; and (5) implement site-specific Emergency Action Levels (EALs) to provide an anticipatory response to a credible threat.

In SECY-02-0104, "Plan for the Comprehensive Review of Safeguards and Security Programs for NRC-Licensed Facilities and Activities," dated June 14, 2002, the NRC staff committed to review several areas that could impact the EP planning basis, as follows: vulnerability assessment, the design basis threat (DBT), staffing adequacy, public evacuation processes, the EP-operations-security interface, and security-based exercise issues. The staff documented its review in SECY-03-0165, "Evaluation of Nuclear Power Reactor Emergency Preparedness Planning Basis Adequacy in the Post-9/11 Threat Environment," September 22, 2003. To accomplish this review, the staff took several actions, including: (1) examining the technical and policy foundation of the EP planning basis to identify aspects that may be challenged by the post-9/11 threat environment; (2) observing a terrorist scenario-based exercise and the EP portion of force-on-force (FOF) exercises; (3) examining the impact of the DBT and vulnerability analyses; and (4) reviewing the 16 EP planning standards of 10 CFR 50.47(b).

The NRC staff concluded that the EP planning basis for NPP reactors remains valid, even considering the impact of hostile action contingencies unanticipated at the time the basis was established. The EP planning basis accounts for the shortest timing and largest magnitude radiological release from a spectrum of accidents. Vulnerability studies revealed that the timing and magnitude of releases related to hostile action events are no more severe than the shortest timing or largest magnitude sequences considered in the EP planning basis. However, the NRC staff also recognized that hostile action events differ from accident events due to the attacker's intention to maximize damage and loss of life and that the EP response to such events also differs.

In addition to the Commission's issuance of the ICMs and the staff's validation of the EP planning basis, the staff observed licensee performance during hostile action-based EP drills and exercises and security FOF exercise evaluations. The staff also discussed hostile action-based EP issues with various stakeholders, including licensees and Federal, State, and local government officials. The staff discovered that, although many licensees had improved their EP programs, additional hostile action-based EP actions may be appropriate.

To address this issue, the NRC issued BL-05-02. The purpose of this Bulletin was to obtain information from licensees on the type of EP enhancements they had implemented in several specific areas to address this hostile action contingency, and to provide enhancement examples

for licensees to consider in their response to hostile action events. The staff requested licensees to:

- Explain how onsite protective action plans for licensee personnel consider possible attack scenarios, particularly when radiological exposure is not the primary threat to personnel safety;
- Explain how licensees' emergency classification schemes address hostile action events including threat notifications;
- Explain how promptly licensees notify the NRC of hostile action events, and how this timing relates to NRC notification of other licensees that may be potentially affected by coordinated hostile action events and NRC notification of Federal agencies in accordance with the National Response Framework;
- Explain how alternative locations for onsite emergency response facilities support EP functions during a hostile action event; and
- Explain how current EP drill and exercise programs prepare or evaluate responders for hostile action events commensurate with established EP standards.

Nuclear plant licensees all responded that they had implemented, or planned to implement, the types of enhancements outlined in the Bulletin for these five issues concerning hostile action events. Further, the Nuclear Energy Institute (NEI) developed a White Paper titled "Enhancements to Emergency Preparedness Programs for Hostile Action," issued May 2005 (revised November 18, 2005). The staff endorsed this guidance in Regulatory Issue Summary (RIS) 2006-12, "Endorsement of Nuclear Energy Institute Guidance 'Enhancements to Emergency Preparedness Programs for Hostile Action,'" dated July 19, 2006, as an acceptable implementation methodology for the program enhancements discussed in BL-05-02.

The enhancements implemented by licensees are voluntary, and the NRC cannot require licensees to include them in the licensing basis as binding requirements or to maintain them as procedural guidance. In sum, based on the staff's review of NPP EP regulations, guidance, and licensee practices since September 11, 2001, the NRC staff does not believe that the current regulations and guidance provide consistent and explicit provisions necessary to address the hostile action threat environment. The staff believes that pursuing rulemaking to implement the proposed regulations would be the best way to ensure a consistent and effective emergency response during hostile action events and reduce overall burden to stakeholders. Rulemaking could also establish repeatable implementation methods, which when consistently applied, would better ensure that licensee EP programs are implemented effectively, given the hostile action threat to plant personnel and equipment. As such, the staff believes the EP regulations addressing the following four issues need to be enhanced.

2.1 Protection for Onsite Personnel

2.1.1. Regulatory Problem Background and Definition

Licensees are required to provide radiological protection for emergency workers and the public in the plume exposure pathway emergency planning zone (EPZ), including actions such as warning of an emergency, providing for evacuation and accountability of individuals, and

providing for protective clothing and/or radioprotective drugs (as required by 10 CFR 50.47(b)(10)). Many of these personnel are required by the site emergency plan, which is a condition of the nuclear plant license that the licensee must follow and maintain. The emergency plan requires responders with specific assignments to be available on-shift 24 hours a day to minimize the impact of radiological emergencies and provide for the protection of public health and safety.

However, existing NRC regulations do not currently require specific emergency plan provisions to protect onsite emergency responders, and other onsite personnel, in emergencies resulting from hostile actions. In analyses performed after the terrorist attacks of September 11, 2001, the NRC staff determined that a lack of protection for emergency responders who are expected to implement the emergency plan could result in the loss of those responders and thus an inability to effectively implement the emergency plan.

BL-05-02 pointed out that different actions than those normally prescribed may be more appropriate during a hostile action, particularly an aircraft attack, and outlined necessary enhancements to ensure effective protective measures for all onsite personnel during this contingency. These may include actions such as evacuation of personnel from potential target buildings and accountability of personnel after the attack has concluded. Precise actions would depend on site-specific arrangements, such as the location of personnel in relation to potential targets. The staff believes that the protective measure enhancements outlined in BL-05-02 should be codified to better ensure personnel protection during a hostile action event.

2.1.2. Existing Regulatory Framework

The specific requirement to provide for the protection of onsite emergency workers and members of the public is found in 10 CFR 50.47(b)(10):

A range of protective actions has been developed for the plume exposure pathway EPZ for emergency workers and the public....

There are no supporting requirements in Appendix E to 10 CFR Part 50 concerning the protection of onsite personnel.

10 CFR 50.47(b)(10) provides for protection of emergency workers and the public by requiring licensees to develop a range of protective actions. However, this regulation and NRC guidance used for the approval of nuclear plant emergency plans may not have envisioned post-September 11, 2001, hostile action events. Onsite protective actions are intended to ensure site personnel safety during accident emergency conditions. Although these actions are appropriate for some emergencies, they may not be effective during a hostile action event, such as an aircraft attack.

Guidance for meeting the requirements contained in 10 CFR 50.47(b)(10) is found in NUREG-0654, Section II.J, "Protective Response." Evaluation Criteria 2–6 state the following:

2. Each licensee shall make provisions for evacuation routes and transportation for onsite individuals to some suitable offsite location....
3. Each licensee shall provide for radiological monitoring of people evacuated from the site.

4. Each licensee shall provide for the evacuation of onsite non-essential personnel in the event of a Site or General Emergency....
5. Each licensee shall provide for a capability to account for all individuals onsite at the time of the emergency and ascertain the names of missing individuals within 30 minutes of the start of an emergency and account for all onsite individuals continuously thereafter.
6. Each licensee shall, for individuals remaining or arriving onsite during the emergency, make provisions for:
 - a. Individual respiratory protection;
 - b. Use of protective clothing; and
 - c. Use of radioprotective drugs, (e.g., individual thyroid protection).

The NRC staff considers NUREG-0654 guidance to be an acceptable method to meet the regulations and uses it to determine the adequacy of licensees' emergency plan provisions for the protection of onsite personnel. However, there is presently no guidance concerning the protection of personnel in an emergency involving hostile action against the plant structures and staff. The normal response actions for personnel protection, such as site evacuation, site assembly and accountability, and activation of onsite emergency response facilities, may not be appropriate in this instance because such actions may place at risk the response personnel necessary to mitigate plant damage resulting from the hostile action.

2.1.3. Options Considered to Resolve the Problem

2.1.3.1. Take no action

The requirement in 10 CFR 50.47(b)(10) concerning the protection of onsite personnel in an emergency is silent concerning a hostile action event. The NUREG-0654 guidance is one acceptable way for meeting this requirement, but it contains no guidance concerning the protection of personnel in an emergency involving a hostile action event. The normal response actions for personnel protection, such as site evacuation, site assembly and accountability, and activation of emergency response facilities, may not be appropriate in a hostile action situation and may place at risk the response personnel necessary to mitigate plant damage resulting from the hostile action. Taking no action could result in the vulnerability of onsite personnel during this contingency, and their loss if normal response actions are implemented.

The staff considered this option to be unacceptable because it ignores the need to enhance licensee capabilities in the current threat environment. The terrorist attacks of September 11, 2001, emphasized the need for enhancements in NRC regulations and guidance. Therefore, taking no action is not acceptable.

2.1.3.2. Use voluntary programs

In the response to BL-05-02, licensees affirmed in writing that they would conditionally develop and implement EP program elements appropriate for hostile action events in the five areas discussed in the Bulletin. NEI developed a guidance document that the NRC staff endorsed as an acceptable implementation methodology for program enhancements in those five areas, but licensee enhancements were voluntary and implementation of those enhancements may vary widely between plants. The NRC cannot require licensees to include them in the licensing basis

or even to maintain them as procedural guidance because they would not be required by regulation, order, or license condition. If a licensee were to retract implementation of these enhancements, the NRC could not enforce their maintenance.

Voluntary programs do not provide a consistent, NRC-approved means for addressing needed enhancements in the post-9/11 threat environment. Also, the implementation of voluntary actions at the existing plants does not ensure that these measures would be incorporated into emergency plans at new plant sites. Therefore, the NRC staff does not consider a voluntary program to be the best approach.

2.1.3.3. Implement proposed regulation

This option would pursue rulemaking to require licensees to provide an expanded range of protective measures for onsite personnel that would be appropriate for protection against a hostile action event. These would be site-specific measures and would consider such issues as the location of workers in relation to potential targets, which will dictate whether sheltering, evacuation, or a combination of the two is appropriate for adequate protection. The new requirement would not direct any specific actions but would allow licensees flexibility to determine on a site-specific basis the protective measures most effective for onsite personnel protection. Licensees would need to confirm that additional measures are incorporated to ensure the protection of the largest number of onsite personnel in the event of a hostile action event.

Guidance for implementation of the enhanced regulation would be promulgated in interim staff guidance based on the elements of BL-05-02 and the associated NEI White Paper, and the regulation change would ensure that these elements are incorporated into licensee emergency plans. The NRC would expect licensees to make emergency plan changes to establish compliance with the new regulation and would use the guidance as the basis for its review.

For these reasons, and for the reasons provided above, the staff believes that the pursuit of rulemaking for this proposed change to EP regulations is the best course of action to resolve this important regulatory issue.

2.2 Licensee Coordination with Offsite Response Organizations During Hostile Action Events

2.2.1. Regulatory Problem Background and Definition

The ICMs required that licensees develop plans, procedures, and training regarding notification, activation, and coordination between the NPP site and OROs. A unique challenge posed by a hostile action event at an NPP is the increased demand on local law enforcement agencies (LLEAs) that are expected to implement portions of ORO emergency plans, as well as respond to the plant. Currently, licensees are not explicitly required to coordinate with OROs to ensure that personnel are available to carry out preplanned actions, such as traffic control and route alerting (by LLEAs), during a hostile action event directed at the plant. The NRC recognized this challenge when it issued order EA-02-26. Specifically, ICM B.5.d required that licensees develop plans, procedures, and training regarding coordination between the site and OROs. SECY-03-0165 identified coordination with OROs as an issue for further review based on observations from drills and exercises. In addition, BL-05-02 provided enhancements to EP drill

and exercise programs to prepare responders, including OROs, to support hostile action events. But the Bulletin enhancements are voluntary and the NRC cannot enforce their compliance.

Therefore, there may be inconsistent implementation concerning effective coordination with OROs to ensure that adequate resources are available to respond to a hostile action event at an NPP. The NRC staff believes that enhanced regulations are necessary to reinforce the ICM requirement for licensee coordination with OROs to ensure adequate planning and compliance for hostile action events. The enhanced regulations will clarify criteria for licensee coordination with the OROs and enable licensees to more effectively implement their pre-planned actions for this contingency.

2.2.2. Existing Regulatory Framework

The specific requirement for establishing an emergency organization to respond to emergency events appears in 10 CFR 50.47(b)(1), which states:

Primary responsibilities for emergency response by the nuclear facility licensee and by State and local organizations within the Emergency Planning Zones have been assigned, the emergency responsibilities of the various supporting organizations have been specifically established, and each principal response organization has staff to respond and to augment its initial response on a continuous basis.

Supporting requirements concerning the licensee organization for coping with radiation emergencies are contained in 10 CFR Part 50, Appendix E, Section IV.A, which states in part:

The organization for coping with radiological emergencies shall be described, including definition of authorities, responsibilities, and duties of individuals assigned to the licensee's emergency organization and the means for notification of such individuals in the event of an emergency. Specifically, the following shall be included:

6. A description of the local offsite services to be provided in support of the licensee's emergency organization.
7. Identification of, and assistance expected from, appropriate State, local, and Federal agencies with responsibilities for coping with emergencies.
8. Identification of the State and/or local officials responsible for planning for, ordering, and controlling appropriate protective actions, including evacuations when necessary.

NUREG-0654, Section II.A, "Assignment of Responsibility (Organization Control)," provides guidance for meeting the requirements of 10 CFR 50.47(b)(1) concerning the offsite emergency organization, and contains the same wording of the regulation which is stated above.

Section II.A, Criterion 1, states the following:

- a. Each plan shall identify the State, local, Federal and private sector

organizations (including utilities), that are intended to be part of the overall response organization for Emergency Planning Zones.

- b. Each organization and suborganization having an operational role shall specify its concept of operations, and its relationship to the total effort.
- e. Each organization shall provide for 24-hour per day emergency response, including 24-hour per day manning of communications links.

In summary, the regulations state that primary responsibilities for Emergency Response Organizations (EROs) must be assigned, responsibilities of supporting organizations established, and there must be adequate staff available for emergency response 24 hours a day, seven days a week. However, licensees are not required to coordinate with OROs to ensure that personnel are available to carry out preplanned response actions during hostile actions directed against an NPP.

2.2.3. Options Considered to Resolve the Problem

2.2.3.1. Take no action

Hostile action events at NPPs pose unique challenges for LLEAs, which must implement ORO emergency plans and respond to the plant. The ICMs required licensees to develop plans, procedures, and training for coordination with OROs. But observations of hostile action drills and exercises revealed that there may be inconsistent implementation among licensees concerning effective coordination with OROs for response to hostile action events. Action is necessary to ensure effective coordination in the present threat environment to enable licensees to more effectively implement their pre-planned actions for hostile action events.

The staff considered this option to be unacceptable because it ignores the need to enhance licensee capabilities in the current threat environment. The terrorist attacks of September 11, 2001, emphasized the need for enhancements in NRC regulations and guidance. Therefore, taking no action is not acceptable.

2.2.3.2. Use voluntary programs

In the response to BL-05-02, licensees and the supporting OROs have taken various actions to respond to this issue, but criteria for determining the adequacy of the licensee and ORO actions have not been established. NEI developed a guidance document that NRC staff endorsed as an acceptable implementation methodology for program enhancements in the five areas addressed by the Bulletin, but licensee enhancements were voluntary and implementation of those enhancements may vary widely between plants. The NRC cannot require licensees to include them in the licensing basis or even to maintain them as procedural guidance because they would not be required by regulation, order, or license condition. If a licensee were to retract implementation of these enhancements, the NRC could not enforce their maintenance.

Voluntary programs do not provide a consistent, NRC-approved means for addressing needed enhancements in the post-9/11 threat environment. Also, the implementation of voluntary actions at the existing plants does not ensure that these measures would be incorporated into

emergency plans at new plant sites. Therefore, the NRC staff does not consider a voluntary program to be the best approach.

2.2.3.3. Implement proposed regulation

The NRC staff proposes to amend the NRC EP regulations to require licensees to coordinate with OROs to provide an adequate response to hostile action events. The ICMs required that licensees develop plans, procedures, and training regarding notification, activation, and coordination between the NPP and OROs. BL-05-02 provided enhancement examples for the EP drill and exercise program to ensure that all OROs were trained to support hostile action events. This rulemaking would codify licensee coordination with OROs to better ensure adequate planning for this type of event.

Guidance for implementation of the enhanced regulation would be promulgated in interim staff guidance based on the elements of BL-05-02 and the associated NEI White Paper, and the regulation change would ensure that these elements are incorporated into licensee emergency plans. The NRC would expect licensees to make emergency plan changes to establish compliance with the new regulation and would use the guidance as the basis for its review.

For these reasons, and for the reasons provided above, the staff believes that the pursuit of rulemaking for this proposed change to EP regulations is the best course of action to resolve this important regulatory issue.

2.3 Emergency Action Levels for Hostile Action Events

2.3.1. Regulatory Problem Background and Definition

The ICMs required licensees to implement EALs to ensure that a site-specific, ICM-related event resulted in the declaration of at least an Unusual Event. Improvements in Federal agencies' information sharing and assessment capabilities have made possible the declaration of hostile action events in a more anticipatory manner, based on a credible threat. EALs are used as criteria for determining the need for notification and participation of State and local agencies, and event classification is a risk-significant EP function specified in 10 CFR 50.47(b)(4). Bulletin 05-02 expanded on the EAL issue and provided EAL enhancement examples for declaration of hostile action events, in a more anticipatory manner, up to the General Emergency level. These enhancements allow for earlier implementation of emergency response actions.

Although all licensees have implemented both the credible threat EAL required by the ICM and the EAL enhancements specified in BL-05-02, licensees are not required to maintain the Bulletin enhancements. This could result in inconsistent EAL implementation among licensees for response to hostile action events. Also, future licensees would not be required to include these enhancements in their emergency plans.

2.3.2. Existing Regulatory Framework

10 CFR 50.47(b)(4) stipulates that emergency plans must include a standard emergency classification and action level scheme, which is a risk-significant EP function. 10 CFR Part 50, Appendix E Section IV.B, specifies that emergency plans shall include EALs which are to be

used as criteria for determining the need for notification of State and local agencies, and participation of those agencies in emergency response.

Section IV.C of Appendix E requires emergency classification levels (ECLs) that determine the extent of participation of the ERO. The ECLs shall include (1) Notification of Unusual Event; (2) Alert; (3) Site Area Emergency; and (4) General Emergency. Plant personnel use EALs to determine the appropriate ECL to declare.

Appendix 1 to NUREG-0654 contains examples of initiating conditions (ICs) for each of the four ECLs. Section II.D.1 of NUREG-0654 states that the licensee should identify plant parameter values or other information corresponding to the example ICs in Appendix 1. The ICs, in conjunction with the associated parameter values and other information, make up the EAL scheme.

NRC Regulatory Guide (RG) 1.101 endorsed NUREG-0654, Appendix 1, as an acceptable method for complying with the standards in 10 CFR 50.47(b)(4) for development of an EAL scheme. In 1992, NRC staff endorsed the NUMARC/NESP-007 methodology as an acceptable alternative to that described in NUREG-0654 for developing EALs to meet NRC requirements.

In 2003, NRC staff endorsed the NEI 99-01 methodology as an acceptable alternative to that described in NUREG-0654 and NUMARC/NESP-007 for developing EALs. The significant change to EALs in NEI 99-01 was an enhancement to the security EAL for the Notification of Unusual Event classification. The post-9/11 change reflected the recognition that security and plant events are interrelated, and hostile action event EALs are necessary to clearly communicate with and notify offsite response organizations.

However, none of the EAL methodologies provide adequate ICs and EALs for hostile action events. The NRC addressed this issue in the ICMs by requiring the declaration of at least an Unusual Event in response to a credible hostile action threat. The NRC issued BL-05-02, which provided EAL enhancement examples for hostile action events up to the General Emergency level. BL-05-02 provided examples of EALs for all three EAL methodologies that could be implemented immediately without prior NRC approval. It also pointed out that because of improvements in Federal agencies' information-sharing and assessment capabilities, hostile action emergency declarations can be accomplished in a more anticipatory manner than the currently prescribed declarations. This would enable earlier implementation of emergency response actions. The staff believes that these EAL enhancements for hostile action events should be codified to better ensure effective implementation of this risk-significant function.

2.3.3. Options Considered to Resolve the Problem

2.3.3.1. Take no action

This option would maintain the current regulatory basis, but there would continue to be no explicit regulatory requirement regarding the incorporation of hostile action events in the emergency classification and action level scheme. The staff recognizes that voluntary implementation of ECLs and EALs as described in BL-05-02 would meet the intent of the Commission following the September 11, 2001 terrorist attacks. However, there would continue to be no regulatory requirement for current or future licensees to incorporate EALs for hostile action events into their emergency plans. Nor would there be a consistent minimum level of implementation that the NRC had determined to be adequate.

The staff considered this option to be unacceptable because it ignores the need to enhance licensee capabilities in the current threat environment. The terrorist attacks of September 11, 2001, emphasized the need for enhancements in NRC regulations and guidance. Therefore, taking no action is not acceptable.

2.3.3.2. Use voluntary programs

In the response to BL-05-02, licensees affirmed in writing that they would conditionally develop and implement EP program elements appropriate for hostile action events in the five areas discussed in the Bulletin. NEI developed a guidance document that NRC staff endorsed as an acceptable implementation methodology for program enhancements in those five areas, but licensee enhancements were voluntary and implementation of those enhancements may vary widely between plants. The NRC cannot require licensees to include them in the licensing basis or even to maintain them as procedural guidance because they would not be required by regulation, order, or license condition. If a licensee were to retract implementation of these enhancements, the NRC could not enforce their maintenance.

Voluntary programs do not provide a consistent, NRC-approved means for addressing needed enhancements in the post-9/11 threat environment. Also, the implementation of voluntary actions at the existing plants does not ensure that these measures would be incorporated into emergency plans at new plant sites. Therefore, the NRC staff does not consider a voluntary program to be the best approach.

2.3.3.3. Implement proposed regulation

Rulemaking would serve to establish consistent EALs for hostile action events. The ICMs and BL-05-02 provided requirements and examples of enhancements to EAL schemes, respectively, that would allow event declarations to be accomplished in a more anticipatory manner. This is of the utmost importance because EALs are used as criteria for determining the need for notification and participation of State and local agencies. The staff believes that these enhancements should be codified to better ensure consistent and effective implementation.

Guidance for implementation of the enhanced regulation would be promulgated in interim staff guidance based on the elements of BL-05-02 and the associated NEI White Paper, and the regulation change would ensure that these elements are incorporated into licensee emergency plans. The NRC would expect licensees to make emergency plan changes to establish compliance with the new regulation and would use the guidance as the basis for its review.

For these reasons, and for the reasons provided above, the staff believes that the pursuit of rulemaking for this proposed change to EP regulations is the best course of action to resolve this important regulatory issue.

2.4 Emergency Response Organization Augmentation at an Alternative Facility

2.4.1. Regulatory Problem Background and Definition

ICM B.5.d required that licensees assess the adequacy of staffing plans at emergency response facilities during a hostile action event, assuming the unavailability of the onsite technical support

center (TSC), and identify alternative facilities capable of supporting event response. ERO members would likely not have access to the site, but hostile action events would still warrant timely ERO augmentation. Licensees were required to identify alternative facilities as staging areas until the site was secured.

In SECY-03-0165, the staff identified a concern associated with the implementation of this ICM. A few sites with onsite EOFs did not have adequate arrangements for alternative facilities to accommodate augmented staff. In response to BL-05-02, some licensees indicated that, if they experienced a hostile action event, they may not activate elements of the ERO until the site is secured. However, based on lessons learned from drills and exercises, it is prudent to fully activate ERO members in response to off-normal working hour events in order to minimize delays in overall site response. The staff also believes that during normal working hours, licensees should consider deployment of onsite ERO personnel to an alternative facility near the site. This action would help ensure ERO safety and facilitate mitigation planning until the site has been secured from hostile action.

The current regulations do not require licensees to identify alternative facilities to support ERO augmentation during hostile action events. The staff believe that the ICM requirement and the enhancement examples described in BL-05-02 concerning ERO augmentation should be codified to maximize the effectiveness of the site response.

2.4.2. Existing Regulatory Framework

The requirement for licensees to provide and maintain emergency response facilities and equipment to support the emergency response is found in 10 CFR 50.47(b)(8). Additionally, 10 CFR Part 50, Appendix E, requires licensees to provide adequate emergency response facilities and equipment. ICM B.5.d required licensees to identify alternative facilities to support emergency operations activities capable of supporting event response and providing communications with Federal officials, State/local officials, and the public. SECY-03-0165 stated that some sites with an onsite EOF may not have made adequate arrangements for alternative facilities to accommodate augmenting staff. BL-05-02 provided acceptable enhancement examples concerning the importance of alternative facilities to support ERO augmentation during hostile action events. The NRC expects the ERO to be staged in a manner that supports rapid event response to limit or mitigate site damage or the potential for an offsite radiological release.

NUREG-0654 Section II.H, "Emergency Facilities and Equipment," Evaluation Criteria 1, 2, 4, and 9 provide the following guidance for meeting the requirements in 10 CFR 50.47(b)(8):

1. Each licensee shall establish a Technical Support Center and an onsite operations support center (assembly area) in accordance with NUREG-0696.
2. Each licensee shall establish an Emergency Operations Facility from which evaluation and coordination of all licensee activities related to an emergency is to be carried out and from which the licensee shall provide information to Federal, State, and local authorities responding to radiological emergencies in accordance with NUREG-0696.
4. Each organization shall provide for timely activation and staffing of the facilities and centers described in the plan.

9. Each licensee shall provide for an onsite operations support center (assembly area) which shall have adequate capacity, and supplies, including, for example, respiratory protection, protective clothing, portable lighting, portable radiation monitoring equipment, cameras and communications equipment for personnel present in the assembly area.

BL-05-02 pointed out that some licensees had chosen not to activate elements of the ERO during a hostile action event until the site is secured. The staff determined that it was prudent to fully activate ERO members for off-normal working hour events to promptly staff alternative facilities. This would help ensure personnel safety and minimize delays in overall site response. During normal working hours, licensees should consider deployment of onsite ERO personnel to an alternative facility near the site. The staff determined that it was appropriate for such alternative facilities to have equipment to support emergency response functions. Attachment 5 to BL-05-02 provides additional information on staff augmentation and facility considerations, as follows:

Training centers, emergency operations centers, and enclosed assembly areas are adequate alternative facilities. The key characteristics of alternative facilities include:

- accessibility even if the site is under threat or attack
- communication links with the EOF, control room, and security
- capability to notify offsite response organizations (OROs) if the EOF is not performing this action
- capability for engineering and damage control teams to begin planning mitigative actions (e.g., general drawings and system information should be available)

Licensees responded that they had implemented or planned to implement the types of enhancements specified in BL-05-02. Further, industry developed a guidance document for use in implementing these enhancements, which the NRC endorsed in RIS 2006-12. However, implementation of these enhancements was voluntary, and the NRC has not inspected licensees for compliance with them. If a licensee decides to remove these enhancements, the NRC has no regulatory recourse outside of issuing orders.

ICM B.5.d and BL-05-02 have pointed out that licensee emergency plans should include the assembly of the onsite ERO at an alternative facility during a hostile action event. The Bulletin specified that this near-site facility should be accessible even if the site is under threat of actual attack, have communication links with the EOF, Control Room, and security personnel, be capable of notifying offsite response organizations, and capable to begin planning for deployment of damage control teams. The Bulletin also recommended that the alternative facility should be equipped with general plant drawings and procedures, telephones, and computer links to the site. This would help to ensure that the ERO is aware of conditions at the site and prepared to return when LLEA incident command allows personnel to re-enter the site. It would also enable rapid staffing of onsite emergency response facilities and implementation of mitigation actions when ERO personnel enter the protected area.

2.4.3. Options Considered to Resolve the Problem

2.4.3.1. Take no action

Under this option, there would continue to be no explicit regulatory requirement regarding the actions necessary during hostile action events for the ERO to staff an alternative facility. ERO members would likely not have access to the site during a hostile action event, but timely augmentation would still be necessary for adequate response. No action may result in inconsistent implementation of ERO augmentation guidelines, leading to less effective overall site response.

The staff considered this option to be unacceptable because it ignores the need to enhance licensee capabilities in the current threat environment. The terrorist attacks of September 11, 2001, emphasized the need for enhancements in NRC regulations and guidance. Therefore, taking no action is not acceptable.

2.4.3.2. Use voluntary programs

In the response to BL-05-02, licensees affirmed in writing that they would develop and implement EP program elements appropriate for hostile action events in the five areas discussed in the Bulletin. NEI developed a guidance document which NRC staff endorsed as an acceptable implementation methodology for program enhancements in those five areas, but licensee enhancements were voluntary and implementation of those enhancements may vary widely between plants. The NRC cannot require licensees to include them in the licensing basis or even to maintain them as procedural guidance because they would not be required by regulation, order, or license condition. If a licensee were to retract implementation of these enhancements, the NRC could not enforce their maintenance.

Voluntary programs do not provide a consistent, NRC-approved means for addressing needed enhancements in the post-9/11 threat environment. The staff wants to ensure consistent industry-wide implementation of the ICM requirements and BL-05-02 enhancements and make them a part of EP requirements going forward. Rulemaking better identifies the level of effort needed to address these concerns in a consistent manner, and potentially reduce burden on licensees and the NRC. It could also establish repeatable implementation methods, which when consistently applied, would better ensure that licensee EP programs are implemented effectively, given the hostile action threat to plant personnel and equipment.

Lastly, the implementation of voluntary actions at the existing plants does not ensure that these measures would be incorporated into emergency plans at new plant sites. Therefore, the NRC staff does not consider a voluntary program to be the best approach.

2.4.3.3. Implement proposed regulation

The NRC staff believes that rulemaking is necessary to require the establishment of alternative facilities for response to hostile actions. The ICMs required licensees to identify alternative facilities for ERO augmentation during a hostile action event. BL-05-02 provided additional information, gained from drill and exercise experience, to consider in enhancing the capabilities of those facilities. These documents pointed out that hostile action events, even assuming the unavailability of emergency response facilities, still warrant timely ERO augmentation by staging responders at the alternative facility. Therefore the staff believes that this issue should also be codified to better ensure effective emergency response to a hostile action event.

Guidance for implementation of the enhanced regulation would be promulgated in interim staff guidance based on the elements of BL-05-02 and the associated NEI White Paper, and the regulation change would ensure that these elements are incorporated into licensee emergency plans. The NRC would expect licensees to make emergency plan changes to establish compliance with the new regulation and would use the guidance as the basis for its review.

For these reasons, and for the reasons provided above, the staff believes that the pursuit of rulemaking for this proposed change to EP regulations is the best course of action to resolve this important regulatory issue.

3. Exercise Issues

3.1. Regulatory Problem Background and Definition

A basic EP principle is that EROs conduct drills and exercises to develop and maintain key skills necessary to protect public health and safety in the unlikely event of a radiological emergency. Licensees and their supporting OROs demonstrate their ability to implement emergency plans and critique response during biennial evaluated exercises. The NRC inspects licensee response during these exercises and reviews the plans against the criteria of NUREG-0654, judging them for adequacy and approving them as appropriate. FEMA additionally evaluates the capabilities of OROs. Another facet of NRC's inspection program is its review of the adequacy of licensee efforts to correct program weaknesses. EP regulations promulgated in 1980 initially required annual exercises, but the agency relaxed this requirement to biennial for State and local governmental authorities in 1984 and for licensees in 1996.

Each site has performed many evaluated exercises through which licensees have come to understand NRC and FEMA expectations for response demonstration. Licensees design exercise scenarios in coordination with State and local agencies to facilitate the performance and evaluation of the exercise whereby all key emergency plan functions are demonstrated. As a result, biennial exercise scenarios have become predictable and may precondition EROs to expect a sequential escalation of emergency classifications culminating in a large radiological release. Current biennial exercise scenarios do not resemble credible reactor accidents in that the timing is improbable and the intermittent containment failure typically used is unlikely. Typical scenarios used by licensees in biennial exercises involve simulated accidents, such as loss of coolant or a steam generator tube rupture. However, the following predictable artifacts emerge in almost all biennial exercise scenarios:

- The exercise will involve a large radiological release, often resulting in the need for public dose-based protective actions beyond 5 miles;
- The ERO will not be allowed to mitigate the accident before a release occurs;
- The release will occur after a General Emergency is declared;
- Initial protective action recommendations will be developed based on plant conditions rather than on a radiological release;
- The release will be terminated before the exercise ends;
- The exercise will escalate sequentially through the emergency classes; and
- Enough time exists between emergency classes to facilitate the evaluation of required demonstrations.

Although the 1980 EP regulations have been successful in ensuring a high level of EP at every nuclear plant site, the staff believes that current exercise scenarios and drills should be enhanced because responders may be preconditioned to accident sequences that are not likely to resemble the accidents they could realistically face.

NRC and FEMA inspect and evaluate biennial exercises, but drills receive no FEMA oversight and limited NRC oversight. The NRC resident inspectors evaluate a sampling of drills, focusing on the conduct of the critique, but they have no input to scenario content. The 1996 regulatory change in exercise requirements was designed to allow licensees flexibility to practice more realistic drill scenarios during the time between evaluated exercises. The regulations (Appendix E, IV, F.2.b.) state that “licensees would have the opportunity to consider accident management strategies, supervised instruction would be permitted, operating staff would have the opportunity to resolve problems (success paths) rather than have controllers intervene, and the drills could focus on onsite training objectives.” This regulation was, in part, intended to discourage preconditioning of EROs by allowing more innovative training opportunities.

Regulations and emergency plans require drills, and licensee drill programs typically exceed the requirements. Licensees have latitude in scenario content for these drills, but in reality this latitude is limited because the time dedicated to drills must be used efficiently and effectively. EROs often consist of three or four teams. Licensees may conduct three or four drills each year, but that allows only one drill for each team. To maintain the key skills of every team member, drill scenarios must contain most of the elements that would be expected in an evaluated exercise. Furthermore, the need for licensees to perform well in evaluated exercises drives the development of drill scenarios that emulate biennial exercise scenarios. OROs may participate to varying degrees in drills and off-year exercises and preparation for evaluated exercises is also an objective from their perspective. The result is that elements of typical biennial exercise scenarios are reflected throughout the drill program, providing the same potentially negative training as found in the biennial exercise.

NRC also sees a need to change the fact that current exercise scenarios generally do not include hostile action¹ events. Following the terrorist attacks of September 11, 2001, and the new threat environment, BL-2005-02 requested licensees to explain how current drill and exercise programs prepare or evaluate responders for hostile action events commensurate with established EP standards.

The staff determined that the EP planning basis remains valid but noted that hostile action events differ from accident-initiated events. The staff observed licensee performance during hostile action-based EP tabletop drills at four sites, a drill at one site, and an exercise at one site, as well as several security force-on-force exercise evaluations. The staff discussed hostile action-related EP issues with licensees, Federal, State, and local government officials and advocacy groups during public meetings in 2005 and 2006. These interactions provided the staff with information on the steps necessary to enhance licensee drill and exercise programs. Through these efforts, the staff concluded that although EP measures are designed to address a wide range of events, response to hostile action can present unique challenges not addressed in licensee and ORO drills and exercises, such as:

- Extensive coordination between operations, security and EP;
- Use of the alternative emergency response facilities for activation of the ERO;

¹ A “hostile action” is an act toward an NPP or its personnel that includes the use of violent force to destroy equipment, take hostages, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, projectiles, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included.

- Execution of initial response actions in a hostile environment (i.e., during simulated hostile action);
- The need to shelter personnel from armed attack or aircraft attack in a manner very different from that used during radiological emergencies;
- Conduct of operations and repair activities when the site conditions prevent normal access due to fire, locked doors, security measures and areas that have not yet been secured;
- Conduct of operations and repair activities with large areas of the plant damaged or on fire;
- Rescue of and medical attention to significant numbers of personnel; and
- Prioritization of efforts to protect plant equipment or to secure access to plant areas for repairs.

In “Staff Requirements—Briefing on Status of Emergency Planning Activities, (Two Sessions) 9:30 a.m. and 1:00 p.m., Tuesday, May 2, 2006, Commissioners’ Conference Room, One White Flint North, Rockville, Maryland (Open to Public Attendance),” dated June 29, 2006, the Commission directed the staff as follows:

The staff should coordinate with DHS to develop emergency planning exercise scenarios which would help avoid anticipatory responses associated with preconditioning of participants by incorporating a wide spectrum of releases (ranging from little or no release to a large release) and events, including security-based events. These scenarios should emphasize the expected interfaces and coordination between key decision-makers based on realistic postulated events. The staff should share experiences of preconditioning or “negative training” with DHS.

In a July 31, 2006, letter to the DHS Director of Chemical and Nuclear Preparedness & Protection, the NRC Director of the Division of Preparedness and Response requested support on the issue addressed in the SRM of June 29, 2006. The letter proposed that a joint NRC/FEMA (referred to as DHS above) working group be formed to review the development of emergency planning exercise scenarios. The working group was assigned the task of identifying the regulations and guidance that will require revision to enhance exercise scenarios.

In October 2006, the NRC and FEMA established the Exercise Scenario Working Group, consisting of senior staff members from NRC Headquarters and FEMA Headquarters and regional offices. The two agencies jointly developed a written charter with the following stated purpose:

This Charter establishes the Exercise Scenario Working Group and defines responsibilities for the evaluation and recommended revisions, as deemed necessary and appropriate, to regulations and guidance in support of implementation of Commission Staff Requirements Memorandum (SRM), dated June 29, 2006 (ADAMS No. ML061870268).

The working group met in November 2006 and February 2007 and developed recommendations for enhancing exercise scenarios. The recommendations included methods to vary radiological releases, initiating scenarios (including hostile action events), and event timing. The recommendations included the need to revise regulations to strengthen the basis for enhancing the content of exercise scenarios.

The working group concluded that licensee drill and exercise programs should be enhanced to use scenarios that are less predictable and periodically include hostile action to more fully prepare EROs for a wide spectrum of accident scenarios. Because existing regulations are general in nature and do not specify the content of drill and exercise scenarios or directly allow the staff to require specific scenario content, the staff believes that a regulatory change is necessary to enhance scenario content to include hostile action scenarios and reduce preconditioning through a wide spectrum of challenges. This change would improve licensee ERO capability to protect public health and safety under all accident scenarios as well as reverse any trend toward preconditioning.

3.2. Existing Regulatory Framework

Title 10, Section 50.47(b)(14), of the *Code of Federal Regulations* (10 CFR 50.47(b)(14)) states:

Periodic exercises are (will be) conducted to evaluate major portions of emergency response capabilities, periodic drills are (will be) conducted to develop and maintain key skills, and deficiencies identified as a result of exercises or drills are (will be) corrected.

This planning standard (PS) requires that licensees establish a drill and exercise program and correct program deficiencies so that the response staff develop and maintain key skills. However, this regulation provides no specifics regarding the content of the drill and exercise scenarios or the nature of the key skills needed. Section IV, "Contents of Emergency Plans," Section F.1., "Training," of Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," contains additional requirements:

The program to provide for: (a) the training of employees and exercising, by periodic drills, of radiation emergency plans to ensure that employees of the licensee are familiar with their specific emergency response duties, and (b) the participation in the training and drills by other persons whose assistance may be needed in the event of a radiation emergency shall be described. This shall include a description of specialized initial training and periodic retraining programs to be provided to each of the following categories of emergency personnel:

- i. Directors and/or coordinators of the plant emergency organization;
- ii. Personnel responsible for accident assessment, including control room shift personnel;
- iii. Radiological monitoring teams;
- iv. Fire control teams (fire brigades);
- v. Repair and damage control teams;
- vi. First aid and rescue teams;
- vii. Medical support personnel;
- viii. Licensee's headquarters support personnel;

ix. Security personnel.

In addition, a radiological orientation training program shall be made available to local services personnel; e.g., local emergency services/Civil Defense, local law enforcement personnel, local news media persons.

These regulations require that certain members of the ERO be trained and drilled and that drills and exercises be critiqued to identify areas for correction. Although the regulations do not directly address specific scenario content, the concept of “principal functional areas” is introduced and indirectly identifies areas of emergency response “such as management and coordination of emergency response, accident assessment, protective action decision making, and plant system repair and corrective actions.” Other requirements dictate scenario elements without specifically identifying them. Section F.2. states:

Exercises shall test the adequacy of timing and content of implementing procedures and methods, test emergency equipment and communications networks, test the public notification system, and ensure that emergency organization personnel are familiar with their duties.

Meeting these requirements in an exercise requires that the scenario include the activation of emergency centers, the declaration of various emergency classifications, and specifically, declaration of a classification that requires using the public notification system, which would ostensibly require a General Emergency classification, the most serious of the four emergency classifications. However, licensees can meet these requirements with any number of nuclear plant accident scenarios as demonstrated since the 1980 regulation was promulgated. The use of hostile action or a wide spectrum of events is not required to meet these regulations, nor do the regulations permit the staff to dictate the scenario content necessary to meet the requirements.

The regulations provide for remedial exercises when the biennial exercise is not an adequate test. The staff does not have clear criteria for the adequacy of biennial exercises but has required exercises to be repeated when the scenario used was not sufficiently different from those used in practice drills preceding the biennial exercise. The regulation permits the staff to require a remedial exercise in the case of a biennial exercise scenario that presents a clearly inadequate test of the emergency plan, but the staff has not done this since the regulation was promulgated, in part because of the lack of clear criteria for invoking the regulation.

Guidance for meeting the regulatory requirements contained in 10 CFR 50.47(b) and Appendix E appears in NUREG-0654. NUREG-0654, Section N, “Exercises and Drills,” contains guidance applicable to the adequacy of drill and exercise programs. Evaluation Criterion N.1.a states the following:

An exercise is an event that tests the integrated capability and a major portion of the basic elements existing within emergency preparedness plans and organizations. The emergency preparedness exercise shall simulate an emergency that results in offsite radiological releases which would require response by offsite authorities. Exercises shall be conducted as set forth in NRC and FEMA rules.

FEMA endorsed this guidance by direct reference to NUREG-0654 in 44 CFR 350.5, “Criteria for Review and Approval of State and Local Radiological Emergency Plans and Preparedness.”

In practice, FEMA interprets the criteria in NUREG-0654 to be requirements, not guidance, for the evaluation of State and local radiological emergency plans.² This practice forms the basis for the FEMA “requirement” that every demonstration exercise include “radiological releases which would require response by offsite authorities.” FEMA consistently “requires” that evaluated exercise scenarios simulate a significant radiological release. Often FEMA scenario reviewers have specified the expected distance and value of the whole body or thyroid dose to the public. The NRC staff views NUREG-0654 as guidance and not as a set of requirements and as such believes that the phrases “radiological release” and “response by offsite authorities” do not necessarily require the implementation of protective actions in response to a significant public dose at some distance from the plant. FEMA typically requires that the biennial exercise scenario include doses to the public that require protective actions beyond 5 miles. The staff believes that a large radiological release is not required for every exercise conducted in a 6-year cycle in order to demonstrate reasonable assurance that adequate protective measures can and will be implemented in response to an emergency. Licensees recommend protective actions, and OROs are expected to consider the recommendation and implement appropriate protective actions after the declaration of a General Emergency irrespective of whether the scenario contains a large radiological release.

Evaluation Criterion N.1.b states the following:

An exercise shall include mobilization of State and local personnel and resources adequate to verify the capability to respond to an accident scenario requiring response. The organization shall provide for a critique of the annual exercise by Federal and State observers/evaluators. The scenario should be varied from year to year such that all major elements of the plans and preparedness organization are tested within a five year period.

Evaluation Criterion N.2 directs that several kinds of drills be conducted periodically, including communications, fire, medical emergency, radiological monitoring, and health physics drills.

These criteria dictate the content of scenarios indirectly (i.e., that there be a radiological release, that State and local personnel mobilize, or that there be a medical emergency). They also introduce the concept of “major elements” of the emergency response which are to be tested every 5 years. However, licensees have been meeting these criteria successfully since their promulgation in 1980. There is no requirement for hostile action or use of a wide spectrum of events to be included in exercise or drill scenarios in order to meet these criteria.

Recognizing its lack of regulatory authority, the staff worked with the industry to begin a voluntary program to integrate hostile action scenarios into routine drills and exercises. BL 2005-02 and licensee responses to the Bulletin reflect this effort. The industry response in the area of enhancements to drill and exercise programs was to commit to developing guidance for the integration of hostile action into drill and exercise scenarios and to implement the guidance upon NRC and FEMA endorsement. The industry developed and issued NEI 06-04, Rev. 1, “Conducting a Hostile Action-Based Emergency Response Drill,” in 2006. The NRC endorsed this document for use in a pilot program in RIS 2008-08, “Endorsement of Revision 1 to Nuclear Energy Institute Guidance Document NEI 06-04, ‘Conducting a Hostile Action-Based Emergency Response Drill,’” dated March 19, 2008. The options analysis in the next section discusses this issue further.

² It is noted that FEMA has chosen not to “enforce” certain evaluation criteria in NUREG-0654, such as “some exercises shall be unannounced”.

3.3. Options Considered to Resolve the Problem

3.3.1. Take no action

This option would maintain the status quo. Although emergency plans are designed to function under a wide spectrum of accidents, emergencies caused by hostile action would present challenges to EROs in areas not routinely practiced in existing drill and exercise programs. This situation could result in EROs being unprepared for the actual emergencies they may face.

The NRC staff believes that in today's threat environment there is a need to enhance licensee drill and exercise programs to ensure that EROs are capable of responding to protect public health and safety in emergencies resulting from hostile action. The staff also believes that a need exists to enhance licensee drill and exercise programs to ensure that EROs are capable of responding to protect public health and safety for a wide spectrum of emergencies. Therefore, the staff considers this option to be unacceptable.

3.3.2. Use voluntary programs

As noted above, the industry has a voluntary program to implement the use of hostile action scenarios in drill and exercise programs. In response to BL-05-02, licensees indicated that they would develop industry guidance to address this effort and fully implement this program upon its endorsement by the NRC and FEMA. The NRC accepted this response to the bulletin and NEI issued NEI 06-04 in 2006. The NRC endorsed this document for use in a pilot program in RIS 2008-08.

The staff has observed several drills conducted under the NEI guidance. The staff recognizes that implementation of NEI 06-04 would improve licensee emergency response capabilities. With each drill, lessons are learned and the site EP program is improved. Additionally, NEI invites observers from other sites and shares lessons learned with all sites. The NEI 06-04 effort is likely improving EP programs nationwide.

However, the staff believes that it is possible to improve NEI 06-04 and its implementation. The industry is planning to conduct a series of drills using NEI 06-04 which should give the staff ample opportunity to express its concerns. This may lead to improvements that will ensure the development and maintenance of key skills necessary for adequate response to hostile action events.

The staff recognizes that there is a lack of certainty in effecting the necessary enhancements to licensee drill and exercise programs on a voluntary basis. A program based solely on voluntary guidance will not ensure that every nuclear power plant ERO is capable of providing adequate emergency response to hostile action. Even if the effort to implement NEI 06-04 succeeds, a change in the regulations is necessary to ensure that an adequate training, drill, and exercise program is implemented consistently at all nuclear plants and remains in effect. Therefore, although the staff recognizes the NEI voluntary effort as a positive addition, it is not sufficient by itself to ensure an adequate emergency response to hostile events.

The issue of implementation of a wide spectrum of scenario events in biennial exercises encompasses the use of hostile action but introduces issues with respect to FEMA exercise evaluation authority. The staff considers it likely that industry would willingly implement a voluntary program to address this issue, but without regulatory force, FEMA may not accept it.

If industry implemented scenarios without the standard radiological releases, FEMA would likely issue findings (called deficiencies) to OROs based on the lack of demonstration of all current FEMA-required objectives. In view of this issue, the staff has not pursued a voluntary program with industry. Revision of the EP regulations should be conducted with stakeholder input, including FEMA's. This process may facilitate FEMA acceptance of a wide spectrum of scenarios as envisioned by the Statements of Consideration that accompanied the 1980 EP regulations and as demonstrated by the following discussion:

The Commission recognizes that no single accident scenario should form the basis for choice of notification capability requirements for offsite authorities and for the public. Emergency plans must be developed that will have the flexibility to ensure response to a wide spectrum of accidents....

Emergency plans have been developed to address a wide spectrum of accidents, but the conduct of biennial exercises has led to predictable sequence of events that may result in negative training for EROs. The exercise program should be enhanced to use scenarios that reflect a wide spectrum of accidents. Without the cooperation of FEMA, a voluntary program would not be viable. The staff's understanding is that FEMA personnel believe that any change to offsite exercise evaluation criteria must occur through a revision of the FEMA oversight documents and that regulatory action is required to effect fundamental changes in the drill and exercise program. This being the case, the staff does not believe a voluntary program can be used to address this issue.

3.3.3. Implement proposed regulation

The staff proposes to revise regulations for EP drill and exercise programs to expressly require that licensees use a wide spectrum of scenarios, including those with hostile action. The staff believes that this would be the best means to ensure that licensees and OROs develop and maintain key skills for ERO response to emergencies. The proposed regulation would also provide a basis for inspection and enforcement to ensure that licensees maintain EP program elements after initial implementation.

4. Staffing Issues

Two of the issues considered in this rulemaking, shift staffing and augmentation, and on-shift multiple responsibilities, involve staffing at nuclear power plants. Shift staffing and augmentation is a historical issue that has developed over years of experience gained since the EP regulations were issued in 1980. On-shift multiple responsibilities is rooted in the same history as the shift staffing issue, however it was one of the elements highlighted by the ICMs issued on February 25, 2002. This section of the technical basis will discuss the issues related to EP staffing at commercial nuclear power plants.

4.1. Regulatory Problem Background and Definition

In the aftermath of the Three Mile Island (TMI) accident in March 1979, the NRC revised its regulations to address areas seen as necessary to prevent a recurrence of such an accident. The revisions significantly increased the level of EP required for nuclear power plants. The regulations were developed rapidly and under pressure from congressional and other stakeholders. The NRC issued the EP regulations in final form in August 1980.

The 1980 revision of EP regulations included 10 CFR 50.47(a)(1), which required an NRC finding of reasonable assurance that adequate protective measures can and will be taken in a radiological emergency before issuance of an operating license. However, NRC regulations do not provide a clear definition of “adequate.” The supporting NRC guidance used for the approval of emergency plans defines the measure of adequacy. Nevertheless, the guidance is not succinct, resulting in inconsistencies in shift EROs across plants of similar design.

Additionally, the 1980 regulatory amendments included 10 CFR 50.54(u), which required then-current licensees to submit revised emergency plans that met the new requirements. All licensees and many applicants submitted emergency plans to the NRC for review and approval. The NRC conducted site inspections to catalogue the completeness of implementation. Some licensees did not satisfy all outstanding issues documented in these initial implementation inspections until the late 1980s. Closure of issues was achieved through the regional inspectorate organization. Perhaps because of the volume of issues requiring closure oversight or because of the dispersion of authority for closure, inconsistencies across emergency plans developed. A few emergency plans did not include staffing levels prescribed by NRC guidance and were approved. In cases where staffing level variances from NRC guidance were significant, NRC staff informed the licensees involved that backfitting under 10 CFR 50.109 was being considered. These licensees appropriately revised their staffing levels to conform to the guidance. In other cases, the NRC did not consider that variances were great enough to support forced compliance through backfitting.

Guidance in NUREG-0654 concerning the onsite emergency organization is written in general terms to allow licensees some flexibility in the number of on-shift staff required by emergency plans for response to emergency events. This has sometimes resulted in the inadequate completion of NUREG-0654 Table B-1 emergency functions required during an emergency event. Staff wrote Information Notice (IN) 91-77, “Shift Staffing at Nuclear Power Plants,” dated November 26, 1991, to alert licensees to problems that could arise from insufficient staff for emergency response. The IN highlighted the following two events:

- A fire at one plant in April 1991 resulted in the licensee’s failure to notify some key emergency response personnel (communication function). The need to staff

the fire brigade and still perform numerous response actions required by the event resulted in a heavy workload for the shift staff; and

- A fire, loss of offsite power, and reactor trip at another plant in June 1991 resulted in difficulties in classifying the event, notifying required personnel, implementing emergency operating procedures, and staffing the fire brigade. Insufficient staff contributed to the licensee's failure to make a timely Notification of Unusual Event.

The NRC initiated an analysis of emergency response staffing guidance to assess the adequacy of the staffing guidance in NUREG-0654, and Pacific Northwest Laboratory completed NUREG/CR-3903, "Analysis of Emergency Staffing for Nuclear Power Plants," in June 1984. The study was a systematic functional analysis of potential demands on the staffing level goals recommended by NRC guidance. It identified a potential lack of adequate radiological support but otherwise concurred with NUREG-0654 guidance.

Another notification, IN 93-81, "Implementation of Engineering Expertise On-Shift," dated October 12, 1993, was written to alert licensees of ineffective implementation of the requirement to provide engineering expertise on shift (plant system engineering function). Each nuclear power plant is required to have a shift technical advisor (STA) on shift to provide engineering and accident assessment expertise (see also Table B-1 in NUREG-0654). However, some licensees had assigned additional response duties to STAs, such as communicator or fire brigade member, which could result in overburdening the control room staff during an emergency event. One licensee had assigned the STA as fire brigade leader rather than keeping this position free of encumbering multiple duties and enabling the STA to perform the primary duty of providing accident assessment and engineering expertise.

The NRC attempted another study in 1995 to assess the adequacy of EP shift staffing, but the study was not completed. However, the NRC issued IN 95-48, "Results of Shift Staffing Study," dated October 10, 1995, to provide licensees with observations from the study. This IN cited several observations of inadequate staffing and also concluded that there could be a large workload for radiological support personnel during emergencies. Data was collected on the adequacy of nuclear power plant staffing practices for performing response activities during two accident scenarios: (1) fire leading to reactor trip with complications; and (2) either control room fire leading to evacuation and remote shutdown or station blackout. Other study observations of interest included the following:

- Licensees surveyed did not use a systematic process for establishing site-specific shift staffing levels;
- Licensees surveyed frequently assigned additional plant-specific tasks that were not specified by regulation to be performed by licensed and non-licensed operators during an event;
- Five of the seven licensees surveyed used licensed personnel to staff the fire brigade;

- Procedures varied significantly concerning licensed and nonlicensed personnel staffing levels, and the number of nonlicensed operators used on the night-shift varied greatly; and
- Radiation protection and chemistry technicians of all the licensees surveyed had a high workload during the scenarios.

These findings demonstrate the need for a revised regulatory framework to explicitly limit on-shift ERO multiple responsibilities to ensure that these emergency responders do not become overburdened during an emergency event.

The ICM Order addressed the on-shift multiple responsibility issue in ICM B.5.d, which required licensees to ensure that (1) multiple responsibilities that would prevent effective implementation of the integrated plans are not assigned; and (2) a sufficient number of personnel are available for emergency plan implementation.

Multiple NRC inspection findings following the terrorist attacks of September 11 indicate the need for regulatory clarity in the assignment of on-shift ERO multiple responsibilities, as follows:

- In February 2003, one licensee revised its emergency plan to reduce the number of dedicated on-shift responders and assigned the function of the deleted responder to a different dedicated responder. Specifically, the licensee reduced the required number of dedicated shift communicators from three to two and assigned the communicator function of the removed responder to the STA as a collateral duty. As previously stated, the primary emergency plan duty of the STA is to provide engineering and accident assessment expertise. This emergency plan change was determined to represent a decrease in the effectiveness of the emergency plan and a violation of 10 CFR 50.54(q) (non-cited violation) (NCV);
- In 2004, three licensees failed to assign on-shift staff responsibilities for reading facility seismic monitors necessary for the timely classification of emergency seismic events. This constituted a violation of 10 CFR 50.47(b)(2) for failure to maintain, at all times, adequate on-shift staffing to provide initial facility accident response in key functional areas. In these cases, the licensees were negligent in not assigning a key emergency task rather than overburdening an on-shift responder with an additional task as a collateral duty. However, this lack of foresight could potentially have the same result since, if a seismic event occurred, some on-shift responder would be called on to read the seismic monitors, potentially preventing the performance of other key emergency tasks and jeopardizing effective emergency plan implementation (green NCV); and
- In April 2005, inspectors discovered that a licensee had revised its emergency plan to allow the assignment of the on-shift health physics technician (HP Tech) as the operations support center coordinator (OSCC), a 30-minute augmented ERO responder. The HP Tech had specific emergency plan tasks assigned, namely in-plant surveys, in-plant protective actions, and rescue/first aid. To also assign the HP Tech as the interim OSCC would potentially overburden this person and defeat the purpose of staff augmentation which is to relieve the on-shift personnel of their emergency duties so that they can return to their normal

shift duties. This emergency plan change was assessed as a decrease in the effectiveness of the emergency plan and a violation of 10 CFR 50.54(q) (NCV).

While the NRC staff believes that resources are adequate at nuclear power plants, the staff is challenged to rationalize differences in staffing levels between similar plants and provide guidance for acceptable changes to staffing levels. The current system does not encourage innovative solutions to workload problems because of the deterministic criteria for staffing. The lack of clarity in requirements and guidance can result in shift staffing organizations that are inconsistent across the industry. For example, one site emergency plan was approved with no radiological support on weekends and holidays, and several others were approved without 30-minute responders. Further, the ambiguity detracts from efficiency in the development of emergency plan change requests and the review and approval of such requests by the staff when required by regulations. The staff has concluded that a revised regulatory framework is necessary to provide clear direction for shift staffing that allows licensees flexibility and limits on-shift ERO duties to ensure that these responders do not become overburdened during an emergency.

4.2. Existing Regulatory Framework

The specific requirement for establishing a shift emergency organization to respond to emergency events is found in 10 CFR 50.47(b)(2) as follows:

On-shift facility licensee responsibilities for emergency response are unambiguously defined, adequate staffing to provide initial facility accident response in key functional areas is maintained at all times....

Supporting requirements concerning the licensee organization for coping with radiation emergencies appear in 10 CFR Part 50, Appendix E, Section IV, "Content of Emergency Plans," Subsection A, "Organization," which states the following:

The organization for coping with radiological emergencies shall be described, including definition of authorities, responsibilities, and duties of individuals assigned to the licensee's emergency organization and the means for notification of such individuals in the event of an emergency. Specifically, the following shall be included:

1. A description of the normal plant operating organization.
2. A description of the onsite emergency response organization with a detailed discussion of:
 - a. Authorities, responsibilities and duties of the individual(s) who will take charge during an emergency;
 - b. Plant staff emergency assignments;
 - c. Authorities, responsibilities and duties of an onsite emergency coordinator who shall be in charge of the exchange of information with offsite authorities responsible for coordinating and implementing offsite emergency measures....

Guidance for meeting the PS requirements contained in 10 CFR 50.47(b) appears in NUREG-0654. NUREG-0654, Section II, "Planning Standards and Evaluation Criteria," Subsection B, "Onsite Emergency Organization," provides guidance for meeting the requirements of 10 CFR 50.47(b)(2) for the onsite emergency organization, including the "minimum staffing requirements" found in Table B-1. Section II.B, Evaluation Criterion 1, states the following:

Each licensee shall specify the onsite emergency organization of plant staff personnel for all shifts and its relation to the responsibilities and duties of the normal staff complement.

Evaluation Criterion 5 states the following:

Each licensee shall specify the positions or title and major tasks to be performed by the persons to be assigned to the functional areas of emergency activity. For emergency situations, specific assignments shall be made for all shifts and for plant staff members, both onsite and away from the site. These assignments shall cover the emergency functions in Table B-1 entitled, "Minimum Staffing Requirements for Nuclear Power Plant Emergencies." The minimum on-shift staffing levels shall be as indicated in Table B-1....

Table B-1 specifies 10 on-shift responders in the following functional areas:

- Plant operations and assessment of operational aspects (6);
- Notification/Communication (1);
- Radiological accident assessment and support of operational accident assessment (2); and
- Plant system engineering, repair, and corrective actions (1).

Additionally, Table B-1 specifies seven on-shift responders who perform response duties which, "may be provided by shift personnel assigned other functions" (referred to as double asterisk responders). In other words, there are no dedicated responders to perform these functions so they must be accomplished by assigning multiple duties to one of the aforementioned 10 on-shift responders. These positions/duties are in the following functional areas:

- Emergency direction and control (Emergency Coordinator) (1);
- Plant system engineering, repair, and corrective actions (2);
- Protective actions (in-plant) (2); and
- Rescue operations and first aid (2).

Finally, Table B-1 specifies two functional areas that must be staffed by on-shift personnel, but for which the number of responders is determined on a site-specific basis, as follows:

- Firefighting; and
- Site access control and personnel accountability.

In addition, NUREG-0654, Subsection B, "Onsite Emergency Organization," states that the on-shift responsibilities for emergency response should be unambiguously defined in the emergency plan. Specifically, Evaluation Criterion 1 states that each licensee shall specify the onsite emergency organization of the plant staff for all shifts and its relation to the responsibilities and duties of the normal staff complement. Therefore, each licensee should have a plan that specifies each emergency function and the emergency position assigned to perform it. The emergency plan must take into account such contingencies as staffing the fire brigade, adequate staff on the back-shift when staffing levels are lowest, and potential overload of radiation protection and chemistry technicians during events involving radiological hazards.

Subsection B, Evaluation Criterion 2, states that each licensee shall designate an individual as emergency coordinator who shall have the authority and responsibility to immediately and unilaterally initiate any emergency actions that he or she deems necessary. Therefore, the emergency coordinator will assess response priorities in an emergency and apply on-shift resources as necessary for effective response. However, no guidance currently prohibits the assignment of one or more of the double asterisk responder tasks to the 10 dedicated on-shift positions identified in Table B-1. (Note that the guidance in Table B-1 addresses the minimum on-shift staffing levels to perform the tasks identified in each functional area, and licensees may use their discretion to assign additional staff if necessary.)

4.3. Options Considered to Resolve the Problem

4.3.1. Take no action

As discussed above, although the current regulatory regimen is adequate for the shift staffing organization, it has resulted in inconsistencies in shift staffing organizations across similar plants and inefficiencies when emergency plan staffing organization changes are requested. It is possible to take no action without directly affecting public health and safety, but the current deterministic requirements suppress innovative solutions to emergency plan implementation.

The background information points out that some licensees may need to improve processes to ensure a sufficient shift complement to accomplish all Table B-1 functions required during an emergency event. Some licensees may have inappropriately overburdened the on-shift staff by assigning emergency responders to the fire brigade as an additional duty or some may have assigned duties in such a way that the number of response actions have resulted in a heavy workload. The shift staffing study referenced in IN 95-48 found that licensees surveyed did not use a systematic process for establishing site-specific shift staffing levels and were assigning additional plant-specific emergency tasks, not required by regulation, to the licensed and non-licensed operators.

This option would maintain the status quo, contrary to direction from the Commission in the staff requirements memorandum of January 8, 2007, associated with SECY-06-0200, and the staff's belief that the regulations should be expanded to allow licensees to voluntarily select an alternative performance-based regimen for approval of shift staff organizational changes. In

addition, taking no action would not ensure that on-shift emergency responders do not become overburdened during an emergency. Task allocation, and specifically the inappropriate assignment of multiple duties to on-shift responders, has been a significant issue for years and is not clearly addressed by NRC regulations or guidance. Some clarification is needed in the intended implementation of on-shift staffing so that the assignment of multiple response duties will not result in unnecessary gaps in response coverage.

Therefore, the staff considers this option to be unacceptable.

4.3.2. Use voluntary programs

The NRC could allow industry to develop its own proposed standard for shift staffing. The staff believes that allowing industry to voluntarily develop a shift staffing standard is not appropriate. Licensees are required by 10 CFR 50.54(q) to maintain in effect plans that meet the PSs. The NRC has implemented this requirement by approving only those plans and plan changes that generally meet the guidance of NUREG-0654 or that provide adequate alternatives that have been approved on a case-by-case basis. Licensees are not permitted to change staffing levels in a manner that deviates from the guidance unless the NRC staff specifically approves. To do otherwise would result in noncompliance with 10 CFR 50.54(q) in that effectiveness would be decreased. The staff believes that it would not be appropriate for an industry-led voluntary effort to replace an established regulatory regimen without regulatory change that proceeds through an established and public process.

Many licensees have sought NRC approval to reduce staffing levels in recent years and the NRC expects this practice to continue. This could increase the risk of over-burdening on-shift responders and result in inadequate or untimely response. An industry-developed standard may reflect this trend in a manner that would not induce licensees to ensure adequate staffing for site-specific needs.

For these reasons, the staff believes that, while a voluntary effort is possible, it would not achieve the level of emergency response capability necessary to adequately protect public health and safety, and is therefore not acceptable.

4.3.3. Implement proposed regulation

The staff proposes to revise regulations for ERO shift staffing and promulgate supporting guidance identifying performance-based criteria necessary for initial emergency response. This proposed regulatory change would provide a method for licensees to use in revising the staffing commitments in emergency plans. These actions would clarify the NRC's expectations regarding shift staffing, provide for demonstrated shift coverage of critical EP functions, and allow licensees increased flexibility in shift staffing options.

The NRC staff has gained insights into emergency response since the implementation of the original regulations and guidance. It is now possible to develop a performance-based regulation that would prevent future inconsistencies in staffing by requiring demonstration of clear performance criteria initially and periodically thereafter. This system would allow for licensee innovation and simplify staff review of emergency plan organization change requests by basing all determinations on performance standards rather than case-by-case analysis of personnel expertise.

An enhanced regulation to limit burdensome multiple responsibilities would streamline the assignment of emergency tasks to on-shift responders and allow more effective emergency plan implementation. It would also allow for licensee innovation to develop processes that ensure the timely performance of all necessary tasks during an emergency. Together, these would contribute to the ultimate goal, the protection of public health and safety.

The proposed regulation would address these issues by requiring demonstrated performance rather than specific staffing levels. While staffing levels may vary between plants because of differences in design or processes, the performance necessary to protect public health and safety would not vary. All sites would be measured against the same criteria.

Additionally, the NRC would develop and promulgate guidance, either in a supplement to NUREG-0654 or through Regulatory Guide 1.101 that would describe the EP and safety functions that a nuclear power plant shift staffing organization must accomplish. The staff would seek stakeholders' input to this guidance.

Enhancing the NRC's EP regulations to require licensees to ensure that multiple responsibilities assigned to on-shift staff do not detract from timely emergency plan implementation would establish a regulatory framework that more clearly codifies the NRC's shift staffing expectations for effective emergency response. As a result, responders would have the time necessary to complete their primary emergency plan functions, promoting public health and safety, as was the intent in the ICMs of February 2002. This change would also address the staffing issues noted in recent generic communications and move the industry toward a more systematic process for establishing site-specific shift staffing levels.

For these reasons, the NRC staff believes that implementation of the proposed regulations would be the best course of action.

5. Facility and Equipment Issues

This chapter consists of two issues from the rulemaking plan, backup means for alert and notification systems and emergency operations facility – performance based approach.

5.1 Backup Means for Alert and Notification Systems

5.1.1. Regulatory Problem Background and Definition

An alert and notification system (ANS) provides the capability to promptly alert and notify the populace within the plume exposure pathway (i.e., 10-mile) EPZ of a nuclear power plant emergency event 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 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. The public typically receives information about an event and offsite protective actions via emergency alert system (EAS) broadcasts or other means, such as mobile loudspeakers.

An ANS has two distinct functions. The alert function provides a warning signal to the population indicating the need to seek additional information regarding an event in progress. By itself, this function provides no information about the type of event or any protective actions that need to be taken. The notification function informs the public about the nature of the event and any protective actions. These functions may be performed by separate means, such as sirens for alerting and EAS broadcasts for notification, or by one method, such as tone alert radios that can provide both a warning signal and an instructional message. Although most ANS problems have involved degradation of the alerting capability, both functions are important for protecting public health and safety. Therefore, a proposed rulemaking would address backup capabilities for both ANS functions.

Nuclear power plant licensees are responsible for ensuring that the ANS is designed to meet applicable standards and, in most cases, are also responsible for the maintenance and testing of these systems. Licensees submit ANS designs to the NRC in compliance with NRC regulations. The NRC in turn relies upon FEMA to review and approve the ANS design. These topics are discussed in more detail later.

In several instances, nuclear power plants have lost all or a major portion of the alert function of an ANS for various reasons, such as damage to ANS components caused by severe weather, loss of offsite alternating current (AC) power, malfunction of ANS activation equipment, or unexpected problems resulting from ANS hardware/software modifications. In other situations, the notification capability has been lost (e.g., the inability to activate tone alert radios which are used to provide both an alert signal and notification function). If a major portion of a facility's ANS is unavailable and no backup exists, then the public may not be promptly alerted of an event at the facility and the protective actions to be taken, which could adversely impact public health and safety. Detailed examples concerning the need for backup ANS capabilities are as follows:

- The ANS is a component of one of four risk-significant planning standards (RSPSs) as defined in the significance determination process (SDP) of the NRC's Regulatory Oversight Program. Other RSPSs include classifying an

emergency event, notifying emergency responders and offsite officials of a declared emergency, and performing dose assessment along with developing protective actions. The NRC considers the emergency response capabilities addressed in the RSPSs to be critical for protecting public health and safety. Offsite officials may be unable to implement protective actions if they cannot alert members of the public. Given the importance of the alerting and notification capabilities, it is appropriate that a backup ANS method be required;

- Several events have occurred in which the alerting portion of the primary ANS was inoperable and would have been unable to provide prompt notification and information during an emergency. These outages were caused by a variety of factors. Multiple NRC 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; IN 2005-06, "Failure to Maintain Alert and Notification System Tone Alert Radio Capability," dated March 30, 2005; and IN 2006-28, "Siren System Failures Due to Erroneous Siren System Signal," dated December 22, 2006. IN 1996-19, "Failure of Tone Alert Radios to Activate When Receiving a Shortened Activation Signal," addressed the inability to activate some tone alert radios because of a shorter tone activation signal permitted as part of EAS implementation. Without the ability to warn the population, the effectiveness of the notification element may be significantly reduced. Having a backup means in place would lessen the impact of the loss of the primary ANS;
- Other events have involved the widespread loss of the electrical grid providing power to siren-based systems, such as the electrical blackout in several areas of the northeastern United States and portions of Canada in August 2003. 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. 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. A regulatory requirement for a backup method would ensure that each primary ANS has appropriate backup measures in place; and
- The U.S. Congress has recognized the importance of ensuring that warning systems are less subject to failure and of encouraging the use of newer alerting and notification technology. The Energy Policy Act of 2005 directed the Commission to require backup power for the emergency notification system, including siren systems, for nuclear power plants located in high-population density areas. In House Report (HR) 107-740, FEMA was directed to update its guidance on outdoor warning and mass notification systems, with a request that the new guidance require all warning systems to be operable in the absence of an AC power supply. 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. It is therefore appropriate that the NRC also consider changes to its existing regulations and guidance regarding warning systems.

Existing NRC regulations and guidance do not address requirements for backup power for sirens or other backup ANS alerting capabilities when a major portion of the primary means is unavailable. The regulations also do not require backup notification capabilities. The NRC staff believes that identification of requirements for backup ANS methods in the regulations is needed and is proposing rulemaking to address backup capabilities for both the alert and notification functions.

5.1.2. Existing Regulatory Framework

The specific requirement for establishing the capability to promptly alert and notify the public if there is an emergency event appears in 10 CFR 50.47(b)(5) as follows:

Procedures have been established for notification, by the licensee, of State and local response organizations and for notification of emergency personnel by all organizations; the content of initial and follow-up messages to response organizations and the public has been established; and **means to provide early notification and clear instruction to the populace within the plume exposure pathway Emergency Planning Zone have been established.** [Emphasis added.]

Overall ANS design objectives are in 10 CFR Part 50, Appendix E, Section IV.D.3, which states the following:

The design objective of the prompt public notification system shall be to have the capability to essentially complete the initial notification of the public within the plume exposure pathway EPZ within about 15 minutes. The use of this notification capability will range from immediate notification of the public (within 15 minutes of the time that State and local officials are notified that a situation exists requiring urgent action) to the more likely events where there is substantial time available for the State and local governmental officials to make a judgment whether or not to activate the public notification system.

In the Statements of Consideration (SOC) for the 1980 final rule pertaining to the design objective found in 10 CFR Part 50, Appendix E, Section IV.D.3, the Commission noted the following:

Specification of particular times as design objectives for notification of offsite authorities and the public are (sic) a means of ensuring that a system will be in place with the capability to notify the public to seek further information by listening to predesignated radio or television stations.

Emergency Planning; Final Rule, 45 *Federal Register* (FR) 55402, 55407 (August 19, 1980).

Thus, the specification provided in 10 CFR Part 50, Appendix E, Section IV.D.3, is a design objective for that part of the ANS that alerts the public to seek further information. In the 1980 final rule SOC, the Commission identified the importance of an ANS:

The Commission recognizes that not every individual would necessarily be reached by the actual operation of such a system under all conditions of system use. However, the Commission believes that provision of a general alerting system will significantly improve the capability for taking protective actions in the event of an emergency. The reduction of notification times from the several hours required for street-by-street notification to minutes will significantly increase the options available as protective actions under severe accident conditions.

An Atomic Safety and Licensing Appeal Board (ASLAB) decision involving Seabrook Station clarified the design objective to “essentially complete the initial notification of the public within the plume exposure pathway EPZ within about 15 minutes”:

“[I]nitial notification” as incorporated in the “about 15 minute” requirement in Appendix E was intended only to encompass completion of the signal that notifies the public that a radiological emergency exists so that they should take appropriate action to seek additional information.

Public Service of New Hampshire (Seabrook Station, Units 1 and 2), ALAB-935, 32 NRC 57, 68 (1990).

Additional decisions have determined that Appendix E to 10 CFR Part 50 is the standard with which warning systems must comply. However, neither Appendix E to 10 CFR Part 50 nor the applicable PS as found in 10 CFR 50.47(b)(5) currently require a backup to the primary public notification system.

NUREG-0654, Section II.E.6, provides additional guidance on meeting the ANS design criteria in 10 CFR Part 50, Appendix E, Section IV.D.3. The guidance states the following:

Each organization shall establish administrative and physical means, and the time required for notifying and providing prompt instructions to the public within the plume exposure pathway Emergency Planning Zone. (See Appendix 3.) It shall be the licensee's responsibility to demonstrate that such means exist, regardless of who implements this requirement. It shall be the responsibility of the State and local governments to activate such a system.

Appendix 3, “Means for Providing Prompt Alerting and Notification of Response Organizations and the Population,” to NUREG-0654 expands on the evaluation criterion in Section II.E.6 with the following statements:

The initial notification, when appropriate, of the affected population within the plume exposure pathway Emergency Planning Zone (EPZ) must be completed in a manner consistent with assuring the public health and safety. The design objective for the system shall be to meet the acceptance criteria of section B of this Appendix. This design objective does not, however, constitute a guarantee that early notification can be provided for everyone with 100% assurance or that the system when tested under actual field conditions will meet the design objective in all cases.

NUREG-0654, Appendix 3, Section B, "Criteria for Acceptance," provides additional information for meeting ANS design criteria and addresses the topic of supplemental alerting arrangements for the population who may not have received the initial notification. Supplemental alerting can be used in extremely rural, low-population areas beyond 5 miles, where up to 45 minutes may be allowed for providing an alert signal and an instructional message to the permanent and transient population. Supplemental alerting is not a backup means employed only if the primary notification system fails but is part of the primary ANS used to cover EPZ areas between 5 and 10 miles that are not covered by the primary notification system. The use of supplemental alerting is part of the overall ANS design and must be approved by FEMA on a case-by-case basis. The following criteria appear in Section B of Appendix 3:

1. Within the plume exposure EPZ the system shall provide an alerting signal and notification by commercial broadcast (e.g., emergency broadcast system, or EBS) plus special systems such as the National Oceanic and Atmospheric Administration (NOAA) radio. A system which expects the recipient to turn on a radio receiver without being alerted by an acoustic alerting signal or some other manner is not acceptable.
2. The minimum acceptable design objectives for coverage by the system are:
 - a) Capability for providing both an alert signal and an informational or instructional message to the population on an area wide basis throughout the 10 mile EPZ, within 15 minutes.
 - b) The initial notification system will assure direct coverage of essentially 100% of the population within 5 miles of the site.
 - c) Special arrangements will be made to assure 100% coverage within 45 minutes of the population who may not have received the initial notification within the entire plume exposure EPZ.

The basis for any special requirements exceptions (e.g., for extended water areas with transient boats or remote hiking trails) must be documented. Assurance of continued notification capability may be verified on a statistical basis. Every year, or in conjunction with an exercise of the facility, FEMA, in cooperation with the utility operator, and/or the State and local governments will take a statistical sample of the residents of all areas within about ten miles to assess the public's ability to hear the alerting signal and their awareness of the meaning of the prompt notification message as well as the availability of information on what to do in an emergency. The system plan must include a provision for corrective measures to provide reasonable assurance that coverage approaching the design objectives is maintained. The system shall be operable no later than July 1, 1981. The lack of a specific design objective for a specified percent of the population between 5 and 10 miles which must receive the prompt signal within 15 minutes is to allow flexibility in system design. Designers should do scoping studies at

different percent coverages to allow determination of whether an effective increase in capability per unit of cost can be achieved while still meeting the objective of item 2.a above.

The above guidance from NUREG-0654 has also been the subject of litigation which is discussed in Appendix B.

There are no requirements for backup alerting and notification capabilities or standards for how quickly backup alerting (if called for in an ANS design or emergency plan) must be completed. Backup alerting is considered a discretionary measure to be employed only when the primary alerting system is unavailable, in which case the 15-minute and 45-minute time limits do not apply. Route alerting is commonly designated as a backup measure in the event some or all warning sirens are inoperable. The issue of backup ANS capabilities has been litigated in several licensing proceedings. Some of the relevant cases and rulings are discussed in Appendix B.

The Energy Policy Act of 2005 directed the Commission to require backup power for an 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 currently meet the population density criteria of the Energy Policy Act of 2005.

Several NRC inspection findings, violations and enforcement actions since 2000 have involved a variety of ANS-related issues, including failure to meet ANS design criteria, failure to submit ANS design and testing changes to FEMA for approval before implementation and improper maintenance or testing of ANS components. In some instances, the ability to notify the public within the 10-mile EPZ in a timely manner was compromised, resulting in findings of low to moderate significance (i.e., white) based on the SDP and/or violations of 10 CFR 50.47(b)(5). Enforcement actions were taken in situations involving improper siren maintenance and tampering such that the siren feedback system was rendered ineffective, in conjunction with the deliberate falsification of siren maintenance records. None of these issues were directly related to ANS backup requirements.

5.1.3. Options Considered to Resolve the Problem

5.1.3.1 Take no action (i.e., new ANS backup capabilities would be specified only in FEMA guidance documents and not in NRC regulations)

Current FEMA regulations do not address ANS design objectives. FEMA guidance documents contain detailed information on ANS capabilities and design review methodology. However, FEMA has previously acknowledged that the NRC establishes regulatory standards. In a memorandum from the FEMA Office of General Counsel dated January 12, 1989, it was noted that the agency has its own statutory authority under 44 CFR Part 350, to determine the adequacy of offsite emergency plans and could issue standards for the FEMA REP program different from those of the NRC. However, the FEMA Assistant General Counsel concluded that given the NRC’s ultimate authority over offsite emergency planning in making licensing decisions, it would be illogical for FEMA to adhere to REP program policies contrary to those adopted by the Commission.

The option of revising only FEMA guidance documents to address ANS backup capabilities would maintain the status quo with respect to ambiguous regulatory requirements since FEMA guidance documents are not considered regulations. As discussed in Appendix B of this document, ASLAB decisions have determined that Appendix E to 10 CFR Part 50 is the standard with which warning systems for nuclear power plants must comply. This option would not revise any regulatory requirement for warning systems.

In HR 107-740 (incorporated by reference into Public Law 108-7 regarding fiscal year 2003 appropriations), the House Committee on Appropriations directed FEMA to update its guidance on outdoor warning and mass notification systems that are used for weather-related and other types of emergencies, including nuclear power plant events, with a request that the new guidance require all warning systems to 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 for the following reasons:

Due to electric power grid interconnections, the loss of normal power to a significant number of sirens would most likely occur coincident with a power outage covering the entire EPZ. Such large power losses are infrequent and are usually caused by adverse weather conditions. Since nuclear power plant general emergencies are extremely unlikely, the likelihood that these two events will occur simultaneously is extraordinarily small. A power outage may prompt many people to turn on their battery-powered radios in an attempt to determine its cause. In light of these considerations, FEMA does not believe it necessary to specifically require backup power for siren systems.

Guide for the Evaluation of Alert and Notification Systems for Nuclear Power Plants, 50 FR 43084, 43085 (Oct. 23, 1985).

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. It is unclear how revised FEMA guidance stating that outdoor warning systems should have backup power would apply to previously approved ANS designs. It is possible that existing systems would be grandfathered from meeting new FEMA criteria for warning systems and therefore installing backup power would be considered optional for these systems. Guidance changes limited to backup power requirements for the alerting function would not address backup capabilities for the ANS notification function.

In summary, this option would not fully address the proposed changes for nuclear power plant ANS design requirements to include a backup method to the primary means for both alerting and notification, and thus the NRC staff considers this option to be unacceptable.

5.1.3.2. Use voluntary program

Some current nuclear power plant ANS designs address one or more aspects of backup ANS capabilities, such as providing backup power in the event primary power to sirens is lost, using backup route alerting when sirens are inoperable or designating multiple EAS broadcast stations to ensure that instructional messages can be transmitted. Based on an informal survey of U.S. nuclear power plant sites conducted in 2005, 28 percent of licensees currently have backup power capabilities for their primary means of prompt alerting, and approximately half of

the remaining licensees plan to add backup power. In this one aspect of voluntarily addressing backup ANS capabilities (i.e., backup power for sirens), most licensees have not acted.

A voluntary approach may be appropriate because State and local authorities can usually compensate for the temporary loss of some ANS capabilities. In a 1993 review of ANS requirements, regulatory oversight and ANS outages resulting from factors such as lightning strikes, ice buildup, severe storm-induced power loss, and hardware failures (as provided in a staff paper responding to the NRC Chairman's question concerning siren system mounting, from F. Congel to F. Miraglia and J. Sniezek, dated June 4, 1993), the NRC staff noted the following:

Nor does it appear that the temporary loss of sirens would subject the public to undue risk during the period of general recovery from a severe storm since backup measures, such as mobile alerting, can usually be employed by State and local authorities to compensate for the temporary loss of a siren system. [emphasis added]...prompt alert and notification siren systems installed by licensees generally appear to have weathered the elements and met NRC/FEMA operability standards without significant problems. In view of the regulatory monitoring and oversight facilitated by NRC's 50.72 reporting requirements and the routine performance (operability) monitoring performed by FEMA, we conclude that current NRC requirements and regulatory oversight for alert and notification siren systems are adequate.

Although the NRC staff's view that the temporary loss of sirens would not pose an undue risk to the public appears to support a voluntary approach, this opinion presumes the availability of backup measures to compensate for the temporary loss of sirens, which may not always be the case. It is also limited to one aspect of backup ANS capabilities (i.e., loss of sirens) and does not address backup means for the notification function.

Allowing licensees to voluntarily install a backup ANS means will not ensure that both the alerting and notification functions are addressed, or that new sites will design warning systems with comprehensive backup ANS capabilities. Given the importance of ANS to ensure adequate protection of public health and safety and without any voluntary industry commitment that existing or new warning systems will have a backup means available, the staff considers a voluntary approach to be inappropriate and finds this option unacceptable.

5.1.3.3. Implement proposed regulations

The NRC staff considered three variations of this option as described in the following sections.

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 warning system used at nuclear power plants is based on sirens that are powered directly, or indirectly through batteries, by an AC power source. Past licensing proceedings (e.g., *Long Island Lighting Company* (Shoreham Nuclear Power Station, Unit 1), LBP-85-12, 21 NRC 644 (1985)) have interpreted the specific issue of siren backup power in various ways, such as treating an accident and loss of offsite power as independent events. As discussed in Regulatory Guide 1.155, 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. There have been recent 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 United States and portions of Canada in August 2003. Thus, it would be prudent to treat the loss of offsite power and core damage accidents as potentially concurrent events.

However, the loss of power is not the only failure mode that can impact warning systems. In several events, the primary ANS was inoperable for other reasons and would have been unable to provide prompt notification or instructional messages during an emergency. Multiple NRC INs document these circumstances, including IN 2002-25, IN 2005-06, and IN 2006-28. Causes of ANS inoperability include inability to detect siren failures, inability to activate sirens, failure to test and maintain personal home alerting devices, use of telephone call-inhibiting devices, and failure to provide and maintain distribution lists of tone alert radios. Thus, a regulatory requirement addressing only backup ANS power would not eliminate any of these other failure modes.

Adding the need for backup power to the guidance in NUREG-0654 or other guidance documents would not create a requirement, and thus licensees could omit backup ANS measures if they chose not to follow that part of the guidance. Guidance addressing only backup ANS power also would not deal with ANS failures resulting from problems other than loss of power and therefore would not be a comprehensive solution.

This option would prescribe one specific method as a backup means, precluding licensees and offsite officials from considering alternative methods, such as route alerting or newer communications technology, that may be more suitable for certain nuclear power plant sites. It addresses only one of several ANS failure modes (i.e., loss of AC power) for one alerting method (i.e., sirens). It does not address backup methods for other types of alerting devices or any part of the notification process. Therefore, the NRC staff considers this option to be unacceptable.

Rejecting this option does not mean that the issue of backup power for warning systems will be left unaddressed. As discussed previously, the House Committee on Appropriations has directed FEMA to require all outdoor warning systems to be operable in the absence of AC power. FEMA is revising its guidance for the design of these systems to address this specific issue.

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 and notification means) 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 (PI) 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. The minimum acceptable ANS operability standard for FEMA is 90 percent. More information on the ANS performance indicator and operability standard is provided later.

Ensuring that all ANS common single failure vulnerabilities have been identified and adequately addressed would be difficult. Even after extensive analysis and testing of a warning system, a common failure mechanism may not become evident until the system is to be activated for an emergency event. For a siren-based system, several additional sirens (with backup power capabilities) may need to be installed to provide overlapping acoustic coverage in the event clusters of sirens fail and thus may discourage licensees at future nuclear power plant sites from using these systems due to the increased cost for installing additional sirens. This approach may not be applicable to non-electronic primary warning systems based on other methods, such as route alerting. For these reasons, the staff considers this option to be unacceptable.

Revise NRC regulations to require backup measures that would be implemented when the primary means of alerting and notification are unavailable

This option would add a requirement that backup measures be identified and the means to implement backup measures be in place, without specifying which backup measures should be used. This would allow flexibility in the selection of the method best suited for each site and would also allow the use of newer technologies or other alternative methods. Licensees and offsite officials would need to ensure that the backup means can alert the public in the entire 10-mile EPZ, that the personnel and resources required to implement the backup means would be available during any type of emergency (including security-related events), and that the designated personnel know how to implement the backup means.

The NRC would also revise its guidance to clarify that backup warning measures do not need to be implemented within a 15-minute timeframe (to ensure direct coverage of essentially 100 percent of the population within 5 miles of the site) or a 45-minute timeframe (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 those for the primary and compensatory alerting methods described in Appendix 3 to NUREG-0654 (*Long Island Lighting Company* (Shoreham Nuclear Power Station, Unit 1), ASLB-88-2, 27 NRC 85 (1988)). The staff recognizes some backup methods may not be capable of meeting the timeframes that are part of the primary ANS design objectives. The intent is not to have a duplicate primary ANS but to have a means of backup notification in place so that the populace can be alerted in sufficient time to allow offsite officials to consider a range of protective actions for the public to take in the event of a severe accident with potential offsite radiological consequences. A graded approach in which the populations most at risk are alerted and notified first, followed by alerting and notification of people in less affected areas, is acceptable for the backup means.

There would be no regulatory requirement for siren backup power. Although siren backup power would address one of the more common failure modes for fixed siren-based systems, other failure modes might still exist. Thus, it is important that the backup means be independent of the primary system so that it is not subject to the same type of failure mechanism.

In summary, the staff believes that implementation of this option is the best course of action. Because, for most events, State and local officials will have adequate time to make a judgment regarding activation of the warning system to alert and notify the public using a backup method, the regulation would not impose specific time requirements. This option would address provisions for a backup means for both major elements of an ANS (i.e., the alerting and notification functions), while allowing licensees and offsite officials flexibility in selecting which backup methods to use.

5.2 Emergency Operations Facility – Performance Based Approach

5.2.1. Regulatory Problem Background and Definition

Each nuclear power plant site is required to have an EOF where the licensee provides overall management of its resources in response to an emergency and coordinates emergency response activities with Federal, State, and local agencies. The original EOF siting criteria called for the facility to be located near the reactor site and imposed a 20-mile upper limit (later modified by the Commission to 25 miles) for the distance between the site and the EOF. This upper limit was generally considered to be the maximum distance from the reactor site within which face-to-face communications between the licensee, offsite officials, and NRC staff could be facilitated, and which also permitted the timely briefing and debriefing of personnel going to and from the site. However, advances in computer and communication technology since the original EOF siting criteria were established now allow EOF functions to be effectively performed independent of distance from the site. Computer-based systems allow plant parameter, meteorological data, and radiological information for multiple sites to be collected, analyzed, trended, and displayed in a remotely located facility. Data and voice communications between the EOF and other onsite/offsite emergency response facilities can be addressed through a variety of independent systems, such as microwave, telephone, internet, intranet, and radio, which provides a high degree of availability and reliability.

Nuclear utility consolidation has resulted in initiatives to standardize fleet emergency plans, use consolidated emergency response facilities, and staff emergency response facilities by designated corporate personnel. Standardized plans, implementing procedures, and accident assessment tools, such as a common dose projection model, allow emergency responders in a consolidated facility to effectively perform their functions for multiple sites, even if the EOF is not located within 25 miles of each site. Consolidated facilities eliminate the need to duplicate work space, displays, communication networks, and other capabilities for each site. Consolidated facilities can also be located at or near corporate offices where nuclear support personnel designated to fill EOF positions can respond more quickly.

Neither current regulations nor guidance documents address the capabilities and functional requirements for a consolidated EOF, such as capabilities for handling simultaneous events at two or more sites, or having provisions for the NRC and offsite officials to relocate to a facility nearer to the site if they desire. Thus, licensees have been uncertain about when they need to submit requests for exceptions or exemptions, which alternative approaches to existing EOF distance and other facility criteria may be acceptable, and, for consolidated facilities, any additional capabilities they need to address. A regulatory mechanism is already in place that allows licensees to make changes to their emergency plans without prior Commission approval when certain conditions are met. This mechanism could be applied to consolidation of EOFs if clearer criteria were established. In the absence of clear criteria, several licensees, such as Commonwealth Edison (now part of Exelon), Southern Nuclear, Exelon, and AmerGen, have submitted requests to consolidate their EOFs in recent years. It was then necessary for the staff to evaluate and the Commission to review these requests on a case-by-case basis.

The NRC should revise the regulations and associated guidance to reflect a performance-based approach for consolidated EOFs that would provide functional requirements for these facilities, thus ensuring that the necessary capabilities are in place to protect public health and safety.

5.2.2. Existing Regulatory Framework

The overall requirement for providing and maintaining adequate emergency response facilities is found in one of the 16 emergency PSs (i.e., 10 CFR 50.47(b)(8)), which states, "Adequate emergency facilities and equipment to support the emergency response are provided and maintained."

In addition to the EOF, the other emergency response facilities typically include an onsite TSC for providing plant management and technical support to plant operations personnel during emergency conditions and an onsite operational support center (OSC) to provide a location for the coordination of plant logistic support during an emergency.

The PS of 10 CFR 50.47(b)(3) requires arrangements to accommodate State and local staff at a licensee's EOF. 10 CFR 50.47(b)(3) specifically refers to a near-site EOF as follows:

Arrangements for requesting and effectively using assistance resources have been made, arrangements to accommodate State and local staff at the licensee's near-site Emergency Operations Facility have been made, and other organizations capable of augmenting the planned response have been identified.

Similar wording regarding a near-site EOF appears in 10 CFR 50.47(d)(1) in the EP requirements for an operating license authorizing only fuel loading or low power (up to 5 percent) operation:

Arrangements for requesting and effectively using offsite assistance on site have been made, arrangements to accommodate State and local staff at the licensee's near-site Emergency Operations Facility have been made, and other organizations capable of augmenting the planned onsite response have been identified.

The wording of both 10 CFR 50.47(b)(3) and 10 CFR 50.47(d)(1) refers to the EOF as being a near-site facility. Other sections of 10 CFR Part 50, such as 10 CFR 50.34(f), also refer to a near-site EOF. The language in 10 CFR Part 50, Appendix E, Section IV.E.8, more clearly states that the EOF will be a near-site facility:

A licensee onsite technical support center and a licensee near-site emergency operations facility from which effective direction can be given and effective control can be exercised during an emergency....

However, none of the previous citations that describe the EOF as a near-site facility nor any other NRC regulation defines the term "near-site."

NRC guidance documents give more detailed information regarding emergency response facility requirements. NUREG-0696 and NUREG-0737, Supplement 1, issued January 1983, provide guidance as to acceptable methods for meeting the Commission's EOF requirements. NUREG-0696, Section 4, provides detailed guidance regarding EOF functions, location, structure, habitability, staffing, staff training, facility size, radiological monitoring capabilities, communications, instrumentation, data system equipment, power supplies, technical data systems, and records availability and management. An abbreviated version of this information appears in NUREG-0737, Supplement 1, Section 8.4. The NRC transmitted NUREG-0737, Supplement 1, to licensees via Generic Letter 82-33, dated December 17, 1982. This letter

offered the following clarification of the criteria for emergency response facilities in NUREG-0737 Supplement 1:

The enclosures to this letter are a distillation of the basic requirements for these topics from the broad range of guidance documents that the NRC has issued (principally NUREG reports and Regulatory Guides). It is our intent that the guidance documents themselves, referred to in the enclosures, are not to be used as requirements, but rather that they are to be used as sources of guidance for NRC reviewers and licensees regarding acceptable means for meeting basic requirements.

Most EOF requirements and characteristics are based on what is needed to perform the intended functions of the facility, and thus they are already performance-based to a large extent. For example, NUREG-0737, Supplement 1, Paragraph 8.4.1.a, summarizes the key functions of the EOF as follows:

The EOF provides for management of overall licensee emergency response, coordination of radiological and environmental assessment, development of recommendations for public protective actions, and coordination of emergency response activities with Federal, State and local agencies.

However, these functions do not address additional capabilities that would apply to a consolidated EOF, such as handling more than one emergency event simultaneously.

The principal characteristics that are not performance based include location, size, habitability, and staffing response times. The following sections discuss each of these characteristics in more detail.

5.2.2.1. EOF Location Criteria

The criteria for the location of an EOF are based solely on distance from the nuclear power plant. The Commission approved two options for licensees to use to site an EOF near nuclear power plant sites. One option allows for a primary EOF to be located up to 10 miles from the reactor with habitability features (i.e., a minimum radiation protection factor of 5 and ventilation protection) and a backup EOF without habitability features (i.e., no special provisions for protection factors or ventilation protection) to be located between 10 and 20 miles from the reactor. The second option allows for a single EOF location between 10 and 20 miles from the reactor with no habitability features. The Commission approved these options (with certain modifications noted) in COMJA-80-37, "Action Plan III.A.1.2—EOF," dated January 21, 1981, and issued them to licensees via Generic Letter 81-10, "Post-TMI Requirements for the Emergency Operations Facility," dated February 18, 1981. They are reflected in NUREG-0696, Subsection 4.2, Table 2, and also in NUREG-0737, Supplement 1, Table 1, which state that an EOF should be located between 10 and 20 miles, or more specifically 10 to 20 miles from the TSC. A primary EOF may be located closer to the site if a backup EOF is located within 10 to 20 miles, or within 10 to 20 miles of the TSC. (Note that the EOF distance is defined in relation to the TSC in NUREG-0696, Table 2, instead of the reactor as stated in COMJA-80-37. NUREG-0737, Supplement 1, Table 1, does not define the reference point from which the EOF distance is determined.) The guidance in both tables further states that specific approval by the Commission and some provision for having the NRC site team closer to the site are required if the EOF is located beyond 20 miles.

SECY-96-0170, "Assessment of Exceptions Granted for Locations and Staffing Times of Emergency Operations Facilities," dated August 5, 1996, discussed the basis for the EOF distance criteria:

The rationale for the requirement for locating an unshielded primary EOF under option 2 (or the backup EOF under option 1) of NUREG-0737, Supplement 1, between 10 to 20 miles from the nuclear power reactor site is traceable to early Commission briefings and decisions. The 10-mile lower limit was determined to be sufficiently far from the site to avoid potentially significant radiation exposures that may be associated with core-melt accidents, yet still close enough to allow the EOF to readily communicate with the site and with personnel engaged in an emergency response. The EOF is intended to facilitate face-to-face communications between the licensee, State and local government officials, and the NRC staff, and the briefing and debriefing of persons going to and from the site, without exposing those persons to undue radiological risks. The 20-mile upper limit was considered to be the generally maximum optimal distance within which such face-to-face communications between the licensee, State and local government officials, and the NRC staff could continue to be effective, while permitting the timely briefing and debriefing of persons going to and from the site. While these goals have been found to be generally attainable at certain sites without strict adherence to the 10-to-20 mile criterion, or conditions may have been found to exist which would support excepting a specific site from this criterion, the staff is not aware of any information that has been presented to date which would invalidate this criterion on a generic basis.

Experience has shown that offsite decision makers do not report to the EOF, contrary to the expectations when the original regulations and guidance were formulated.

The Commission has approved several licensee requests for exceptions to the EOF distance criteria. In SECY-96-0170, the staff reported that the Commission had granted 12 exceptions from the primary EOF location criteria and 23 exceptions from the backup EOF location criteria for operating plants. The staff stated the following basis for granting exceptions to the EOF distance criteria:

When the EOF location was a greater distance from the site (beyond 25 miles), the accepted rationale for its location was generally either (1) the EOF and the State Emergency Operations Center could be collocated, (2) the location was more favorable to the State or local government officials, or (3) the location facilitated a common licensee EOF.

The NRC staff noted that many of the exceptions could have been avoided by changing the outer limit from 20 to 25 miles and asked that the Commission authorize the staff to approve or disapprove exceptions, without referral to the Commission, for primary or backup EOFs located up to 25 miles from a site. The Commission, in its SRM to SECY-96-0170, dated September 18, 1996, allowed an additional 5 miles in the maximum EOF distance, thereby permitting an EOF to be located between 10 and 25 miles from the TSC. The SRM also noted that if a licensee cannot meet this criterion, it must request an exception from the above guidance from the Commission.

As of August 1996, the assessment of exceptions granted for EOF locations in SECY-96-0170 also indicated that the Commission had considered three proposed emergency plans that

provided for a consolidated EOF well beyond the distance criteria previously discussed which would serve as a single EOF for a multisite licensee. The Commission approved two of the requests, one involving the Tennessee Valley Authority's arrangement for a consolidated EOF for the Browns Ferry, Watts Bar, and Sequoyah plants (see COMJA-80-37) and one involving Commonwealth Edison (see SECY-95-0274, "Commonwealth Edison Company's Proposal to Use Its Corporate Emergency Operations Facility as an Interim Emergency Operations Facility," dated November 21, 1995, and the SRM to SECY-95-0274, dated January 31, 1996). The Commission based its approval on the licensees' ability to staff a consolidated facility within 1 hour and perform emergency response functions, to arrange offsite emergency management agency support for a consolidated facility, and to provide for another facility closer to the site to which the NRC site team and other responders could report. In SECY-84-0089, "Emergency Operations Facility for the Oconee Nuclear Station, Units 1, 2 and 3," dated February 22, 1984 (and also SECY-84-0089A, dated May 14, 1984), the Commission agreed with the staff's disapproval of an exception request by Duke Power Company to use a consolidated EOF located 125 miles from the Oconee Nuclear Station in Charlotte, North Carolina, as the EOF for that site, as well as for the McGuire and Catawba nuclear stations. The staff recommended that the Oconee proposal be rejected "because the principal EOF management staff could not interact directly with its Federal, State, and local counterparts located near the plant site. Additionally, the Oconee plan did not contain provisions for staffing a near-site EOF." Upon subsequent appeal of the Commission decision to the U.S. Court of Appeals for the Fourth Circuit, the Court noted that the Commission acted within its discretion in denying Duke's proposal (*Duke Power Co. v. U.S. Nuclear Regulatory Commission*, 770 F.2d 386 (4th Cir. 1985)). In its ruling, the Court stated the following:

Duke's argument that the staff did not take a "hard look" at all the reasons suggested by it (Duke) in support of its petition for an exemption is similarly refuted by the record. The staff was not perfunctory in its review of the petitioner's application. Nor does Duke contend that it was denied the right to make a full presentation of its views. The record amply shows that the presentations made by Duke before the staff were adequately summarized in the summaries of such presentations furnished the Commission for its guidance in evaluating Duke's application. The staff, in its recommendations, differed with Duke's contentions. There is little doubt that, based on their experience in connection with the Three Mile Island disaster, as well as on their own expertise, the staff felt that the opportunity for face-to-face co-operation and co-ordination between on-site and off-site personnel in an emergency was the better procedure. And this view was accepted by the Commission.

Duke Power Co., 770 F.2d at 390.

Duke Power submitted a revised EOF proposal as discussed in SECY-87-0067, "Exception for the Emergency Operations Facility Design for the Oconee Nuclear Station," dated March 11, 1987. The revised Oconee EOF location was 9.4 miles from the plant site and would not be used as a central facility by other Duke Power nuclear plants. The proposed facility had a protection factor of 5, but the ventilation system could not be isolated and would not be equipped with high-efficiency particulate air filters, nor was a backup EOF planned, in accordance with NUREG-0737, Supplement 1, Table 1. To support its request, Duke Power provided analyses indicating little measurable difference between the radiological effect on personnel within an EOF located at 9.4 miles versus 10 miles from the plant and attesting that the facility at 9.4 miles would have essentially the same probability of continued use following a core melt accident. The NRC staff found the proposed exceptions to the EOF requirements of

NUREG-0737, Supplement 1, Table 1, to be acceptable. The Commission did not object to the staff's proposed approval of the request (see the memorandum regarding SECY-87-0067 from S. Chilk, Secretary, to V. Stello, Executive Director of Operations, dated April 30, 1987).

The NRC staff later considered another request for the proposed location of a combined EOF to serve the Peach Bottom Atomic Power Station (at a distance of 30 miles from the site) and Limerick Generating Station (within 10 to 20 miles of the site). In SECY-90-0072, "Location of the Combined Emergency Operations Facility for Peach Bottom and Limerick Nuclear Power Plants," dated March 5, 1990, the staff concluded that the combined facility "will actually enhance the emergency response capability because the new site is more accessible to the corporate emergency response staff and the NRC Region I office. The new facility will also be better equipped to perform its intended response functions." The Commission did not object to the staff's proposed approval of the request (see the memorandum regarding SECY-90-0072 from S. Chilk, Secretary, to J. Taylor, Executive Director of Operations, dated March 21, 1990).

Because neither NRC regulations nor guidance documents define the term "near-site," it is unclear at what point a licensee can no longer request an exception to the EOF distance criteria in NUREG-0696 and NUREG-0737, Supplement 1, and thus must request an exemption to the requirements for a near-site EOF found in 10 CFR 50.47 and Appendix E to 10 CFR Part 50. As a result, licensees have continued to seek Commission approval for exceptions and exemptions to EOF distance requirements. In SECY-98-0274, "Commonwealth Edison Company's Proposal to Centralize Its Emergency Operations Facilities at Its Corporate Offices," dated November 23, 1998, the staff recommended Commission approval of Commonwealth Edison's (ComEd's) request to consolidate four near-site EOFs at its five operating nuclear power plant sites into a centralized EOF (CEOF) at its corporate offices, at distances from the plant sites ranging from 32 miles (for Dresden) to 116 miles (for Quad Cities). The staff based its recommendation in part on the following:

While there may be a negative perception that the greater distances involved in the proposed plan would impede the licensee's ability and NRC's ability to perform their respective functions, the staff believes that technological advances in communications and monitoring capabilities, the stationing of other governmental officials remote from the sites, the proximity of NRC's Region III offices to the CEOF, and the improvement in ComEd's emergency response capability outweigh the concerns regarding the distance between the proposed CEOF and the sites. The staff is confident that this proposal will provide reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. In addition, if approved, there will be resource savings for the licensee and NRC.

The Commission approved this request in the SRM to SECY-98-0274, dated January 29, 1999. The Commission also noted the following:

[A]pproval of this proposal should not be interpreted by the staff as generic support of the centralized EOF approach in all cases. The staff should carefully review proposals from other licensees on a case-by-case basis to ensure that emergency response, communication, and coordination are not adversely affected by the proposals.

Such was the case when AmerGen Energy Company requested approval to integrate the Clinton Power Station EOF into the CEOF formerly operated by ComEd and now operated by

Exelon. The EOF would be located 136 miles from the plant site. The NRC staff recommended Commission approval of the proposal in SECY-02-0033, "AmerGen's Request to Consolidate the Clinton Power Station Emergency Operations Facility (EOF) into the Centralized EOF Operated by Exelon Generation Co.," dated February 27, 2002. The Commission approved the request in the SRM to SECY-02-0033, dated March 15, 2002, with the same caveat noted previously regarding the need to review similar centralized EOF proposals on a case-by-case basis.

In 2003, AmerGen Energy Company submitted a request to consolidate the TMI Unit 1 EOF with the EOF for Peach Bottom and Limerick. The EOF for Peach Bottom and Limerick was 50 miles from TMI, while the existing TMI EOF was approximately 12 miles from the site (reference SECY-03-0033, "Revised AmerGen's Request to Consolidate the Three Mile Island Unit 1 EOF into the Combined EOF for Peach Bottom Atomic Power Station (PBAPS) and Limerick Generating Station (LGS)," dated March 7, 2003). The Commission approved this request in the SRM to SECY-03-0033, dated March 18, 2003.

A more recent example of an EOF distance exemption request involved Southern Nuclear Operating Company's proposal to combine the EOFs at its three operating nuclear plants in Georgia and Alabama into a consolidated EOF at its corporate offices in Birmingham, Alabama (see SECY-04-0236, "Southern Nuclear Operating Company's Proposal to Establish a Common Emergency Operating Facility at Its Corporate Headquarters," dated December 23, 2004). The distances from the plant sites to the consolidated EOF ranged from 213 miles (for Farley) to 352 miles (for Hatch). In the SRM to SECY-04-0236, dated February 23, 2005, the Commission approved this proposal. The Commission also requested that the staff consider changes to 10 CFR Part 50 to make the EOF requirements more performance-based, but that "[I]n the interim, the Commission will continue to evaluate EOF consolidation requests on a case-by-case basis."

5.2.2.2. EOF Size Criteria

With respect to the size of an EOF, NUREG-0696, Subsection 4.4, provides the following criteria:

Working space for the personnel assigned to the EOF as specified in the licensee's emergency plan, including State and local agency personnel, at the maximum level of occupancy without crowding (minimum size of working space provided shall be approximately 75 sq ft/person);...

Separate office space to accommodate at least five NRC personnel during periods that the EOF is activated for emergencies.

However, more specific criteria appear later in NUREG-0696, Subsection 4.4, irrespective of the criteria above:

The EOF working space shall be sized for at least 35 persons, including 25 persons designated by the licensee, 9 persons from NRC, and 1 person from FEMA. This minimum size shall be increased if the maximum staffing levels specified in the licensee's emergency plan, including representatives from State and local agencies, exceed 25 persons.

Unlike the reference to the licensee's emergency plan for determining working space needs for licensee, State, and local personnel assigned to the EOF, the guidance has no corresponding reference to Federal response plans, such as the National Response Plan, issued December 2004, or incident response procedures to determine Federal working space needs. (A discrepancy also exists for NRC working space requirements (i.e., five versus nine persons) provided in Subsection 4.4.)

5.2.2.3. EOF Habitability Criteria

Radiological habitability criteria for the EOF are determined by its location and are given in terms of protection factors and ventilation protection in both NUREG-0696, Table 2, and NUREG-0737, Supplement 1, Table 1. Enhanced habitability requirements apply to an EOF located within 10 miles and only to those areas of the EOF in which dose assessment, communications, and decision-making take place. NUREG-0696, Subsection 4.2, provides the following guidance on requesting exceptions to EOF criteria pertaining to size and habitability:

Licensees who cannot meet the requirements of size and habitability for the EOF must submit to NRC a request for an exception. This request must include justification for the exception and an alternate proposal. NRC will review requests for exceptions on a case-by-case basis.

5.2.2.4. EOF Staffing Criteria

NUREG-0696 and NUREG-0737, Supplement 1, provide EOF staffing criteria and goals, including maximum EOF staff response times. NUREG-0696, Section 4.3, states that "[U]pon EOF activation, designated personnel shall report directly to the EOF to achieve full functional operation within 1 hour." NUREG-0737, Supplement 1, Section 8.4.1.i, states that the EOF will be "[S]taffed using Table 2 (previous guidance approved by the Commission) as a goal. Reasonable exceptions to goals for the number of additional staff personnel and response time for their arrival should be justified and will be considered by NRC staff." NUREG-0737, Supplement 1, Table 2, "Minimum Staffing Requirements for NRC Licensees for Nuclear Power Plant Emergencies," provides guidance regarding the capability for augmenting on-shift staff and the response times for augmented staffing, which is a maximum of 60 minutes for EOF responders. In SECY-96-0170, the staff reported that 17 exceptions have been granted to the 60-minute EOF staffing time goal, ranging from an additional 15 to 60 minutes. These exceptions were based on the overall remoteness of the sites and the location of the EOFs with respect to the individual sites. However, the staff determined that the existing EOF staffing response time guidance was adequate and did not recommend any changes. Thus, licensees would continue to submit requests for EOF staffing response time goals greater than 60 minutes to NRC staff for approval.

5.2.2.5. Processing of EOF Exception and Exemption Requests

NUREG-0737, Supplement 1, Section 8.4.2, "Documentation and NRC Review," provides additional guidance for licensees considering other methods of satisfying emergency response facility requirements in its statement that "Exemptions from or alternative methods of implementing these requirements should be discussed with NRC staff and in some cases could require Commission approval."

The NRC staff has sought Commission approval to process and approve licensee requests for exceptions/exemptions to EOF requirements on several occasions. However, previous

Commission decisions involving exceptions to EOF requirements directed that future exception (as well as exemption) requests be submitted to the Commission for approval. The following summarizes several of these staff requests and subsequent Commission decisions.

SECY-81-0509, “NUREG-0696 Criteria for Emergency Operations Facilities for Nuclear Power Reactors,” dated August 24, 1981. The NRC staff sought Commission approval to process and approve licensee requests for exceptions to the location and backup criteria of NUREG-0696 for EOFs where the licensee or applicant provided sufficient justification and alternative methods that met the intent and purpose of NUREG-0696 functional criteria. However, requests for EOFs beyond 20 miles would continue to be referred to the Commission for approval. By memorandum from S. Chilk, Secretary, to W. Dircks, Executive Director of Operations, dated September 30, 1981, the Commission approved the proposal for staff to act as follows:

The Commission agrees that the staff can accept close-in, hardened EOF's, provided that each emergency plan identify an alternate location where utility and government officials can meet to discuss plant status and appropriate public protective actions, and that the emergency plan indicate that contingency arrangements have been made to provide equipment for necessary communication with the TSC in the event of an emergency.

In the particular case addressed in SECY-81-0509, the licensee proposed to locate the Davis-Besse EOF within the 10-mile emergency planning zone with protection factors in excess of 100 and ventilation systems that would ensure a habitable facility even during a core-melt accident. Thus, it was considered to be a “hardened” facility.

SRM-M830302B, “Briefing on Staff Actions Regarding Location of Emergency Operations Facilities,” dated March 3, 1983. The NRC staff briefed the Commission on actions regarding the location and habitability of EOFs proposed by utilities. The SRM reported that “[A] majority of the Commission expressed a continuing desire to review all exemption requests; and directed staff to refer exemption requests and proposed staff action (grant or deny) to the Commission for decision on a negative consent basis.”

SECY-87-0067, “Exception for the Emergency Operations Facility Design for the Oconee Nuclear Station,” dated March 11, 1987. As previously discussed, Duke Power had proposed exceptions to the EOF habitability and backup requirements for a primary EOF to be located within 10 miles of the plant. By memorandum from S. Chilk to V. Stello dated April 30, 1987, the Commission stated that it had no objection to the staff's proposed approval of the utility's request for an exception to the location, radiological habitability, and backup requirements for the Oconee EOF, but the Commission “has agreed that future requests for exceptions to EOF requirements should continue to be submitted to the Commission.”

SECY-96-0170. The staff provided the Commission with an assessment of exceptions granted for locations and staffing times of EOFs and recommended that the existing guidance be maintained. In the SRM to SECY-96-0170, the Commission approved the staff proposal to maintain existing guidance and directed the staff to continue to seek Commission approval for consolidated EOF proposals.

SECY-04-0236. In a departure from previous decisions, the Commission issued the following direction to the staff in the SRM to SECY-04-0236:

The staff should consider revising 10 CFR Part 50 to make the requirements for EOFs more performance-based to allow other multi-plant licensees to consolidate their EOFs, if those licensees can demonstrate their emergency response strategies will adequately cope with an emergency at any one of the associated plants.

5.2.2.6. Co-located EOFs

Two different licensees may co-locate an EOF to serve multiple plants, as defined in Appendix E to 10 CFR Part 50. A co-located EOF has some of the same characteristics as a consolidated facility in terms of equipment, displays and other types of resources. The performance-based criteria for a consolidated EOF would also apply to a co-located facility. However, each licensee would staff and operate the co-located facility according to a plant-specific emergency plan and set of implementing procedures. In this sense, a co-located EOF is more like a single-site facility. Therefore, the siting criteria for a single-site facility would still apply to ensure the co-located EOF location adequately addresses all of the facility-specific emergency response capabilities in NUREG-0696.

5.2.3. Options Considered to Resolve the Problem

5.2.3.1. Take no action

This option would maintain the status quo, contrary to direction from the Commission and the desire to have performance-based requirements for consolidated EOFs, as opposed to siting and habitability criteria based solely on distance from the nuclear power plant. The staff considers this option to be unacceptable because it would still require licensees to submit EOF consolidation requests for Commission approval and involve substantial staff resources for their review. It also does not recognize advances in computer and communications technology that may obviate the need for a dedicated facility near each site and the successful implementation of consolidated EOFs by several licensees, nor is it responsive to the SRM for SECY-06-0200 to develop performance-based EOF criteria.

5.2.3.2. Implement proposed regulation to address the location of single, co-located and consolidated EOFs

The regulations (and associated guidance) could be written such that both the consolidation of EOFs for multiple sites, as well as situations in which a licensee proposes to locate an EOF for a single site or multiple licensees propose to share an EOF that is separately staffed and operated by each licensee, more than 25 miles from that site, could be implemented without prior NRC approval. However, the benefit of locating an EOF for a single site or co-locating an EOF for multiple licensees at a remote location is not evident in terms of increasing staffing flexibility and standardizing emergency response. Although a co-located EOF would have some of the same characteristics as a consolidated facility in terms of equipment, displays, and other types of resources, each licensee would staff and operate the co-located facility according to a plant-specific emergency plan and set of implementing procedures. In this sense, a co-located EOF is more like a single-site facility. Offsite officials that respond to the facility would not benefit from dealing with a standardized licensee emergency response staffing organization or response methodology for multiple sites. The remote siting of an EOF for a single site or as a co-located facility would be more appropriately addressed as a request for an exception to NRC guidance or an exemption from NRC regulations and considered on a case-by-case basis. This option also does not address other EOF criteria, such as habitability, size and staffing, that are

not currently performance-based. Therefore, the staff determined that this option was not appropriate.

5.2.3.3. Implement proposed regulation and guidance for consolidated EOFs only

Such changes would obviate the need for licensees to seek NRC approval at either the staff or Commission level to consolidate EOFs shown to meet the performance-based requirements. Licensees could then implement their emergency response strategies under the provisions of 10 CFR 50.54(q) without prior NRC approval. Since the approval process involves a considerable expenditure of staff resources to evaluate these requests, revising the regulations to clearly define the conditions under which licensees would be allowed to establish consolidated EOFs without prior NRC approval (i.e., in accordance with 10 CFR 50.54(q)) or when Commission approval would still be required would reduce regulatory burden and increase staff efficiency in the review process. Licensee EOF functions would still be effectively performed independent of distance from the site.

The staff is therefore proposing changes to NRC regulations such that the requirements for consolidated EOFs reflect a performance-based approach. The staff is also proposing revisions to regulations and guidance to remove the “near-site” requirement for EOFs, thereby allowing licensees to establish consolidated EOFs in accordance with 10 CFR 50.54(q), as long as the licensees can demonstrate that their emergency response strategies will adequately cope with an emergency for any of their nuclear power plants, and to inform licensees when Commission approval is required for the establishment of a consolidated EOF.

Generic EOF capabilities are currently provided in several regulations and guidance documents and include the following:

- Management of overall licensee response effort;
- Coordination of radiological and environmental assessment;
- Classification of emergencies (when performed at EOF per emergency plan);
- Determination of protective action recommendations;
- Notification of offsite agencies (when performed at EOF per emergency plan);
- Coordination of event, plant, and response information provided to public information staff for dissemination to the media and public;
- Coordination of emergency response activities with Federal, State, local, and tribal agencies;
- Staffing and activation of the facility within timeframes and at emergency classification levels defined in the emergency plan; and
- Capability to locate NRC and offsite agency staff closer to each site if the EOF is greater than 25 miles from the site.

The NRC would add specific criteria for co-located and consolidated EOFs to regulations and guidance where appropriate. The NRC staff would verify these capabilities by a review of emergency plan changes and via observation in a drill or exercise before their implementation and periodically thereafter. These criteria include the following:

- Ability to obtain and display key plant data and radiological information for each plant the co-located or consolidated EOF serves;
- Ability to analyze plant technical information and provide technical briefings to licensee staff and offsite agency responders for each type of plant; and
- Ability to effectively respond to and coordinate response efforts for multi-site events.

The adoption of performance-based criteria should minimize or eliminate the staff resources and time needed to complete an exception/exemption review for consolidated EOFs. In addition, the consolidated EOFs that have been approved to date would meet the intent of a proposed rule based on the foregoing analysis. During exercises and actual events, these EOFs have functioned as effective emergency response facilities and have demonstrated that a near-site EOF is not necessary to adequately protect public health and safety. The staff believes that implementation of such a proposed regulation would best resolve the issue. The proposed regulatory changes would not be extensive and would rely on more detailed information to be provided in guidance documents for the determination of EOF adequacy.

6. Emergency Plan Issues

There are three issues in this chapter, all which relate to aspects of the licensee emergency plan. The issues will each be discussed separately and they include: evacuation time estimate updating, reduction in effectiveness, and emergency classification timeliness.

6.1 Evacuation Time Estimate Updating

6.1.1. Regulatory Problem Background and Definition

ETEs serve two purposes: (1) they provide data used to develop specific traffic control plans as part of the planning process; and (2) they provide a representative timeframe for evacuation so that emergency officials can make well-informed, realistic decisions about protective action options in responding to an actual emergency. An ETE serves as a tool in the protective action decision-making process by providing a framework within which decision makers can incorporate input on evacuation characteristics and traffic flows at the time of an actual emergency. ETEs are intended to be representative and take into account a wide range of weather, road conditions, time of day, and seasonal variations in population so that any protective action decision based on them will reflect realistic conditions.

Before the accident at Three Mile Island, NRC regulations carried no specific requirement that ETEs be developed for a nuclear power plant site. Title 10, Section 100.3, "Definitions," of the *Code of Federal Regulations* (10 CFR 100.3) did require that a low-population zone (LPZ) be established for a proposed site. One of the factors considered in the development of an LPZ was whether the population density was such that residents could be evacuated from the LPZ, but an applicant was not required to perform a rigorous evacuation time analysis.

Following the accident at Three Mile Island in March 1979, the NRC sent a letter on November 29, 1979, to all applicants for construction permits and licensees of plants under construction requesting information regarding estimates for evacuation of various areas around proposed nuclear power plants. The NRC reported on the analysis of the responses to this request in NUREG/CR-1856, PNL-3662, "An Analysis of Evacuation Time Estimates Around 52 Nuclear Power Plant Sites," Volume 1, issued May 1991. The NRC also included the requirement for ETEs in the amended emergency planning regulations issued in August 1980. The amended regulations applied to all applicants for nuclear power reactor operating licenses and holders of nuclear power reactor licensees.

Nuclear power plant applicants and licensees are now responsible for developing the ETE analysis for a specific site. They submit the analysis to the NRC, in support of their emergency plans, usually as a standalone document. Applicants and licensees include the results of the ETE analysis in the onsite and offsite emergency plans (for the State and local governments within the plume EPZ) in the emergency plan implementing procedures for protective action recommendations.

The consequences of a radiological emergency at a commercial nuclear power plant can be mitigated by the implementation of protective actions including the evacuation of the public from the area surrounding the plant. As such, the time estimates are intended to be representative and reasonable so that any protective action decision based on those estimates would reflect realistic conditions. ETEs need not include an analysis of worst-case scenarios (i.e., the worst conceivable combination of weather and traffic conditions). Neither the NRC regulations nor

NUREG-0654 contemplates such an analysis. Further, neither NRC regulations nor NUREG-0654 establishes a standard for effectuating evacuations within a given time. An overly conservative ETE could result in an inappropriate protective action decision.

The NRC and FEMA jointly evaluate the adequacy of emergency preparedness at a nuclear power plant site. FEMA is the Federal agency with the lead responsibility for evaluating offsite emergency planning and preparedness. To coordinate the review process, the NRC and FEMA entered into a memorandum of understanding (MOU) outlining the responsibilities of the two agencies. The initial MOU became effective on January 14, 1980; the current version of the MOU was issued on June 17, 1993 (58 FR 47996). (Note that the MOU does not specifically mention ETEs.)

The NRC regulations provide that FEMA will make findings and determinations as to whether State and local emergency plans are adequate and whether there is reasonable assurance that they can be implemented. With regard to its overall finding of reasonable assurance for a nuclear power reactor, the NRC bases its finding on a review of the FEMA findings and determinations and on the NRC assessment as to whether the onsite emergency plans are adequate and whether there is reasonable assurance that they can be implemented.

The NRC regulations are ambiguous concerning the need for licensees to periodically review and update their ETEs following initial submission; consequently, licensees have been inconsistent in updating their ETEs, as revealed in an NRC informal review. In March 1992, NRC Region II sent a letter to the licensees in the region to call their attention to the availability of 1990 census data (ML072040241). The letter noted that a regional survey indicated that a number of licensees had not yet incorporated updated population data into their emergency plans or updated their ETEs to reflect changes in the population. Licensees were “encouraged” to use the census data to update their emergency plans and ETEs for the plume exposure EPZ.

NUREG-0654 requires the adjustment of census data that are not current and accurate; it does not require projected ETEs for future populations. NUREG-0654 requires that the ETEs be updated as the population of the area changes. *Public Service Company of New Hampshire, et al.* (Seabrook Station, Units 1 and 2), LBP-83-32A, 17 NRC 1170, 1179–1180 (1983).

In RIS 2001-16, “Update of Evacuation Time Estimates,” dated August 1, 2001, the NRC staff alerted licensees to the possible need to update their ETEs based on the 2000 census and discussed a regulatory basis for updating ETEs. The staff noted that because the emergency plan is considered to be part of the final safety analysis report (FSAR), in accordance with Section III of Appendix E to 10 CFR Part 50, the updating requirements of 10 CFR 50.71(e) apply. This section states that licensees shall periodically update the FSAR to ensure that the information in the original report contains the latest information developed and is submitted at regular intervals to the NRC. However, 10 CFR 50.71(e) does not specifically mention ETEs and provides no criteria regarding when licensees should update their ETEs. Hence, 10 CFR 50.71(e) provides only a very broad, general basis for requiring the updating of ETEs.

As stated in RIS 2001-16, recently published results of the year 2000 census show increases or decreases in population within the plume exposure pathway EPZ around certain nuclear power facilities. Consequently, the ETEs could increase or decrease, and longer or shorter evacuation times could in turn affect decisions about evacuating the public in the event of a radiological emergency. Therefore, decision makers may need updated estimates of how long it would take

to evacuate the public. The RIS did not transmit any new requirements or staff positions and required no specific action or written response by licensees.³

Recent reviews of ETEs in new applications under 10 CFR Part 52 have highlighted the problem of keeping ETEs up to date and consistent with the latest guidance. For an early site permit (ESP) application, 10 CFR 52.17(b)(1) requires that the applicant identify physical characteristics unique to the proposed site, such as egress limitations, that could significantly impede the development of emergency plans. NUREG-0654/FEMA-REP-1, Revision 1, Supplement 2, provides guidance on developing emergency plans for ESP applicants. As stated in Supplement 2, the ETE analysis is an emergency planning tool that can be used to assess the feasibility of developing emergency plans for a proposed site. Supplement 2 refers to Appendix 4 of NUREG-0654/FEMA-REP-1 and to NUREG/CR-4831 for guidance on performing an ETE analysis.

Each of the four initial ESP applications submitted to the NRC for review has included an ETE analysis. Since the ESP sites were located on or near an operating nuclear power plant site with an existing emergency plan, three of the ETEs submitted in support of the early site permit applications essentially used the existing ETE analysis from the emergency plans for the operating plant on the site (the fourth ESP application relied on a new ETE analysis). The NRC staff's review of the ETEs in the ESP applications found that the submittals raised questions concerning whether the methodology and assumptions used in the ETE analyses fully addressed all of the criteria of Appendix 4 to NUREG-0654/FEMA-REP-1 and subsequent guidance.

The staff is focusing increased attention on the use of ETEs in developing and implementing protective actions for the public located within the plume EPZ. In SECY-03-0165, "Evaluation of Nuclear Power Reactor Emergency Planning Basis Adequacy in the Post 9-11 Threat Environment," dated September 22, 2003, the staff recommended a review of NRC protective action recommendation (PAR) guidance, including the efficacy of evacuation versus sheltering. In SRM-M030924, dated October 3, 2003, the Commission directed the staff to "[c]ontinue to evaluate the NRC protective action recommendation guidance to assure that it continues to reflect our current state of knowledge with regard to evacuation and sheltering. Update the guidance, as necessary."

In 2004, the NRC staff began a project with Sandia National Laboratories entitled "Review of NUREG-0654, Supplement 3, Criteria for Protective Action Recommendations for Severe Accidents" (also known as the PAR Study). The objectives of this study were to identify and evaluate alternative PARs that could reduce the dose to the public during a radiological emergency and to determine whether improvements or changes to the NRC guidance would be beneficial. The preliminary conclusions of the study indicate that (1) protective action strategies that reduce evacuation time also reduce consequences; and (2) improving the quality of the ETEs is important for recommending the best protective action.

In conjunction with the PAR Study, the NRC contracted with Sandia to review and update the NRC guidance on ETEs. The NRC issued the results of the Sandia ETE study in NUREG/CR-6863 (SAND2004-5900) in January 2005. This recent guidance integrates new technologies in traffic management, computer modeling, and communication systems to identify

³ An informal survey conducted by the staff indicated that a number of licensees had reviewed their ETEs following the issuance of RIS 2001-16. In general, however, the documentation of the results and the criteria used to determine the necessity of revising the ETEs did not appear to follow any consistent format.

additional tools useful in the development of new ETEs or updates to existing ETEs. In terms of the latter issue, NUREG/CR-6863 states that the ETE should be periodically evaluated and updated, with consideration of the factors that affect population growth and traffic flow to determine their impact on the ETE.

In SRM-M060502, issued June 29, 2006, following a briefing on the status of emergency planning activities, the Commission stated that because of the important role ETEs play in informing protective action recommendations, the staff should evaluate potential improvements in the methodology and periodically update the ETEs, particularly for the 2-mile EPZ subzones and the 5-mile keyholes used in most States' emergency planning documents.

While the emergency planning regulations clearly specify the requirement for the development of ETEs, the regulations are ambiguous on the need to review and update the ETEs following the initial licensing of a nuclear power plant. The NRC staff has observed that there are inconsistencies in the methods and frequency in which licensees have reviewed and updated their ETEs since initial licensing. In addition, due to advances in understanding of evacuation methodologies, ETEs could benefit from a consistent updating requirement.

6.1.2. Existing Regulatory Framework

The NRC has codified a set of emergency planning standards in 10 CFR 50.47(b) and supporting requirements in Appendix E to 10 CFR Part 50. The requirement for ETEs appears generally in planning standard 10 CFR 50.47(b)(10) and more specifically in 10 CFR Part 50, Appendix E, Section II, "The Preliminary Safety Analysis Report," Section III, "The Final Safety Analysis Report," and Section IV, "Content of Emergency Plans."

The following language can be found in 10 CFR 50.47(b)(10):

A range of protective actions has been developed for the plume exposure pathway EPZ for emergency workers and the public. In developing this range of actions, consideration has been given to evacuation, sheltering, and, as a supplement to these, the prophylactic use of potassium iodide (KI), as appropriate.

Section II.G of Appendix E to 10 CFR Part 50, states the following:

As a minimum, the following items should be described: A preliminary analysis that projects the time and means to be employed in the notification of State and local governments and the public in the event of an emergency. A nuclear power plant applicant shall perform a preliminary analysis of the time required to evacuate various sectors and distances within the plume exposure pathway EPZ for transient and permanent populations, noting major impediments to the evacuation or taking of protective actions.

Section III of Appendix E to 10 CFR Part 50, states, in part, the following:

The Final Safety Analysis Report shall contain the plans for coping with emergencies.... The plans submitted must include a description of the elements set out in Section IV for the Emergency Planning Zones (EPZs) to an extent sufficient to demonstrate that the plans provide reasonable assurance that

adequate protective measures can and will be taken in the event of an emergency.

Section IV of Appendix E to 10 CFR Part 50, states, in part, the following:

The nuclear power reactor operating license applicant shall also provide an analysis of the time required to evacuate and for taking other protective actions for various sectors and distances within the plume exposure pathway EPZ for transient and permanent populations.

Regarding the updating of ETEs, 10 CFR Part 50, Appendix E, Section IV.G, "Maintaining Emergency Preparedness," requires licensees to have provisions to ensure that their emergency plan and its implementing procedures are kept up to date. This is a general requirement, not specific to ETEs, and this section contains no criteria as to when it would be appropriate to review and update the ETEs.

Emergency planning standard 10 CFR 50.47(b)(16) addresses the responsibilities for the planning effort, which include the responsibilities for the development, periodic review, and distribution of the emergency plans. Under this planning standard, licensees typically develop procedures for annual updating of their emergency plan and agreement letters. Again, there is nothing specific in this standard regarding the need to periodically review and update ETEs.

The regulations in 10 CFR Part 52, "Early Site Permits; Standard Design Certifications, and Combined Licenses for Nuclear Power Plants," specify the requirements for, among other things, ESPs, standard design certifications, and combined licenses (COLs) for nuclear power plants. 10 CFR 52.17(b)(1) requires that an ESP application identify the physical characteristics unique to the proposed site, such as egress limitations, that could pose a significant impediment to the development of emergency plans. NUREG-0654/FEMA-REP-1, Revision 1, Supplement 2, "Criteria for Emergency Planning in an Early Site Permit Application," issued April 1996, gives guidance to ESP applicants on developing emergency plans. As stated in Supplement 2, the ETE analysis is an emergency planning tool that can be used to assess, in an organized and systematic fashion, the feasibility of developing emergency plans for a proposed site.

For a COL under 10 CFR Part 52, the application must contain, in accordance with 10 CFR 52.79(a)(21), emergency plans complying with the requirements of 10 CFR 50.47, "Emergency Plans," and Appendix E to 10 CFR Part 50. That is, the COL application must contain an ETE analysis complying with the requirements of 10 CFR 50.47(b)(10) and Appendix E to 10 CFR Part 50.

The specific standards and criteria that FEMA uses for evaluation of offsite radiological emergency preparedness appear in FEMA regulations, 44 CFR Part 350, "Review and Approval of State and Local Radiological Emergency Plans and Preparedness." These are similar to the 16 emergency planning standards from 10 CFR 50.47(b) and the regulation incorporates by reference the joint FEMA/NRC guidance document NUREG-0654/FEMA-REP-1. The FEMA regulation at 44 CFR 350.5(a)(10) is identical to the NRC's 10 CFR 50.47(b)(10); however, the FEMA regulations do not include the equivalent of Appendix E to 10 CFR Part 50. As stated in 44 CFR 350.5(a), FEMA uses 10 CFR 50.47 and NUREG-0654 in reviewing, evaluating, and approving State and local radiological emergency plans and preparedness and in making any findings and determinations with respect to the adequacy of the plans and capabilities of State and local governments to implement them.

6.1.3. Options Considered to Resolve the Problem

6.1.3.1. Take no action

This option would continue to rely on the current requirements in Section IV.G of Appendix E to 10 CFR Part 50 and 10 CFR 50.71(e) as the regulatory basis for reviewing and updating the ETES. Section IV.G, "Maintaining Emergency Preparedness," of Appendix E to 10 CFR Part 50, specifies that provisions be described to ensure that the emergency plan and implementing procedures, as well as emergency equipment and supplies, are maintained up to date. As stated in 10 CFR 50.71(e), licensees shall periodically update the FSAR to ensure that the information in the original report contains the latest information and is submitted at regular intervals to the NRC. The emergency plan, as indicated in Section III of Appendix E to 10 CFR Part 50, is considered to be part of the FSAR; thus, the argument can be made that the ETES in the emergency plan should also be periodically updated. As indicated above, these regulations do not address ETES directly, do not include a specific requirement to periodically review and update the ETES in the emergency plan, and provide no criteria as to when a review of the ETES should be performed and when they should be updated. Thus, the current regulatory scheme does not ensure that the ETES, in particular the primary ETE input parameters of population and roadway capacity, will be periodically reviewed and updated in an organized and systematic fashion. Therefore, the NRC staff considers this option to be unacceptable.

6.1.3.2. Use voluntary program and issue updated guidance

This option could involve the issuance of a RIS or an information notice to reiterate the importance to licensees of periodically reviewing and updating their ETES. It could also call the licensees' attention to the ETE guidance issued since the publication of NUREG-0654/FEMA-REP-1, Revision 1, in particular NUREG/CR-4831, issued March 1992, and NUREG/CR-6863, issued January 2005. However, since NUREG/CR-4831 and NUREG/CR-6863 are written in the format of a technical report on the state of the art in ETE studies at the time the NUREGs were issued, it may be more appropriate to develop a new guidance document which provides specific steps or recommendations for licensees to use in reviewing and updating their ETE analyses. The new guidance could be in the form of a NUREG or a regulatory guide and could contain specific criteria similar to the proposed rule language above for determining when a review and update of the ETES should be initiated. The guidance could include specific criteria or trigger points for population and infrastructure change to prompt licensees to consider updating their ETES. However, regulatory guides and other NRC guidance documents are not substitutes for regulations, and compliance with them is not required. Therefore, this option would not provide the regulatory certainty of a rulemaking requiring that licensees review and update their ETES as recommended in the guidance, and the emergency planning regulations would continue to lack specificity regarding the updating of ETES as is the situation under the current rules. Therefore, the NRC staff determined that this option is not adequate.

6.1.3.3. Implement proposed regulation

Given the results of previous staff examinations of licensee ETES, the lack of a clear requirement in the regulations that ETES should be reviewed and updated as necessary on a periodic basis, the inconsistency throughout the industry of the implementation and updating of ETES, and the increased emphasis by the NRC on the use of ETES in the determination of the appropriate protective actions for the public in the event of a nuclear power plant accident, the staff has concluded that the NRC regulations should be amended. The regulations should more clearly require licensees to review and update their ETES periodically or when significant

changes take place in the infrastructure of an EPZ. By establishing definite requirements regarding the review and updating of ETEs, the NRC and other stakeholders would be certain that the ETEs in licensee and offsite emergency response organization emergency plans are up to date and consistent across the industry. Thus, amending the regulations is the best course of action to ensure that licensee ETEs will be periodically reviewed and updated in an organized and systematic manner. Licensees and other stakeholders have indicated that they support clear regulatory requirements concerning the update of ETEs.

6.2 Reduction in Effectiveness

6.2.1. Regulatory Problem Background and Definition

Title 10, Section 50.54, “Conditions of licenses,” of the *Code of Federal Regulations* (10 CFR 50.54) establishes a series of requirements that are deemed to be conditions in every license the NRC issues pursuant to 10 CFR Part 50. Furthermore, 10 CFR 50.54(q) establishes (1) that a licensee must maintain in effect and follow its emergency plan, and (2) a change process by which a licensee can modify its approved plan depending on whether the change would “decrease the effectiveness” of the plan. The NRC staff has identified the following two regulatory problems involving 10 CFR 50.54(q):

- (1) This section lacks clarity in the regulatory intent of the phrase “maintain in effect.” The current language does not adequately convey the NRC expectation that maintaining an emergency plan also requires maintaining the various capabilities and functions relied on in the plan. If those capabilities or functions are to be reduced, the NRC expects the licensee to act to ensure that the plan continues to provide adequate protection of public health and safety at the same or higher level as a result of the change. The staff has identified several occurrences in which licensee personnel outside of the emergency preparedness group have changed the status of capabilities and functions under their cognizance without considering the impact on the effectiveness of the emergency plan or without alerting the emergency preparedness group; and
- (2) This section lacks a definition for the phrase “decrease the effectiveness” in the context of changes to emergency plans. This lack of regulatory clarity has led to varied implementation by licensees, several enforcement actions, and unnecessary precautionary submittals for NRC review. These instances have resulted in inefficient and ineffective use of licensee and staff resources.

Related to the second problem is a concern regarding the process to be used by the NRC for reviewing proposed emergency plan changes. The current language directs the licensee to submit such changes under the provisions of 10 CFR 50.4, which provides the procedures for making certain submissions to the NRC. Some confusion exists as to whether all proposed emergency plan changes submitted under 10 CFR 50.4 would result in a decrease in effectiveness and whether Commission review of such submissions is necessary.

6.2.2. Existing Regulatory Framework

Currently, 10 CFR 50.54(q) states, in part, the following:⁴

A licensee authorized to possess and operate a nuclear power reactor shall follow and maintain in effect emergency plans which meet the standards in § 50.47(b) and the requirements in appendix E of this part. A licensee authorized to possess and/or operate a research reactor or a fuel facility shall follow and maintain in effect emergency plans which meet the requirements in appendix E of this part.

The licensee must follow and maintain in effect its emergency plan if the NRC is to continue to find that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency as stipulated by § 50.54(s)(2)(ii). The majority of the requirements in the Commission's emergency preparedness regulations address the *content* of the licensee's emergency plans, rather than licensee *performance*. The § 50.54(q) excerpt cited above is the only regulation that requires the licensee to implement its emergency plan during an actual radiological emergency and to maintain the effectiveness of the plan so that adequate protective measures can and will be taken in the event of a radiological emergency. Accordingly, this regulatory requirement is frequently cited in enforcement actions taken within the EP cornerstone.

Although the Commission's emergency preparedness regulations generally refer to the onsite emergency plan as a stand-alone document, the continued effectiveness of the emergency plan greatly depends on the actions of site (and perhaps corporate) personnel outside of the typical emergency planning organization. Much of the instrumentation and communication equipment relied on in the emergency plan is maintained and controlled outside of the typical emergency planning organization. Several enforcement actions in the past few years have been associated with EALs being rendered ineffective by configuration changes made to instruments referenced in the EAL without the change being reflected in the EAL, or without a compensatory action being put into place. Examples include modifications to installed seismic instruments that eliminated the direct readout of acceleration needed for classifying a seismic event and changes in reactor vessel level criteria (in a boiling water reactor) being made without a conforming change being made to the EAL. In another finding, concrete barriers installed in a security-initiated change blocked a site access road required by the emergency plan to be used for site evacuation. Based on its experience in reviewing root cause analyses and corrective actions associated with inspection findings, the NRC staff believes that an underlying cause of these occurrences is often that the plants' configuration control programs may not adequately consider the impact of configuration changes on the effectiveness of the emergency plan.

Although 10 CFR 50.54(q) requires the licensee to "maintain in effect" its emergency plan, the staff finds that this language is not adequately clear in conveying the NRC's

⁴ There are several paired requirements in the current 10 CFR 50.54(q) that differ only in the applicability of the planning standards in 10 CFR 50.47(b) to power reactors. The staff would propose language to eliminate the need for paired requirements (e.g., "...which meet the requirements in appendix E to this part and, for nuclear power reactors, the planning standards of 10 CFR 50.47(b)").

expectations. Accordingly, the staff believes that clarification is needed to convey the NRC expectation that maintaining an emergency plan also requires maintaining the various capabilities and functions on which the plan relies.

The following is stated in 10 CFR 50.54(q):

The nuclear power reactor licensee may make changes to these plans without Commission approval only if the changes do not decrease the effectiveness of the plans and the plans, as changed, continue to meet the standards of § 50.47(b) and the requirements of appendix E to this part. The research reactor and/or the fuel facility licensee may make changes to these plans without Commission approval only if these changes do not decrease the effectiveness of the plans and the plans, as changed, continue to meet the requirements of appendix E to this part.

The regulations do not define the term “decrease the effectiveness” or identify the type of changes that would constitute a decrease in effectiveness. In 1998, the NRC issued Emergency Preparedness Position (EPPOS) 4, “Emergency Plan and Implementing Procedure Changes,” to provide guidance to NRC inspectors regarding their review of licensees’ emergency plan changes. In 2004, the NEI submitted two white papers proposing a definition of “reduction in effectiveness” for NRC consideration. The staff could not reach consensus with NEI and thus did not endorse the NEI guidance. In 2005, the NRC withdrew EPPOS-4 and issued RIS 2005-02, “Clarifying the Process for Making Emergency Plan Changes,” dated February 14, 2005, to (1) clarify the meaning of decrease in effectiveness, (2) clarify the process for making changes to emergency plans, and (3) provide some examples of changes that are not decreases in effectiveness. Although RIS 2005-02 provides pertinent guidance, the NRC and NEI continue to discuss ways to improve the 10 CFR 50.54(q) change process, including the use of a regulatory framework parallel to that of 10 CFR 50.54(a)(3) for quality assurance programs, 10 CFR 50.54(p)(2) for safeguards plans, and 10 CFR 50.59, “Changes, Tests, and Experiments.”

6.2.3. Options Considered to Resolve the Problem

6.2.3.1. Take no action

This option would maintain the status quo. There would be no definition of the “follow and maintain in effect” requirement in 10 CFR 50.54(q) and no definition of which emergency plan changes constitute a reduction in effectiveness. There would be no defined process for changes that warrant NRC prior review. As a result, inefficiencies and ineffectiveness in the use of licensee and staff resources would continue in the absence of the proposed clarifications. Enhancements for consistent and predictable implementation and enforceability would not be made.

6.2.3.2. Use a voluntary program

In 2004, NEI submitted two white papers to clarify the characteristics of emergency plan changes that should be considered to be decreases in effectiveness. The NRC staff did not endorse NEI’s white paper due to the need for definition of the terms “subjecting” and “enforceability”. Although regulatory guidance, and perhaps industry guidance, may ultimately

be part of the solution,⁵ the staff believes that the fundamental definitions and requirements need to be codified to ensure consistent and predictable implementation and enforceability. Similarly, the staff believes that proposed amendments to define the term “maintain in effect,” as well as the proposed process for emergency plan changes requiring prior NRC review, need to be codified to ensure consistent and predictable implementation and enforceability. Accordingly, the staff considers this option to be unacceptable.

6.2.3.3. Implement the proposed regulation

The NRC staff believes that an amendment to the regulations, as described below, supplemented as necessary by regulatory guidance, would be the best course of action and would ensure that (1) the effectiveness of the EP plans would be maintained; (2) changes to the approved emergency plan would be properly evaluated; and (3) any change that reduces the effectiveness of the plan, or that is an alternative approach to the methods identified in the regulatory guide, would be reviewed by the NRC prior to implementation. The staff also believes that these rule changes would promote consistent and predictable implementation and enforcement, while minimizing inefficient and ineffective use of licensee and staff resources. Although RIS 2005-02 provides pertinent guidance, the desirable changes in structure and content of 10 CFR 50.54(q) require rulemaking. The NRC would issue regulatory guidance concurrently with the implementation of the amended rule language and would consider stakeholder-developed and –proposed guidance as an alternative to NRC-developed guidance.

Changes to the regulations would define the phrase “reduction in the effectiveness” and supplement the definition with examples of those types of changes that would not reduce the effectiveness of the plan in a regulatory framework parallel to that of 10 CFR 50.54(a)(3), 10 CFR 50.54(p)(2), and 10 CFR 50.59. Also, the regulations should be clarified to state that emergency plan changes that would have the effect of reducing the effectiveness of said plans would need to be submitted under the license amendment process provided by 10 CFR 50.90.

6.3 Emergency Classification Timeliness

[Note: The proposed rule refers to this issue as Emergency Declaration Timeliness]

6.3.1. Regulatory Problem Background and Definition

The current EP regulations do not establish timeliness criteria for the emergency classification process. In its oversight of licensee EP programs, the NRC staff has occasionally observed a lack of urgency by a few licensees in performing emergency classifications and has issued generic communications in this regard. (These generic communications are discussed further in the next section.) A timeliness goal for completing classifications was provided in one of these communications and licensee compliance with this timeliness goal is tracked by the voluntary EP cornerstone performance indicators. Although licensee performance in the performance indicator remains high, the staff continues to identify licensee classification delays during actual emergency events.

⁵ See Regulatory Guide 1.187, “Guidance for Implementation of 10 CFR 50.59 Changes, Tests, and Experiments,” which endorsed NEI 96-07, “Guidelines for 10 CFR 50.59 Evaluations.”

The process of determining an emergency classification involves the plant operators' recognition of an abnormal plant condition via indications on plant instrumentation, including alarms, or via verbal reports from plant personnel (e.g., reports of fire) or persons outside of the plant (e.g., severe weather warnings). The plant operators assess the validity of these indications or reports by instrument checks, comparing indications on redundant instruments, or dispatching personnel to confirm reports. After validating the indication or report, the plant operators then compare the condition to the EAL thresholds in the emergency classification scheme. Not all abnormal conditions would be immediately obvious, and not all indications would be unambiguous. While some conditions can be classified on recognition, others require assessment. In any case, the staff expects the resulting emergency classification to be declared as soon as possible when conditions warrant such a declaration. The staff established this expectation in an EPPOS-2, "Timeliness of Classification of Emergency Conditions." Licensees are expected to have an on-shift capability (e.g., adequate qualified personnel on shift, adequate procedures) to classify plant conditions promptly without affecting plant operations. Nonetheless, the staff recognizes that there may be unanticipated situations during an actual emergency in which plant operators may slightly delay classifications in the interest of performing critically needed actions to mitigate the event. The staff may find such delays justifiable if they do not have the effect of precluding the OROs from performing actions necessary to protect the public.

By its very nature, an emergency instills a sense of urgency and dictates the necessity for prompt action, a fundamental aspect of a licensee's EP program. The intent of the emergency classification scheme is to provide an effective mechanism to rapidly identify and classify abnormal plant conditions into one of the four emergency classifications. Subsequent ERO and ORO response actions and measures are implemented in a staged manner proportional to the declared emergency classification. If an emergency classification is delayed, the subsequent emergency response actions, including notification of OROs, may not be timely and emergency response personnel, facilities, and equipment may not be in position if it becomes necessary to implement measures to protect the public health and safety. Timeliness of emergency classifications is, therefore, critical in minimizing the consequences of a radiological emergency.

6.3.2. Existing Regulatory Framework

Title 10, Section 50.47, "Emergency Plans," of the *Code of Federal Regulations* (10 CFR 50.47), provides for the development of onsite and offsite EP plans and procedures that provide reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. The planning standards in 10 CFR 50.47(b) identify requirements that onsite and offsite emergency response plans must meet. In particular, 10 CFR 50.47(b)(4) states that:

A standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters, is in use by the nuclear facility licensee, and State and local response plans call for reliance on information provided by facility licensees for determinations of minimum initial offsite response measures.

In Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," to 10 CFR Part 50, Sections IV.B and IV.C expand on these requirements within the context of the licensee's plans. However, neither these sections nor 10 CFR 50.47(b)(4) establishes a timeliness criterion for the emergency classification function as a programmatic capability or as an ERO performance standard.

The NRC's emergency planning regulations establish timeliness criteria which are applicable following the declaration of an emergency. Section IV.D.3 of Appendix E to 10 CFR Part 50, states in part the following:

A licensee shall have the capability to notify responsible State and local governmental agencies within 15 minutes after declaring an emergency.... By February 1, 1982, each nuclear power reactor licensee shall demonstrate that administrative and physical means have been established for alerting and providing prompt instructions to the public within the plume exposure pathway EPZ.... The design objective of the prompt public notification system shall be to have the capability to essentially complete the initial notification of the public within the plume exposure pathway EPZ within about 15 minutes.

The existence of this 15-minute ORO notification capability requirement and the 15-minute public alert and notification system design objective supports the sense of urgency and the necessity for prompt action and implies that classification should also proceed with a similar urgency. Unwarranted delays in classification defeat the intent of prompt notification of OROs and prompt public warning.

In 1985, the NRC published Information Notice 85-80, "Timely Declaration of an Emergency Class, Implementation of an Emergency Plan, and Emergency Notifications," to describe an instance when an emergency condition was not classified and declared in a timely manner. In the text of the IN, the NRC described circumstances of classification delays and stated the following:

Licensees should not delay the declaration of an Emergency Class when conditions warrant such a declaration. Delaying the declaration can defeat the appropriate response to an emergency. It is the licensee's responsibility to ensure that adequate personnel, knowledgeable about plant conditions and emergency plan implementing procedures, are available on shift to assist the shift supervisor to classify an emergency and activate the emergency plan, including making appropriate notifications, without interfering with plant operation.

In 1995, the NRC published EPPOS-2, "Timeliness of Classification of Emergency Conditions," in response to the failure of some licensees to classify and declare an actual event and observations of a lack of urgency in performing emergency classifications. EPPOS-2 expressed the NRC staff's expectation that the classification should be made promptly following indications that conditions have reached an EAL threshold and that 15 minutes would be a reasonable goal for completing the assessment and classification once the indications are available to the control room operators.⁶ EPPOS-2 also stated that this 15-minute period should not be viewed as a grace period in which a licensee could resolve a condition that had already exceeded an EAL threshold to avoid an emergency declaration. EPPOS-2 did note that the 15-minute goal was not a regulatory requirement but was rather a guideline for staff evaluation of a licensee's performance in responding to an actual radiological emergency.

⁶ This technical basis refers to "control room operators" and "control room" for convenience. The staff notes that rule language would need to be broad enough to capture classifications performed in the technical support center or other emergency response facilities as described in the licensees' plans.

The NRC staff considered three major factors in establishing a reasonable period of time for operators to assess and classify an emergency condition. First, as discussed above, there is an inherent need to rapidly communicate plant conditions to OROs during a radiological emergency. Second, current NRC regulations and regulatory guidance call for the development of emergency classification schemes incorporating EALs based on clearly observable in-plant conditions and instrumentation, in addition to onsite and offsite monitoring. These EALs are developed with clearly defined thresholds that can be readily identified with a minimum of assessment and evaluation and with an objective evaluation of emergency conditions. Emergency classification schemes have reached a level of maturity that enables emergencies to be classified in a relatively short time once cognizant licensee personnel know of the abnormal condition and associated plant parameters. Third, as IN 85-50 states, the licensee must ensure that adequate personnel, knowledgeable about plant conditions and emergency plan implementing procedures, “are available to assist the shift supervisor to classify an emergency...without interfering with plant operation....” Obviously, assigned collateral duties must not be allowed to interfere with emergency classifications.

After considering these factors, the staff developed the following guidelines provided in EPPOS-2:

- Emergency classifications should be made promptly following the receipt of information that plant conditions have or may have reached an EAL threshold;
- A 15-minute goal allows a reasonable period of time for assessing and classifying an emergency once indications are available to control room operators that an EAL threshold has or may be exceeded;
- A delay in classifying an emergency for up to 15 minutes would have minimal impact upon the overall emergency response and protection of public health and safety; and
- The 15-minute assessment and classification period must not be interpreted as a grace period in which a licensee may attempt to restore plant conditions to clear an EAL threshold that has been exceeded.

When the NRC developed the voluntary EP cornerstone performance indicators, the industry incorporated comparable guidance into NEI 99-02, “Regulatory Assessment Performance Indicator Guideline.” The NRC endorsed the use of NEI 99-02 in RIS 2000-08, “Voluntary Submission of Performance Indicator Data,” issued March 28, 2000. Under this voluntary program, an emergency classification opportunity is categorized as a failure if the classification process does not meet this timeliness goal.⁷

The NRC staff incorporated comparable criteria in the “Emergency Preparedness Significance Determination Process” (Appendix B to Inspection Manual Chapter (IMC) 0609, “Significance Determination Process”) for assessing whether the licensee’s program has the capability of classifying an emergency condition within the timeliness goal and the significance of not having

⁷ Since the PI combines licensee performance in emergency classifications, notifications, and protective action recommendations into a single indicator, weaknesses in emergency classifications can be masked by strengths in the other two metrics. As such, the PI is not an unambiguous indicator of performance in classification.

that capability. During the development of Appendix B to IMC 0609, the staff determined that there may be defensible extenuating circumstances for an emergency classification to be delayed beyond 15 minutes during an actual radiological emergency, provided that the situation meets the following conditions:

- The delay has a minimal impact on the implementation of adequate measures to protect the public health and safety;
- The delay was caused by a licensee actively performing another action immediately needed to protect the public health and safety such that a delay in classification represents the lesser risk;
- The cause of the delay was not reasonably within the licensee's ability to foresee and prevent; and
- The delay did not deny OROs the opportunity to implement actions to protect the public health and safety.

Although regulatory guidance is an appropriate mechanism for identifying acceptable means for complying with broadly worded regulatory requirements, there is currently no regulatory requirement, broad or otherwise, that emergency classifications meet any timeliness criterion.

6.3.3. Options Considered to Resolve the Problem

6.3.3.1. Take no action

This option would maintain the status quo and there would continue to be no explicit regulatory requirement for the timeliness of emergency classifications, and without such a criterion, the regulatory problem with delayed classifications would likely continue. The staff's ability to pursue enforcement actions for untimely classifications would continue to be impaired because of the absence of an explicit classification timeliness performance standard in regulation (i.e., a violation of a regulation can be cited only against the requirements that exist in the regulation). Thus, the staff considers this option unacceptable.

6.3.3.2. Use a voluntary program

The NRC could continue to rely on the industry-developed PIs for drills and exercises. NEI 99-02 incorporates a drill and exercise performance (DEP) PI, which is part of the Reactor Oversight Process (ROP). This indicator monitors the timeliness and accuracy of licensee performance during simulator training evaluations, drills and exercises, actual events, and other performance-enhancing experiences that have opportunities for evaluation of ERO performance in classification, notification, and development of PARs. The associated DEP PI guidance provides a timeliness goal of 15 minutes for classifications. However, this timeliness expectation is not directly enforceable since there is no timeliness criterion in regulations. Also, the structure of the DEP PI has the effect of averaging the performance in all classifications, notifications, and PAR developments observed in all performance opportunities (i.e., the successes in classifications, notifications, and PAR developments are summed together and then divided by the total number of opportunities), which may mask lesser performance in classifications during the infrequent actual events.

The two major components of the NRC's ROP are the PIs discussed above and the baseline and supplemental inspection program. The NRC recognizes that the licensee's self-assessment of ERO performance, and the trending of that performance, allows a licensee to identify performance weaknesses and to take necessary corrective actions that increase the likelihood of acceptable performance during an actual event. Should a licensee's performance decrease below certain thresholds, the licensee's program would enter the regulatory response column, and the NRC would perform supplemental inspections. However, although the staff may consider the timeliness criterion in assessing the significance of an inspection finding, the staff's ability to implement enforcement action arising from a resulting supplemental inspection is impaired in that there is no timeliness criterion in the regulations.

The NRC staff notes that the industry DEP PI guidance finds that the 15-minute goal provides a reasonable period of time for assessing and classifying an emergency once indications are available to control room operators that an EAL "...has been exceeded." Although EPPOS-2 used similar language, the staff's intent was for the classification clock to start when the information is available to the control room operators that an EAL may be exceeded. The staff notes that the purpose of the emergency classification process is to assess the abnormal conditions, compare those conditions to the EAL thresholds, and to declare the emergency. Once the licensee has concluded that the EAL has been exceeded, the assessment is complete, and the emergency condition should be promptly declared.

Placing a timeliness criterion into a regulation would facilitate consistent application by the licensees, as well as provide the NRC with a regulatory framework to consistently enforce expectations. As such, the NRC staff does not consider the voluntary program option to be acceptable.

6.3.3.3. Implement the proposed regulation

The NRC staff believes that an amendment of the regulations would be the best course of action to ensure that licensees can and will complete emergency classifications in a timely manner in a radiological emergency. The staff considered amending 10 CFR 50.47(b)(4), 10 CFR Part 50, Appendix E, Sections IV.B, IV.C, or IV.D, or a combination of all.

- 10 CFR 50.47(b) requires that onsite and offsite emergency response plans meet the planning standards established in 10 CFR 50.47(b)(1) through 10 CFR 50.47(b)(16). These planning standards are broadly worded statements of the elements that onsite and offsite emergency response plans must address to provide reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. Specific performance criteria are not identified in 10 CFR 50.47(b). These planning standards were incorporated into FEMA regulations at 44 CFR 350.5, and into the jointly prepared NUREG-0654/FEMA-REP-1, Revision 1, which provides specific evaluation criteria for each planning standard. As such, revising 10 CFR 50.47(b)(4) would require conforming changes to the FEMA regulations as well as to NUREG-0654/FEMA-REP-1, which would unnecessarily complicate this rulemaking and is not necessary to achieve the intended regulatory action for the reasons provided below.
- Section IV of Appendix E to 10 CFR Part 50, supplements the broad planning standards of 10 CFR 50.47(b) and provides additional planning

elements that are specifically applicable to NRC licensees. Appendix E does provide numeric performance standards for other issues, thereby establishing a precedent. For example, Section IV.D.3 requires a capability for notifying OROs within 15 minutes after declaring an emergency. Section IV.D.3 also provides a design objective for the public alert and notification system ("essentially complete initial notification of the public within the EPZ within about 15 minutes"). Within Appendix E, Section IV.B, "Assessment Actions," addresses EALs; Section IV.C, "Activation of Emergency Organization," addresses EALs in the context of activating the ERO and ORO; and Section IV.D, "Notification Procedures," addresses the means for notifying OROs, providing instructional material to the public, providing numeric performance standards for notification of the ORO, and providing design standards for the public alert and notification system.

Accordingly, the NRC should amend Section IV.C of Appendix E to 10 CFR Part 50 by adding a new subparagraph that would provide a timeliness criterion. The bases of this decision are: (1) The planning standards in 10 CFR 50.47(b) are generally applicable to both onsite and offsite emergency response plans and would require conforming changes by FEMA; (2) The planning elements in Appendix E to 10 CFR Part 50 are applicable only to the licensee and would not require conforming changes by FEMA; (3) The timeliness criteria are applicable only to the licensee; (4) There is a precedent for numeric performance criteria currently in Appendix E; and (5) Amending 10 CFR 50.47(b)(4) would require a conforming change to FEMA regulations and to NUREG-0654/FEMA-REP-1. Within Appendix E, Section IV.C would be revised because classification of an emergency is an assessment action, and Sections IV.C and IV.D address actions that occur once the emergency has been declared.

The NRC staff also considered whether to add the timeliness criterion in the form of a capability requirement (such as that contained in Section IV.D.3) or in the form of an ERO performance criterion (such as "the licensee shall classify and declare the emergency within 15-minutes"). Given the precedent in Section IV.D.3, the staff is proposing that the timeliness criterion require the capability to classify and declare the emergency within 15 minutes from when information becomes available that an EAL threshold may be exceeded. The staff believes that by specifying the capability to classify, the licensee would be required to demonstrate that its procedures, ERO training, EAL scheme, ERO staffing, and hardware support meet the timeliness criterion during a radiological emergency. The NRC can evaluate this capability during routine baseline inspections and supplemental inspections, and if it finds the capability lacking, can initiate enforcement action, thereby allowing the deficiency to be addressed prior to an actual event occurring. In addition, by specifying a capability criterion, the regulation would inherently provide for extenuating circumstances in which the licensee may need to delay classifications in the interest of performing higher priority actions necessary to protect public health and safety. Accordingly, the NRC should pursue a capability criterion rather than a performance criterion.

If, during an actual radiological emergency, a licensee ERO fails to complete the classification as specified in the capability criterion and there are no extenuating circumstances, the licensee's performance would be contrary to the "shall follow and maintain" language of 10 CFR 50.54(q). As such, the overall objective—ensuring the timeliness of emergency classifications—would still be achieved using a capability criterion rather than a performance criterion.

Appendix A: Inspection Guidance, NRC Documents, and Non-NRC Documents Needing Revision

Inspection Guidance

NRC Inspection Manual, "Inspection Procedure (IP) 71114 Reactor Safety - Emergency Preparedness," June 29, 2006.

NRC Inspection Manual, "IP 71151 Performance Indicator Verification," June 28, 2007.

NRC Inspection Manual, "IP 82001 Evaluation of Emergency Preparedness," May 22, 2000.

NRC Inspection Manual, "Attachment 95003.01 Emergency Preparedness," January 15, 2009.

NRC Inspection Manual, "Manual Chapter 0609 Significance Determination Process," August 5, 2008.

NRC Documents

NUREG-0654/FEMA-REP-1, Rev. 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," November 1980.

NUREG-0696, "Functional Criteria for Emergency Response Facilities," February 1981.

NUREG-0737, "Clarification of TMI Action Plan Requirements," Supplement 1, "Requirements for Emergency Response Capabilities," January 1983.

NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," Chapter 13.3, "Emergency Planning," Rev. 3, March 2007.

NUREG-1022, Rev. 2, "Event Reporting Guidelines: 10 CFR 50.72 and 50.73," October 2000.

NUREG/CR-4831, PNNL-776, "State of the Art in Evacuation Time Estimate Studies for Nuclear Power Plants," March 1992.

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Regulatory Guide 1.101, Rev. 5, "Emergency Response Planning and Preparedness for Nuclear Power Reactors," June 2005.

10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants."

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Non-NRC Documents

44 CFR Part 350, "Review and Approval of State and Local Radiological Emergency Plans and Preparedness."

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NEI 99-02, Rev. 5, "Regulatory Assessment Performance Indicator Guideline," July 2007.

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, "GM PR-1, Policy on NUREG-0654/FEMA-REP-1 and 44 CFR Periodic Requirements," October 1, 1985.

FEMA-REP-10, "Guide for the Evaluation of Alert and Notification Systems for Nuclear Power Plants," June 1, 1997.

FEMA, "Civil Preparedness Guide (CPG) 1-17 Outdoor Warning Systems Guide," March 1, 1980.

FEMA, "Appendix A to Part 353—Memorandum of Understanding Between Federal Emergency Management Agency and Nuclear Regulatory Commission," September 14, 1993.

Appendix B: Judicial Proceedings

ANS Design Objectives

The ASLAB has interpreted the satisfaction of the acceptance criteria in NUREG-0654, Appendix 3, Sections B.2.b and B.2.c, as follows:

The Commission previously has indicated that, as the guidance embodied in NUREG-0654, Appendix 3, Criteria B.2.b. and c., reflects, while a warning system should “assure direct coverage of essentially 100% of the population within 5 miles of the site,” there is some flexibility in terms of the percentage of population coverage that must be obtained by the warning system at a distance of more than five miles from the facility. Specifically, the Commission has declared that “[t]he lack of a specified percentage from 5 to 10 miles is to allow planners the flexibility to design the most cost-effective system to meet [the general objective of providing an alert signal and an informational/instructional message in the 10-mile EPZ within 15 minutes].” ...FEMA’s Guidance Memorandum AN-1, in addressing qualification of alert and notification systems under NUREG-0654, provides that “[a]lert and notification systems must also be capable of providing an alert signal and an instructional message within 15 minutes between 5 and 10 miles of the facility. However, in extremely rural, low population areas beyond 5 miles, up to 45 minutes may be allowed for providing an alert signal and an instructional message to the permanent and transient population.” (*Public Service Company of New Hampshire, et al.* (Seabrook Station, Units 1 and 2), ALAB-935, 32 NRC 57, 72, n. 55 (1990))

Although the ASLAB noted the flexibility provided by the guidance criteria, it also cautioned against overlooking the fundamental criteria:

[T]he geographic distinction embodied in NUREG-0654, Appendix 3, Criteria B.2.b and c., affords some latitude in providing notification to the remote areas in the portion of the EPZ that is 5 to 10 (or more) miles away from the facility. It does not, however, sanction a warning system whose design fails to provide an alert signal and an informational/instructional message to more populated areas throughout the entire EPZ, including the 5 to 10 mile portion, within 15 minutes. (Id.)

Additional interpretation of what direct coverage of essentially 100 percent of the population within 5 miles means appears in an Atomic Safety and Licensing Board (ASLB) proceeding involving Shearon Harris (*Carolina Power & Light Company and North Carolina Eastern Municipal Power Agency* (Shearon Harris Nuclear Power Plant), LBP-86-11, 23 NRC 294 (1986)). The ASLB determined that greater than 95-percent arousal would be acceptable for the first 5 miles and based this on the Commission position that not every person must be alerted and that Appendix E to 10 CFR Part 50 requires only “essentially” complete alerting. The ASLB did not directly establish a criterion for the outer 5 miles, noting that the evidentiary record established that the level of alerting in the outer 5 miles was sufficiently high. However, in its decision, the Board determined that the fraction of population alerted would be 91 percent

which "...clearly satisfies the 15-minute notification requirement" for the outer 5 miles. In arriving at the 91-percent estimate, the ASLB considered sirens and informal alerting. The ASLB also found that route alerting would cover 30 to 40 percent of the EPZ population (most of whom would already be alerted) within about 15 minutes after the decision was made to notify the public and would be completed in about 45 minutes. The Board determined that the combined effect of sirens and informal alerting would arouse 91 percent of the residents in the first 5 miles, which is less than the 95 percent criterion developed by the Board. The applicant committed to installing tone alert radios throughout the first 5 miles. The Board determined that, with the proposed tone alert radios, there would be 98.5-percent arousal. (*Id.* at 396, 397)

Backup ANS Capabilities

In a case involving Wolf Creek (*Kansas Gas & Electric Company* (Wolf Creek Generating Station, *et al.* (Unit 1), LBP-84-26, 20 NRC 53 (1984))), the ASLB rendered an initial decision related to the issuance of the operating license for the plant. The cited issues were related to notification of people in an area outside siren coverage, boaters, farmers in their fields, and the hearing impaired. The Board found all issues to be without merit and stated (with regard to provisions for a backup method) the following:

If a siren should fail to operate during an emergency, the Sheriff's patrol cars and fire department vehicles on an *ad hoc* basis would be sent to notify the residents in that area; however, NUREG-0654 does not require that such a redundant means of notification be set forth in the County Plan. (*Id.* at 95)

In a case involving Shoreham (*Long Island Lighting Company* (Shoreham Nuclear Power Station, Unit 1), LBP-85-12, 21 NRC 644 (1985)), the ASLB addressed a contention asserting that route alerting could not be accomplished within 15 minutes in the event of siren failures. Citing a ruling in an Indian Point case (*Consolidated Edison Company of New York* (Indian Point, Unit No. 2), *Power Authority of the State of New York* (Indian Point, Unit No. 3), LBP-83-68, 18 NRC 811, 939 (1983)) in which the Board had stated, "[c]learly, if the siren alerting system will not work during a power failure, a route alerting system may be necessary," the Shoreham ASLB also noted that there is no requirement that the route alerting system function in 15 minutes and stated (with regard to the performance of a backup method for alerting special facilities) the following:

We find this contention also without merit. The feature of the [utility] Plan of which it complains is, once more, an effort to exceed compliance with the strict requirements, a backup to a backup. We cannot fault it for being less immediate than the primary means of notification. (21 NRC 761)

Other adjudicatory proceedings have also noted that requirements for providing a backup means of notification if the primary means is unavailable are either lacking or unclear. In an ASLB ruling that addressed several contentions involving demonstration of the Shoreham offsite emergency plan (Shoreham ASLB LBP-88-2 (27 NRC 85)), one of the contentions dealt with the timeframe for performing backup route alerting called for in the utility offsite emergency plan. The NRC staff position was that the time for completing backup alerting is essentially discretionary. The applicant asserted that the 15-minute and 45-minute time limits for public notification do not apply to the discretionary backup route alerting, and that guidance provided by FEMA in Guidance Memorandum (GM) AN-1, "FEMA Action to Qualify Alert and Notification Systems Against NUREG-0654/FEMA-REP-1 and FEMA-REP-10," for assessing and

determining the adequacy of an ANS was fully consistent with this position. The ASLB ruled as follows:

We do not agree with Intervenor that NUREG-0654 requires that backup alerting be accomplished within 45 minutes. Rather, we believe a more reasonable interpretation to be that initial notification of residents in certain hard-to-reach areas of the EPZ which are more than 5 miles from the plant must be accomplished within 45 minutes. This is the position adopted in GM AN-1. Requiring the same speed for backup route alerting would not make regulatory sense. Under the interpretation urged by Intervenor, a licensee would be required to provide a discretionary backup notification system that essentially meets the criteria of the mandatory primary system that has failed....

GM AN-1 ... states that there is "no hard and fast time requirement for completing the backup route alerting process."

We find that there is no requirement that backup route alerting be completed within 45 minutes....

In the above proceeding, the ASLB also noted that the NRC staff and applicant statements differed on whether backup route alerting is a requirement but decided that it did not need to determine the validity of the NRC staff's assertion that backup route alerting was mandatory because the applicant's offsite emergency plan already called for a backup means.

EOF Performance Based Approach

In an early decision concerning the importance of an EOF, the Commission emphasized the need for face-to-face communications, as stated in the following:

[T]he EOF is the ideal place for face-to-face communications regarding protective action recommendations between federal, state and local officials, and the Licensee official charged with making the recommendation to the [State]. The Commission does not believe.....that telephonic communications between the governmental officials in the EOF and the Licensee's decisionmaker in the control room provide an equivalent opportunity for an exchange of information. The Commission views the opportunity for face-to-face communications as the best means to exchange pertinent information between Government officials and the Licensee and to formulate protective action recommendations, particularly when it is essential that there not be misunderstandings between those involved. (*Metropolitan Edison Company* (Three Mile Island Nuclear Station, Unit No. 1), CLI-83-22, 18 NRC 299, 308 (1983)).

Evacuation Time Estimate Updating

Issues related to ETEs have been among the most contentious and heavily litigated topics in the licensing of nuclear power plants following the issuance of the amended emergency planning regulations in 1980; hence, the adjudicatory record is extensive. The NRC staff presented its view on the litigation of ETEs in a memorandum to the Commission dated June 29, 1989. In this memorandum, the staff stated that interveners have interpreted the NRC regulatory

requirement to provide ETEs in the emergency plans as a requirement to meet some predetermined evacuation times and that the precision of the ETEs has been litigated beyond their intended purpose in planning or their utility during an emergency. A summary of the adjudicatory rulings related to ETEs follows.

ETEs are used for two principal purposes. The first is to provide decision makers in an emergency with knowledge of the length of time to effect evacuation under various conditions, thus allowing an informed choice of protective actions (e.g., evacuation versus in-place sheltering) and, second, to identify those areas or routes in the vicinity of a site where bottlenecks are likely to occur and traffic control would be appropriate. *Duke Power Company, et al.* (Catawba Nuclear Power Station, Units 1 and 2), LBP-84-37; 20 NRC 933 (1984); *Public Service Company of New Hampshire, et al.* (Seabrook Station, Units 1 and 2), LBP-83-32A, 17 NRC 1170 (1983).

Neither NRC regulations nor NUREG-0654 establishes a standard for effectuating evacuations within a given time. An ETE does not attempt to predict exact conditions during an evacuation. Rather, it attempts to indicate the sensitivity of the analysis to a number of commonly occurring events. *Philadelphia Electric Company* (Limerick Generating Station, Units 1 and 2), LBP-85-25, 22 NRC 101, 109 (1985); LBP-85-14, 21 NRC 1219, 1243–44 (1985).

ETEs are for use by emergency response officials who must recommend and decide on protective actions in an emergency. Evacuation would be called for when it would result in dose savings to the population. There is no standard for judging the adequacy of evacuation routes, nor has a minimum evacuation time been set. Additional roads and highways would reduce the time for evacuation, but there is no requirement that roads be built for that reason or that existing roads be upgraded. There are, therefore, no criteria for deciding, in the words of the contention in this case, whether “the roads and highway necessary for such evacuation are inadequate.” Estimates are required of the time needed to evacuate the entire population within the plume EPZ over the presently existing roads. Since such estimates form the basis for protective action decisions, ETEs must be reasonably reliable, neither too short nor too long. *Louisiana Power and Light Company* (Waterford Steam Electric Station, Unit 3), LBP-82-100, 16 NRC 1550, 1561, 1575 (1982).

The primary purpose of an ETE is to serve as a tool for the protective action decision-making process by providing a framework within which decision makers can incorporate input on evacuation characteristics and traffic flows at the time of an actual emergency. Thus, ETEs are intended to be representative and reasonable in order to reflect realistic conditions. An overly conservative ETE could result in an inappropriate protective action decision. *Philadelphia Electric Company* (Limerick Generating Station, Units 1 and 2), LBP-85-14, 21 NRC 1219, 1243 (1985).

Evacuation time estimates need not include an analysis of worst-case scenarios. Neither NRC regulations nor NUREG-0654 criteria contemplate such an analysis. ETEs are intended to be representative and reasonable so that any protective action decision based on them will reflect realistic conditions. *Philadelphia Electric Company* (Limerick Generating Station, Units 1 and 2), LBP-85-25, 22 NRC 101, 109 (1985); LBP-85-14, 21 NRC 1219, 1244 (1985).

ETEs should be as realistic as is reasonably achievable. It would be imprudent to incorporate unnecessary conservatism in ETEs for overestimates of evacuation times could lead to the selection of the wrong protective action in a radiological emergency. *Carolina Power & Light*

Company and North Carolina Eastern Municipal Power Agency (Shearon Harris Nuclear Power Plant), LBP-85-27A, 22 NRC 207, 215 (1985).

There is an inherent danger in basing time estimate studies on only worst-case scenarios as this could lead to advising the population to shelter when evacuation is feasible and safer. Moreover, there is an overwhelming probability that any accident would occur during the time periods defined as “normal” or “adverse” weather as defined in Appendix 4 to NUREG-0654. If decision makers only had worst-case estimates available to them, they would be denied the flexibility essential to making a realistic determination of what protective action recommendation would best serve the public health and safety. Thus, the “normal” and “adverse” weather conditions used in the applicant’s ETE study are appropriate and provide the best information to emergency planning officials for use in their decision-making. *Duke Power Company, et al.* (Catawba Nuclear Station, Units 1 and 2), LBP-84-37, 20 NRC 933, 997 (1984).

ETEs are needed to plan for traffic control and to aid in the decision to advise sheltering or evacuation in an emergency. Conservative assumptions do not aid these goals. The time estimates must be realistic since wrong decisions concerning evacuation may be made if based on overly conservative estimates. *Pacific Gas and Electric Company* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), LBP-82-70, 16 NRC 756, 785 (1982).

In the *Byron* proceeding, the Licensing Board concluded that if evacuation is the only course open to the protective action decisionmaker, overestimating the traffic time assumptions would not help in making a decision and in fact ETEs would have greatly reduced importance. Where decision makers must select from more than one protective action, any departure from realistic ETEs could influence their decisions away from safety. The Board required the applicant to modify its ETE to reflect realistic traffic time estimates. It said conservatism could remain in the study provided that they were clearly identified and quantified. *Commonwealth Edison Company* (Byron Nuclear Power Station, Units 1 and 2), LBP-84-2, 19 NRC 36, 263 (1984).

Although ETEs are useful devices to aid in the protective action decision-making process, such estimates are only one of the tools that decision makers will use. The ETEs cannot possibly evaluate every conceivable evacuation scenario. Information about delays resulting from specific roadway conditions is best obtained at the time of the emergency from knowledgeable local officials. The county and State emergency response organizations will use the ETEs as a baseline that can be modified by their own judgment based on an informed evaluation of then-current conditions. For example, under a condition in which evacuation is not feasible, such as a heavy snowfall, the amount of time necessary to make the road passable would be considered in conjunction with the evacuation time study. *Consumers Power Company* (Big Rock Point Plant), LBP-84-32, 20 NRC 601, 693 (1984).

Emergency response plans need not be in final form at the time an operating licensing application is noticed for hearing. It is also correct that there are no prescribed time limits governing evacuation of plume EPZs. However, evacuation plans should be concerned with the efficiency with which evacuation might be accomplished given the conditions under which it must take place because the goal of emergency planning is the achievement of maximum dose savings in a radiological emergency. For informed decision-making, responsible government officials must have available to them time estimates that are realistic appraisals of the minimum period in which, in light of existing local conditions, evacuation could reasonably be accomplished. *Cincinnati Gas and Electric Company, et al.* (Wm. H. Zimmer Nuclear Power Station, Unit 1), ALAB 727, 17 NRC 760, 770–771 (1983).

The regulations do not require that time estimates for evacuation be less than a specified time period. The purpose of the time estimates is to supply decision makers with an appropriate basis for determining whether evacuation can be carried out successfully in advance of potential radiation exposures under the circumstances at that time. *Southern California Edison Company, et al.* (San Onofre Nuclear Generating Station, Units 2 and 3), LBP-82-39, 15 NRC 1163, 1185 (1982).

NRC rules set no time limit on evacuation. The NRC does not, and in the nature of things, probably could not, require that if evacuation were to begin precisely when a plume was released, evacuation could always be a step ahead of the plume. What the NRC rules do call for is that ETEs be part of the plans, to add to the information that would enable emergency response officials to choose wisely between sheltering and evacuation, both when evacuation is feasible before plume passage and when it is not. *Carolina Power & Light Company, et al.* (Shearon Harris Nuclear Power Plant, Units 1 and 2), LBP-84-29B, 20 NRC 389, 394 (1984).

Maximum time allowances for evacuation are not required as part of the process of establishing ETEs. *Pennsylvania Power and Light Company, et al.* (Susquehanna Steam Electric Station, Units 1 and 2), LBP-82-30, 15 NRC 771, 817 (1982).

The Commission's emergency planning regulations do not specify the time within which the plume EPZ must be evacuated in the event of a nuclear emergency. Section IV of Appendix E to 10 CFR Part 50 requires only that applicants provide an analysis of the time required to evacuate and to take other protective actions for various sectors and distances within the plume EPZ for transient and permanent populations. *Detroit Edison Company, et al.* (Enrico Fermi Atomic Power Plant, Unit 2), ALAB-730, 17 NRC 1057, 1069, n. 13 (1983).

No particular time limits are established or required for an evacuation. Rather, the ETE analysis is intended to reflect a realistic time for completing an evacuation. Emergency coordinators are to use the ETE to decide what protective actions are warranted. *Philadelphia Electric Company* (Limerick Generating Station, Units 1 and 2), ALAB-845, 24 NRC 220, 244; ALAB-836, 23 NRC 479 at 486, 491 (1986).

NUREG-0654 calls for evacuation time estimates only for normal and adverse weather conditions; there cannot possibly be an estimate calculated for every possible weather condition. *Carolina Power & Light Company* (Shearon Harris Nuclear Power Plant, Units 1 and 2), LBP-85-27A, 22 NRC 207, 225–226 (1985).

An ETE should not reflect a worst-case scenario. It is intended to be representative and reasonable so that any protective action based on the ETE will reflect realistic conditions. ETEs should, however, account for a wide range of seasonal, weather, and other conditions. *Philadelphia Electric Company* (Limerick Generating Station, Units 1 and 2), ALAB-845, 24 NRC 220, 246; ALAB-836, 23 NRC 479 at 491 (1986).

NRC regulations require the ETEs to be included in the applicant's emergency plan so that they are readily available to protective action decision makers. *Philadelphia Electric Company* (Limerick Generating Station Units 1 and 2), ALAB-845, 24 NRC 220, 248 (1986). See also CLI 85-15, 22 NRC 184. In this vein, ETEs necessarily must be readily available (logically as an addendum to the emergency plan) to all those decision makers whom the ETEs are to aid in deciding on protective actions. *Philadelphia Electric Company* (Limerick Generating Station, Units 1 and 2), ALAB-845, 24 NRC 220, 249 (1986). Thus, in its "immediate effectiveness review" for Limerick, the Commission directed the staff to ensure that ETEs were actually

“inserted” in the emergency plans. *Philadelphia Electric Company* (Limerick Generating Station, Units 1 and 2), CLI-85-15, 22 NRC 184, 188 (1985).

The ETE methodology for Indian Point did not explicitly model the effect of traffic accidents during the evacuation. While serious traffic accidents should be anticipated, particularly at the start of an evacuation when high-speed travel is still possible, the Licensing Board was not convinced that it is practical or possible to model such accidents. In view of the accident mitigation provisions in the emergency plans, the Parsons-Brinckerhoff reduction in capacity attributed to traffic accidents that would reduce the evacuation rate was found to be reasonable. *Consolidated Edison Company of New York (Indian Point Unit 2)*, *Power Authority of State of New York* (Indian Point Unit 3), LBP-83-68, 18 NRC 811 at 970, n. 98 (1983).

The impact of spontaneous evacuation either within or outside the EPZ is likely to lessen actual evacuation time rather than extend it. *Southern California Edison Company, et al.* (San Onofre Nuclear Generating Station, Units 2 and 3), LBP-82-39, 15 NRC 1163, 1185 (1982).

Although population increase determinations may be relevant for other purposes, the NRC’s emergency planning regulations do not require such determinations for use in ETEs. The purpose of ETEs is to provide decision makers with an acceptable basis for determining whether evacuation can be completed successfully in advance of potential radiation exposure under whatever circumstances may be in effect. The future viability of evacuation as a protective measure is not overlooked because annual review of the emergency plans is required by the regulations, and new time estimates and plans will be made as needed. *Southern California Edison Company, et al.* (San Onofre Nuclear Generating Station, Units 2 and 3), LBP-82-39, 15 NRC 1163, 1243–1244 (1984).

The Licensing Board found reasonable the use of an adverse weather condition in the ETE which was intended to represent the upper limit where roads were passable but not in good condition. In heavier snow, where roads were entirely impassable, evacuation, if done at all, would not begin until roads are cleared. *Commonwealth Edison Company* (Byron Nuclear Power Station, Units 1 and 2), LBP-84-2, 19 NRC 36 at 262 (1984).

Appendix C: Technical References and Supporting Documents

The following table contains all of the technical references and supporting documents for the technical basis. The table indicates the relevant rulemaking topic(s) for each reference. Full citations for each reference follow the table.

Reference/ Document	Security Issues	Exercise Issues	Staffing Issues	Backup Means for ANS	EOF – Performance Based Approach	ETE Updating	Reduction in Effectiveness	Emergency Classification Timeliness
10 CFR 50.34					✓			
10 CFR 50.47	✓		✓	✓	✓		✓	✓
Appendix E to 10 CFR Part 50	✓		✓	✓	✓			✓
10 CFR 50.54				✓	✓		✓	
10 CFR 50.59							✓	
10 CFR 50.72				✓	✓			
10 CFR Part 52				✓	✓			
44 CFR Part 350				✓	✓			✓
B.K. Grimes, NRC, to J.H. Sniezek, NRC						✓		
National Response Plan					✓			
Energy Policy Act of 2005				✓				
Executive Order No. 13407				✓				
FEMA GM AN-1				✓				
FEMA GM PR-1				✓				
FEMA CPG 1-17				✓				
FEMA Interim REP Program Manual				✓	✓			
FEMA Outdoor Warning Systems Technical Bulletin				✓				
House Report 107- 740				✓				
J. Phillip Stohr, NRC Region II, to Region II licensees						✓		
NEI Comments on Draft 'NRC Views for 50.54(q) Discussion' May 20, 2004							✓	
NEI White Paper Emergency Plan Change Process 10 CFR 50.54(q)							✓	
NEI White Paper Enhancements to Emergency Preparedness Programs for Hostile Action	✓	✓						
NEI 99-02, Rev. 5				✓	✓			✓

Reference/ Document	Security Issues	Exercise Issues	Staffing Issues	Backup Means for ANS	EOF – Performance Based Approach	ETE Updating	Reduction in Effectiveness	Emergency Classification Timeliness
NEI 06-04, Rev. 1		✓						
Bulletin 2005-02	✓	✓						
COMJA-80-37					✓			
EA-02-26	✓							
EPPOS-2								✓
EPPOS-4							✓	
GL 81-10					✓			
GL 82-33					✓			
IN 85-80								✓
IN 91-77			✓					
IN 93-44			✓					
IN 93-81			✓					
IN 95-23			✓					
IN 95-48			✓					
IN 96-19				✓				
IN 2002-25				✓				
IN 2005-06				✓				
IN 2006-28				✓				
IP Attachment 71114.02								
IP 71151				✓				
IP 82001				✓	✓			
IP Attachment 82001.04				✓	✓			
IP 95003					✓			
Manual Chapter 0609				✓	✓			✓
NUREG-0654 / FEMA REP-1, Rev. 1	✓		✓	✓	✓	✓	✓	✓
NUREG-0654 / FEMA-REP-1, Rev. 1, Addenda					✓			
NUREG-0654 / FEMA-REP-1, Rev. 1, Supplement 1					✓			
NUREG-0654 / FEMA-REP-1, Rev. 1, Supplement 2					✓			
NUREG-0654 / FEMA-REP-1, Rev. 1, Supplement 3					✓			
NUREG-0696	✓		✓		✓			
NUREG-0718					✓			
NUREG-0737			✓		✓			
NUREG-0800				✓	✓			
NUREG-0933			✓					
NUREG-1022			✓		✓			
NUREG-1791			✓					
NUREG/CR-1745						✓		
NUREG/CR-1856						✓		
NUREG/CR-4873						✓		
NUREG/CR-4874						✓		
NUREG/CR-4831						✓		
NUREG/CR-6863						✓		
RG 1.101	✓					✓		

Reference/ Document	Security Issues	Exercise Issues	Staffing Issues	Backup Means for ANS	EOF – Performance Based Approach	ETE Updating	Reduction in Effectiveness	Emergency Classification Timeliness
RG 1.155				✓				
RIS 2001-16						✓		
RIS 2004-15	✓	✓						
RIS 2005-02					✓		✓	
RIS 2006-02	✓	✓						
RIS 2006-12	✓	✓						
SECY-81-0509					✓			
SECY-84-0089					✓			
SECY-87-0067					✓			
SECY-90-0072					✓			
SECY-93-184			✓					
SECY-93-193			✓					
SECY-95-0274					✓			
SECY-96-0170					✓			
SECY-98-0274					✓			
SECY-02-0033					✓			
SECY-03-0033					✓			
SECY-03-0165	✓	✓						
SECY-04-0213	✓	✓						
SECY-04-0236					✓			
SECY-05-0010	✓	✓						
SECY-06-0200							✓	
SECY-06-0220				✓	✓			
SRM dated March 3, 1983					✓			
SRM-SECY-95-274					✓			
SRM-SECY-96-0170					✓			
SRM-SECY-98-274					✓			
SRM-SECY-02-0033					✓			
SRM-SECY-03-0033					✓			
SRM-SECY-04-0236					✓			
SRM dated December 20, 2004	✓	✓						
Staff response dated February 25, 2005	✓	✓						
SRM dated June 29, 2006		✓				✓		
Urbanik, T. ETEs for Nuclear Power Plants						✓		

10 CFR 50.34, “Contents of Applications; Technical Information.”

10 CFR 50.47, “Emergency Plans.”

Appendix E to 10 CFR Part 50, “Content of Emergency Plans.”

10 CFR 50.54, “Conditions of Licenses.”

10 CFR 50.59, “Changes, tests and experiments.”

10 CFR 50.72, "Immediate Notification Requirements for Operating Nuclear Power Reactors."

10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants."

44 CFR Part 350, "Review and Approval of State and Local Radiological Emergency Plans and Preparedness."

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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, "Interim Radiological Emergency Preparedness (REP) Program Manual," August 2002.

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J. Phillip Stohr, NRC Region II, to Region II licensees, "Update of Evacuation Times for Offsite Populations in the Event of Emergency," March 20, 1992. (ADAMS Accession No. ML072040241).

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