



# U.S. NUCLEAR REGULATORY COMMISSION

## DRAFT REGULATORY GUIDE DG-1346

### Revision 1

*Proposed new Regulatory Guide 1.235*

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## EMERGENCY PLANNING FOR DECOMMISSIONING NUCLEAR POWER REACTORS

### A. INTRODUCTION

#### Purpose

This regulatory guide (RG) provides decommissioning nuclear power reactor licensees with a method that the staff of the U.S. Nuclear Regulatory Commission (NRC) considers acceptable for use in meeting regulatory requirements for emergency preparedness (EP) in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, “Domestic Licensing of Production and Utilization Facilities” (Ref. 1).

#### Applicability

This RG applies to applicants and licensees of nuclear power reactors licensed under 10 CFR Part 50 and 10 CFR Part 52, “Licenses, Certifications, and Approvals for Nuclear Power Plants” (Ref. 2).

#### Applicable Regulations

- 10 CFR Part 50 provides regulations for licensing production and utilization facilities.
  - 10 CFR 50.47, “Emergency plans,” and Appendix E to 10 CFR Part 50, “Emergency Planning and Preparedness for Production and Utilization Facilities,” provides EP requirements for nuclear power reactors.
  - 10 CFR 50.54(q), “Emergency plans,” provides requirements for emergency plan changes.

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This RG is being issued in draft form to involve the public in the development of regulatory guidance in this area. It has not received final staff review or approval and does not represent an NRC final staff position. Public comments are being solicited on this draft regulatory guide (DG) and its associated regulatory analysis. Comments should be accompanied by appropriate supporting data. Comments may be submitted through the Federal-rulemaking Web site, <https://www.regulations.gov>, by searching for draft regulatory guide DG-1346. Alternatively, comments may be submitted to Office of the Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, ATTN: Rulemakings and Adjudications Staff. Comments must be submitted by the date indicated in the *Federal Register* notice.

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- 10 CFR 50.54(t)(1) provides requirements for the development, revision, implementation, maintenance, and periodic independent review of a licensee’s EP program
- 10 CFR 50.82, “Termination of license,” provides the requirements for termination of a 10 CFR Part 50 license.
- 10 CFR 50.200, “Power reactor decommissioning emergency plans,” provides EP requirements for nuclear power reactors after permanent cessation of operations and removal of fuel from the reactor vessel.
- 10 CFR Part 52 governs the issuance of early site permits, standard design certifications, combined licenses, standard design approvals, and manufacturing licenses for nuclear power facilities.
  - 10 CFR 52.79, “Contents of applications; technical information in final safety analysis report,” requires compliance with 10 CFR 50.47 and Appendix E to 10 CFR Part 50.
  - 10 CFR 52.110, “Termination of license,” provides the requirements for termination of a 10 CFR Part 52 license.
- 10 CFR Part 72, “Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste” (Ref. 3) provides regulations for licensing independent spent fuel storage installations (ISFSIs).
  - 10 CFR 72.32, “Emergency plan,” provides EP requirements for ISFSIs and monitored retrievable storage installations.

### **Related Guidance**

- RG 1.219, “Guidance on Making Changes to Emergency Plans for Nuclear Power Reactors” (Ref. 4), provides guidance for nuclear power reactor licensees implementing requirements in 10 CFR 50.54(q), for following and maintaining the effectiveness of and evaluating and implementing changes to emergency plans.
- RG 3.67, “Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities” (Ref. 5), provides guidance on the information to be included in emergency plans for fuel cycle and materials facilities and establishes a format for presenting the information.
- NUREG-0396 (EPA 520/1-78-106), “Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants,” issued December 1978 (Ref. 6), provides guidance for determining the appropriate degree of emergency response planning efforts for operating power reactor licensees and introduces the concept of emergency planning zones.
- NUREG-0654/FEMA-REP-1, Revisions 1 and 2, “Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants,” issued November 1980 and December 2019, respectively (Refs. 7 and 8), provide guidance and evaluation criteria for the development and evaluation of the radiological emergency response plans for nuclear power reactors.

- NUREG-0696, “Functional Criteria for Emergency Response Facilities” (Ref. 9), provides guidance on the facilities and systems used by operating nuclear power plant licensees for responses to emergency situations.
- NSIR/DPR-ISG-01, “Interim Staff Guidance on Emergency Planning for Nuclear Power Plants” (Ref. 10), provides guidance to be used by operating power reactor licensees and applicants for implementing changes to onsite EP programs based on changes to 10 CFR Part 50 in the 2011 EP Final Rule (Ref. 11), and by NRC staff for reviewing the adequacy of revised programs. The Interim Staff Guidance also provides guidance on integrating offsite response organization (ORO) event response concepts with onsite EP programs.
- SFST-ISG-16, “Spent Fuel Storage and Transportation Interim Staff Guidance on Emergency Planning” (Ref. 12), provides guidance to NRC staff for review of emergency plans for facilities licensed pursuant to 10 CFR Part 72.

### **Purpose of Regulatory Guides**

The NRC issues RGs to describe to the public methods that are acceptable to the staff for implementing specific parts of the agency’s regulations, to explain techniques that the staff uses in evaluating specific problems or postulated events, and to provide guidance to applicants. Regulatory guides are not NRC regulations and compliance with them is not required. Methods and solutions that differ from those set forth in RGs will be deemed acceptable if supported by a basis for the issuance or continuance of a permit or license by the Commission.

### **Paperwork Reduction Act**

This RG provides voluntary guidance for implementing the mandatory information collections in 10 CFR Parts 50, 52, and 72 that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et. seq.). These information collections were approved by the Office of Management and Budget (OMB), approval numbers 3150-0011, 3150-0151, and 3150-0132 respectively. Send comments regarding this information collection to the FOIA, Library, and Information Collections Branch, (T6-A10M), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to [Infocollects.Resource@nrc.gov](mailto:Infocollects.Resource@nrc.gov), and to the OMB reviewer at: OMB Office of Information and Regulatory Affairs (3150-0011, 3150-0151, 3150-0132), Attn: Desk Officer for the Nuclear Regulatory Commission, 725 17th Street, NW Washington, DC 20503; e-mail: [oira\\_submission@omb.eop.gov](mailto:oira_submission@omb.eop.gov).

### **Public Protection Notification**

The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the document requesting or requiring the collection displays a currently valid OMB control number.

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## B. DISCUSSION

### Reason for Issuance

This RG provides guidance on implementing a graded approach to EP during the transition to decommissioning. It was developed to provide implementing guidance associated with the rulemaking for 10 CFR 50.200, “Power reactor decommissioning emergency plans.” This rule establishes EP requirements that are commensurate with the reductions in radiological risk at four levels of decommissioning: (1) permanent cessation of operations and removal of all fuel from the reactor vessel, (2) fuel in the spent fuel pool (SFP) has sufficiently decayed such that it would not reach ignition temperature within 10 hours under adiabatic heat-up conditions, (3) all fuel is in dry storage, and (4) all fuel is removed from the site.

### Background

Prior to issuance of the EP requirements in 10 CFR 50.200 and this RG, the NRC’s regulations and guidance did not provide a framework to distinguish between EP requirements and guidance for a power reactor that has permanently shut down and defueled and those for an operating reactor. Licensees historically requested exemptions from some of the emergency planning requirements in 10 CFR 50.47 and Appendix E to 10 CFR Part 50 for their permanently shut down and defueled power reactors.

With the issuance of 10 CFR 50.200, the NRC has established a graded approach to the planning standards specific to nuclear power reactor licensees as they transition through each phase of decommissioning. This RG identifies the applicable evaluation criteria for emergency plans and provides amplifying guidance on the emergency planning requirements for decommissioning power reactors.

Each of the first three levels in the decommissioning process has a corresponding emergency plan. Licensees are not required to have a radiological emergency plan during the last level of decommissioning because all fuel has been removed from the site in that level. The emergency plans for the first three levels are:

- (1) *A post-shutdown emergency plan (PSEP)*, which may be implemented after the NRC’s docketing of the licensee’s certifications of permanent cessation of operations and permanent removal of fuel from the reactor vessel pursuant to 10 CFR 50.82(a)(1) or 10 CFR 52.110(a). Under a PSEP, the onsite emergency response plan must meet the planning standards of 10 CFR 50.47(b) and the requirements in Appendix E to 10 CFR Part 50. As described under 10 CFR 50.200(a), the emergency response organization (ERO) staffing required by 10 CFR 50.47(b)(2) will be commensurate with a reduced spectrum of credible accidents for a permanently shut down and defueled power reactor facility.
- (2) *A permanently defueled emergency plan (PDEP)*, which may be implemented after the NRC’s docketing of the licensee’s certifications of permanent cessation of operations and permanent removal of fuel from the reactor vessel pursuant to 10 CFR 50.82(a)(1) or 10 CFR 52.110(a) and after a spent fuel decay period of 10 months (for boiling water reactors (BWRs)) or 16 months (for pressurized water reactors (PWRs)).<sup>1</sup> If a licensee’s fuel does not meet the criteria of 10 CFR 50.54(q)(7)(ii) then a PDEP may be

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<sup>1</sup> Licensees interested in implementing a PDEP before this timeframe may submit for NRC approval an analysis as described under 10 CFR 50.54(q)(7)(ii).

implemented after NRC approval of a site-specific alternative spent fuel decay period under 10 CFR 50.54(q)(7)(ii)(B) and (C). Under a PDEP, the onsite emergency response plan must meet the planning standards in 10 CFR 50.200(b) and the requirements in 10 CFR 50.200(c) or 50.54(q)(7)(i).

- (3) An *ISFSI only emergency plan (IOEP)*, which may be implemented once all spent fuel is in dry cask storage. Under the IOEP, per the requirements of 10 CFR 50.54(q)(7)(iii), licensees that transition all fuel to dry cask storage must follow and maintain the effectiveness of an emergency plan that meets the requirements in 10 CFR 72.32(a) or 10 CFR 50.54(q)(7)(ii).

### **Consideration of International Standards**

The International Atomic Energy Agency (IAEA) works with member states and other partners to promote the safe, secure, and peaceful use of nuclear technologies. The IAEA develops Safety Requirements and Safety Guides for protecting people and the environment from harmful effects of ionizing radiation. This system of safety fundamentals, safety requirements, safety guides, and other relevant reports, reflects an international perspective on what constitutes a high level of safety. To inform its development of this RG, the NRC considered IAEA Safety Requirements and Safety Guides pursuant to the Commission's International Policy Statement (Ref. 13) and Management Directive and Handbook 6.6, "Regulatory Guides" (Ref. 14). Relative to this RG, IAEA Safety Guide GS-R-7, "Preparedness and Response for a Nuclear or Radiological Emergency" (Ref. 15), generally addresses emergency preparedness plans and procedures. This RG is consistent with the basic safety principles provided in IAEA Safety Guide GS-R-7.

## C. STAFF REGULATORY GUIDANCE

This section provides detailed descriptions of the methods, approaches, or data that the staff considers acceptable for meeting the requirements of the regulations cited in the Introduction.

### Post-Shutdown Emergency Plans

1. After the NRC docket the licensee's certifications required under 10 CFR 50.82(a)(1) or 10 CFR 52.110(a), the licensee may transition to a PSEP. The licensee must continue to follow and maintain the effectiveness of an emergency plan that meets of the requirements of Appendix E to 10 CFR Part 50 and the planning standards of 10 CFR 50.47(b). Licensees choosing to revise their emergency plans to reflect the change in facility status to a permanently shut down and defueled facility may make changes to their emergency plans related to staffing, the Emergency Response Data System (ERDS), emergency action levels (EALs), annual dissemination of public information, evacuation time estimates (ETEs), and exercises as described below.

Licensees should refer to 10 CFR 50.54(q)(8) when making initial emergency plan changes to comply with the requirements of 10 CFR 50.200(a). Licensees must submit these plan changes to the NRC at least 60 days prior to implementation, consistent with the requirements under 10 CFR 50.4. The licensees should follow the guidance in Appendix B, "Emergency Plan Change Process for Facilities Transitioning to Decommissioning," of this RG.

A PSEP prepared in accordance with 10 CFR 50.200(a) should meet the following criteria.

- a. Assignment of Responsibility
  - (1) The emergency plan should follow the guidance in Section II.A of a version<sup>2</sup> of NUREG-0654/FEMA-REP-1.
- b. Onsite Emergency Organization
  - (1) The emergency plan should follow the guidance in Section II.B of NUREG-0654/FEMA-REP-1.
  - (2) The ERO staffing required by 10 CFR 50.47(b)(2) may be commensurate with a reduced spectrum of credible accidents for a permanently shut down and defueled power reactor facility. For PSEPs, the spectrum of credible accidents and operational events requiring a response from the ERO is reduced as compared to that for an operating plant, and the principal public safety concern involves the potential radiological risks associated with the storage of spent fuel on site in the SFP. The reactor, reactor coolant system, and reactor support systems are no longer in operation and have no function related to the storage of spent fuel. Therefore, postulated accidents involving a failure or malfunction of the reactor, reactor coolant system, or reactor support systems are no longer applicable.

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<sup>2</sup> Licensees making changes to their emergency plans based on a *different* version of NUREG-0654/FEMA-REP-1 than that used in their operating emergency plans should indicate the version on which the changes are based. Methods or solutions that differ from those described in any version of NUREG-0654/FEMA-REP-1 issued by the NRC may be deemed acceptable if a licensee makes available sufficient bases and information for the NRC staff to evaluate whether the proposed alternatives(s) meet the intent of the planning standards.

- (3) Changes to the ERO staffing level should consider the following:
    - a. Reductions in facility staffing may be made as long as the facility operates with no loss of EP functions as required by 10 CFR 50.47(b) and Appendix E.
    - b. The reduction in ERO staffing can have no impact on the offsite radiological emergency plans that are in effect.
  - (4) To ensure that the on-shift staff can carry out their assigned emergency response functions until the augmenting ERO arrives, each licensee should define the events used in the staffing analysis contained within a PSEP and performed pursuant to 10 CFR Part 50, Appendix E, Section IV.A.9. These events should include unanticipated occurrences.
- c. Emergency Response Support and Resources
- (1) The emergency plan should follow the guidance in Section II.C of NUREG-0654/FEMA-REP-1.
  - (2) The emergency plan no longer needs to address activation of the ERDS because decommissioning facilities do not need to meet this requirement as stated in Appendix E to 10 CFR Part 50.
- d. Emergency Classification System
- (1) The emergency plan should describe facility EALs consistent with Attachment 1, "Post-Shutdown Emergency Plan Emergency Action Level Scheme," of Appendix A of this RG.
- e. Notification Methods and Procedures
- (1) The emergency plan should follow the guidance in Section II.E of NUREG-0654/FEMA-REP-1.
- f. Emergency Communications
- (1) The emergency plan should follow the guidance in Section II.F of NUREG-0654/FEMA-REP-1.
- g. Public Education and Information
- (1) The emergency plan should follow the guidance in Section II.G of NUREG-0654/FEMA-REP-1.
  - (2) Before transitioning to a PDEP, the emergency plan should provide for a final dissemination of information to the public residing within the plume exposure emergency planning zone that describes the facility status during the four levels of the decommissioning process, provides a general summary of expected changes to EP that are commensurate with the reductions in radiological risk at the four levels of decommissioning, and shares basic emergency planning information appropriate to the site at each of the four levels.



- h. Emergency Facilities and Equipment
  - (1) The emergency plan should follow the guidance in Section II.H of NUREG-0654/FEMA-REP-1.
- i. Accident Assessment
  - (1) The emergency plan should follow the guidance in Section II.I NUREG-0654/FEMA-REP-1.
- j. Protective Response
  - (1) The emergency plan should follow the guidance in Section II.J of NUREG-0654/FEMA-REP-1.
  - (2) The emergency plan may reflect that existing ETE analyses in place when a licensee transitions to a PSEP would remain effective within the emergency plan until the licensee transitions to a PDEP.
- k. Radiological Exposure Control
  - (1) The emergency plan should follow the guidance in Section II.K of NUREG-0654/FEMA-REP-1.
- l. Medical and Public Health Support
  - (1) The emergency plan should follow the guidance in Section II.L of NUREG-0654/FEMA-REP-1.
- m. Recovery and Reentry Planning and Post-Accident Operations
  - (1) The emergency plan should follow the guidance in Section II.M of NUREG-0654/FEMA-REP-1.
- n. Exercises and Drills
  - (1) The emergency plan should follow the guidance in Section II.N of a version of NUREG-0654/FEMA-REP-1.
  - (2) A licensee that conducts a full participation biennial exercise just prior to the NRC docketing the licensee's certifications required under § 50.82(a)(1) or § 52.110(a) may not be required to conduct another exercise before transitioning to a PDEP depending on the timing of the exercise in relation to the spent fuel decay period. If an exercise is to be conducted as part of the 8-year exercise cycle, as required under appendix E to 10 CFR part 50, paragraph IV.F.2.j, after the NRC docketing the licensee's certifications required under § 50.82(a)(1) or § 52.110(a), but prior to transitioning to a PDEP, the scenario should reflect actual plant conditions (e.g., no operating reactor, spent fuel is in the spent fuel pool).

- o. Radiological Emergency Response Training
  - (1) The emergency plan should follow the guidance in Section II.O of NUREG-0654/FEMA-REP-1.
- p. Responsibility for the Planning Effort: Development, Periodic Review and Distribution of Emergency Plans
  - (1) The emergency plan should follow the guidance in Section II.P of NUREG-0654/FEMA-REP-1.

### **Permanently Defueled Emergency Plans**

- 2. After the NRC docket the licensee's certifications required under 10 CFR 50.82(a)(1) or 10 CFR 52.110(a) and after a spent fuel decay period of 10 months (for a BWR) or 16 months (for a PWR), the licensee may transition to a PDEP. Alternately, licensees interested in implementing a PDEP before this timeframe may submit, for NRC approval, an analysis as described under 10 CFR 50.54(q)(7)(ii). See Appendix C, "Guidance for Performing a Spent Fuel Assembly Adiabatic Heat-up Calculation," of this RG for guidance on developing this analysis. If a licensee's fuel does not meet the criteria in 10 CFR 50.54(q)(7)(ii), then a PDEP may be implemented after NRC approval of a site-specific alternative spent fuel decay period under 10 CFR 50.54(q)(7)(ii)(B) and (C).

After the spent fuel decay period, the licensee may revise its emergency plan to follow and maintain the effectiveness of a PDEP that meets the planning standards identified in 10 CFR 50.200(b) and the requirements in 10 CFR 50.200(c). Licensees choosing to revise their emergency plans in accordance with 10 CFR 50.200(b) and the requirements of 10 CFR 50.200(c) may make changes to their emergency plans related to staffing, emergency classification and EALs, emergency declaration, offsite radiological emergency plans, notifications, protective action recommendations, emergency facilities, and drills and exercises, as described below.

Licensees should refer to 10 CFR 50.54(q)(8) when making initial emergency plan changes to comply with the requirements of 10 CFR 50.200(b). As required by 10 CFR 50.54(q)(8)(i), licensees must submit these plan changes to the NRC at least 60 days prior to implementation, consistent with the requirements under 10 CFR 50.4. The licensee should follow the guidance in Appendix B, "Emergency Plan Change Process for Facilities Transitioning to Decommissioning," of this RG.

A PDEP prepared in accordance with 10 CFR 50.200(b) and 10 CFR 50.200(c) should meet the following criteria.

- a. Assignment of Responsibilities
  - (1) The emergency plan should identify, for each licensee and sub-organization having an operational role, its concept of operations, and its relationship to the total effort.
  - (2) The emergency plan should identify a specific individual, by title/position, who will be in charge of the emergency response.

- (3) The emergency plan should provide for 24-hour per day emergency response, including 24-hour per day staffing of communications links.
  - (4) The emergency plan should provide for continuous operations for a protracted period.
- b. Onsite Emergency Organization
- (1) The emergency plan should 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 (see Table B-1SD, “Minimum Staffing Requirements for Permanently Defueled Emergency Plans”).
  - (2) The emergency plan should designate an individual who shall be on shift at all times and who shall have the authority and responsibility to immediately and unilaterally initiate any emergency response measures.
  - (3) The emergency plan should establish the functional responsibilities assigned to the emergency coordinator.
  - (4) The emergency plan should 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, the emergency plan should describe specific assignments made for all shifts and for plant staff members, both onsite and away from the site. The emergency plan should provide for augmentation of on-shift capabilities within a short period after declaration of an emergency. Table B-1SD provides a model for licensees to consider.
  - (5) The emergency plan should identify the services to be provided by local agencies for handling emergencies (e.g., law enforcement, medical and ambulance services, hospital support, and fire support). The emergency plan should provide for transportation and treatment of contaminated, injured personnel. Reference to the arrangements and agreements reached with external organizations, including contractors, and local agencies, should be appended to the plan. The agreements should delineate the authorities, responsibilities, and limits on the actions of the contractor, private organization, and local services support groups.

Table B-1SD

Minimum Staffing Requirements for Permanently Defueled Emergency Plans (see Sections C.2.b(1) and C.2.b(5))

MAJOR FUNCTIONAL AREA	MAJOR TASKS	EMERGENCY POSITION, TITLE, OR EXPERTISE	ON-SHIFT	AUGMENTED STAFF CAPABILITY FOR RESPONSE IN 2 HOURS
Plant Operations and Assessment of Operational Aspects	Plant Operations	Shift Supervisor Shift Operator	1 1	
Emergency Direction and Control	Emergency Coordinator	Shift Supervisor	*	
Notification/Communication	Notify State and Federal personnel and maintain communications	Communicator	*	
Radiological Accident Assessment and Support of Operational Accident Assessment	Onsite Dose Assessment and Monitoring	Health Physics Expertise	*	1
Protective Actions (In-Plant)	In-Plant Surveys Radiation Protection a. Access Control b. Health Physics Coverage for Repair, Corrective Actions, Search and Rescue, First Aid, and Firefighting c. Personnel Monitoring d. Dosimetry	Health Physics Technician	1	As needed
Engineering Support	Technical Direction	Technical Expertise		1
Plant Condition Evaluation, Repair and Corrective Action	Repair, Mitigation and Corrective Action	Shift Operators	**	As needed
Firefighting	Firefighting	Per Fire Protection Plan		
Rescue Operations/ First Aid	Rescue and First Aid		*	As needed
Security	Security	Per Security Plan		

\* May be provided by shift personnel assigned other functions. Identify if the shift personnel assigned EP functions/task are from firefighting or security resources.

\*\* Number of additional personnel required to perform site-specific mitigation strategies required for a catastrophic loss in SFP inventory.

- c. Emergency Response Support and Resources
  - (1) The emergency plan should identify each organization from which emergency response support and/or resources may be requested. Such assistance should be identified and supported by appropriate letters of agreement.
- d. Emergency Classification System
  - (1) The emergency plan and procedures should describe facility EALs consistent with Attachment 2, “Permanently Defueled Emergency Plan Emergency Action Level Scheme,” of Appendix A of this RG.
- e. Notification Methods and Procedures
  - (1) The emergency plan should describe the mutually agreeable process for direct and prompt notification of response organizations aligned with the emergency classification and action level scheme.
  - (2) The emergency plan should establish procedures for alerting, notifying, or activating emergency response personnel.
  - (3) The emergency plan should address that the licensee, in coordination with State, local, and Tribal government organizations, will establish the contents of the initial and follow-up emergency messages to be sent from the nuclear facility. These messages should contain the following information if it is known and appropriate:
    - a. location of incident and name and telephone number (or communications channel identification) of caller;
    - b. date/time of incident;
    - c. class of emergency;
    - d. licensee emergency response actions underway;
    - e. request for any needed onsite support by offsite organizations; and
    - f. prognosis for worsening or termination of event based on facility information.
  - (4) The emergency plan should provide for notification to NRC within eight hours of a major loss of emergency assessment capability or offsite communications capabilities, as required in 10 CFR 50.72(b)(3)(xiii). For decommissioning power reactors, this reporting requirement focuses on the loss of capabilities that could substantially impair the licensee’s ability to respond to an event and perform the functions identified in the PDEP. Failures of individual systems or facilities are reportable only to the extent that these failures meet this threshold. Examples of equipment or facilities whose failure may need to be evaluated against this threshold for reportability include plant monitors for accident assessment and emergency communications systems that enable a licensee to make

notifications and provide follow-up information to offsite officials. Some engineering judgment is needed to determine the significance of loss of particular equipment.

f. Emergency Communications

- (1) The emergency plan should establish reliable primary, and backup means of communication from licensees to local and State response organizations. Such systems should be selected to be compatible with one another. Each plan should include provisions for:
  - a. continuous capability for notification to, and activation of, the emergency response network, including a minimum of two independent communication links;
  - b. communications with contiguous State/local governments;
  - c. systems for alerting or activating emergency personnel in each response organization; and
  - d. communication by the licensee with the NRC.
- (2) The emergency plan should establish that the licensee will ensure that coordinated communication methods for medical support exist.
- (3) The emergency plan should establish that the licensee will conduct periodic testing of the entire emergency communications system (see Sections C.2.h.5 and C.2.n.2.a).

g. Public Education and Information

- (1) The emergency plan should designate news media points of contact.
- (2) The emergency plan should:
  - a. designate a spokesperson with access to all necessary information;
  - b. establish arrangements for timely exchange of information among the designated spokespersons representing the entities involved in incident response; and
  - c. describe coordinated arrangements for identifying and addressing public inquiries and rumors.

h. Emergency Facilities and Equipment

- (1) The emergency plan should establish an emergency facility from which evaluation and coordination of all licensee activities related to an emergency is to be carried out, and from which the licensee will provide information to Federal, State, local, and Tribal government authorities responding to emergencies.
  - a. A power reactor facility may combine the emergency response functions into one or more command centers. The emergency plan should describe the principle and alternate locations from which emergency control and assessment activities will

occur. At least one location should be inhabitable during an emergency. The plan should include the means for identifying which command center(s) will be used in an emergency. The criteria for evacuating the command center(s) and re-establishing control from an alternate location should be described. The plan should identify locations from which licensee emergency workers would be dispatched to perform radiation surveys, damage assessment, emergency repair, or other mitigating tasks.

- b. The command center(s) should be onsite within the owner-controlled area and preferably in the protected area.
  - c. The command center(s) should have sufficient space available for all relevant emergency response activities and personnel.
- (2) The emergency plan should provide for timely activation and staffing of the facility(ies) described in the plan.
- a. Activation of the command center(s) should provide sufficient time to adequately respond to the corresponding accident sequence, but not more than two hours following the declaration of an emergency event.
  - b. The command center(s) should be staffed to provide the overall management of licensee resources and the continuous evaluation and coordination of licensee activities during and after an accident. Upon activation of the command center(s), designated personnel should report to the command center(s) in a timely manner to achieve full functional operation within two hours of declaration of an emergency event.
- (3) The emergency plan should describe onsite-monitoring systems that are to be used to initiate emergency response measures in accordance with the emergency classification scheme, as well as those to be used for conducting assessment.

The equipment should include:

- a. geophysical phenomena monitors (e.g., meteorological);
  - b. radiation monitors (e.g., process, area, effluent and portable monitors) and sampling equipment; and
  - c. fire and combustion products detectors.
- (4) The emergency plan should describe provisions to acquire data from, or for, emergency access to offsite monitoring and analysis equipment including data on:
- a. geophysical phenomena (e.g., meteorological, seismic monitors).

- (5) The emergency plan should:
  - a. Describe licensee provisions to inspect, inventory and operationally check emergency equipment/instruments at least once each calendar quarter and after each use. There should be sufficient reserves of instruments/equipment to replace those which are removed from emergency kits for calibration or repair. Calibration of equipment should be at intervals recommended by the supplier of the equipment.
  - b. Provide for functionality testing of communication systems as follows:
    - i. State/local and NRC (emergency notification systems) communication systems should be tested monthly. This is not the same as a communication drill as stated in Section C.2.n.2.
- (6) The emergency plan should include identification of emergency kits by general category (protective equipment, communications equipment, radiological monitoring equipment, and emergency supplies).
  - i. Accident Assessment
    - (1) The emergency plan should identify plant system and effluent parameter values characteristic of a spectrum of off-normal conditions and accidents, and should identify the plant parameter values or other information which correspond to the example initiating conditions. Such parameter values and the corresponding emergency class should be included in the appropriate facility emergency procedures. Facility emergency procedures should specify the kinds of instruments being used and their capabilities.
    - (2) The emergency plan should provide that onsite capability and resources to provide initial values and continuing assessment throughout the course of an accident should include radiation monitors.
  - j. Protective Response
    - (1) The emergency plan should establish the means and time required to alert, notify, and provide a range of protective actions for onsite individuals and individuals who may be in areas controlled by the licensee, including:
      - a. employees not having emergency assignments;
      - b. visitors;
      - c. contractor and construction personnel; and
      - d. other persons who may be in the public areas on or passing through the site or within the owner-controlled area.
    - (2) The emergency plan should describe licensee provisions for evacuation routes and transportation for onsite individuals.



- (3) The emergency plan should provide for radiological monitoring of people evacuated from the site.
- (4) The emergency plan should provide for a capability to account for all individuals onsite following declaration of an emergency and ascertain the names of missing individuals within 60 minutes following the emergency declaration and maintain accountability for all onsite individuals continuously thereafter.
- (5) The emergency plan should provide that the licensee will, for individuals remaining or arriving onsite during the emergency, make provisions for personal radiological protection.

k. Radiological Exposure Control

- (1) The emergency plan should establish onsite exposure guidelines consistent with the U.S. Environmental Protection Agency (EPA) Emergency Worker and Lifesaving Activity Protective Actions Guides for:
  - a. removal of injured persons;
  - b. undertaking corrective actions;
  - c. performing assessment actions;
  - d. providing first aid;
  - e. performing personnel decontamination;
  - f. providing ambulance service; and
  - g. providing medical treatment services.
- (2) The emergency plan should provide for an onsite radiation protection program to be implemented during emergencies, including methods to implement exposure guidelines. The plan should identify individual(s), by position or title, who can authorize emergency workers to receive doses in excess of 10 CFR Part 20, "Standards for Protection Against Radiation" (Ref. 16). Procedures should be worked out in advance for permitting onsite volunteers to receive radiation exposures in the course of carrying out lifesaving and other emergency activities. These procedures should include expeditious decision making and a reasonable consideration of relative risks.
- (3) The emergency plan should:
  - a. Include provisions for 24-hour-per-day capability to evaluate the doses received by emergency personnel involved in any nuclear accident, including volunteers. The emergency plan should include provisions for distribution of dosimeters.
  - b. Provide that the licensee will ensure that dosimeters are read at designated intervals and provide for maintaining dose records for emergency workers involved in any nuclear accident.

- (4) The emergency plan should:
  - a. as appropriate, specify action levels for determining the need for decontamination; and
  - b. as appropriate, establish the means for radiological decontamination of emergency personnel, equipment, vehicles, and personal possessions, and for waste disposal.
- (5) The emergency plan should implement onsite contamination control measures.
- l. Medical and Public Health Support
  - (1) The emergency plan should describe the licensee's arrangements for hospital and medical services having the capability for evaluation of radiation exposure and uptake, including assurance that persons providing these services are adequately prepared to handle contaminated, injured individuals.
  - (2) The emergency plan should provide for onsite first aid capability (see Section C.2.o.2).
  - (3) The emergency plan should provide that the licensee will arrange for transporting victims of radiological accidents to medical support facilities.
- m. Recovery and Reentry Planning and Post-Accident Operations
  - (1) The emergency plan describes general plans and procedures for reentry and recovery. This process should consider both existing and potential conditions.
  - (2) The emergency plan should contain the position/title of individuals that comprise the licensee's recovery organization. This organization should include technical personnel with responsibilities to develop, evaluate and direct recovery and reentry operations.
- n. Exercises and Drills
  - (1) The emergency plan should address the following:
    - a. An exercise is an event that tests the integrated capability and a major portion of the basic elements existing within EP plans and organizations. The emergency plan should provide that exercises will be conducted as set forth in 10 CFR 50.200.
    - b. The emergency plan should provide for a critique of the exercise. The scenario should be varied from year to year such that all major elements of the plans and preparedness organizations are tested.
  - (2) A drill is a supervised instruction period aimed at testing, developing and maintaining skills in a particular operation. A drill is often a component of an exercise. The emergency plan should provide that drills will be supervised and evaluated by a qualified drill instructor. The emergency plan should provide that the licensee will conduct drills, in addition to the exercise at the frequencies indicated below:

- a. Communication Drills: The emergency plan should provide for annual drills of communications with State and local governments. The emergency plan should provide for annual drills of communications with the NRC. Communication drills should also include the aspect of understanding the content of messages.
  - b. Fire Drills: The emergency plan should provide that fire drills will be conducted in accordance with the plant's licensing basis or technical specifications.
  - c. Medical Emergency Drills: The emergency plan should provide that a medical emergency drill involving a simulated contaminated individual which contains provisions for participation by the local support services agencies (i.e., ambulance and offsite medical treatment facility) will be conducted annually.
  - d. Health Physics Drills: The emergency plan should provide that health physics drills will be conducted annually.
- (3) The emergency plan should describe how exercises and drills are to be carried out to allow free play for decision making and to meet the following objectives. The scenarios for use in exercises and drills should include but not be limited to, the following:
- a. the basic objective(s) of each drill and exercise and appropriate evaluation criteria;
  - b. the date(s), time period, place(s) and participating organizations;
  - c. the simulated events;
  - d. a time schedule of real and simulated initiating events;
  - e. a narrative summary describing the conduct of the exercises or drills to include such things as simulated casualties, offsite fire department assistance, rescue of personnel, use of protective clothing; and
  - f. a description of the arrangements for and advance materials to be provided to official observers.
- (4) The emergency plan should provide that official observers from the NRC will observe, evaluate, and critique the required exercises. A critique should be scheduled at the conclusion of the exercise to evaluate the ability of the licensee to respond as called for in the plan. The critique should be conducted as soon as practicable after the exercise, and a formal evaluation should result from the critique.
- (5) The emergency plan should establish means for evaluating observer and participant comments on areas needing improvement, including emergency plan procedural changes, and for assigning responsibility for implementing corrective actions. The emergency plan should provide that the licensee will establish management control used to ensure that corrective actions are implemented.

- o. Radiological Emergency Response Training
  - (1) The emergency plan should provide that the licensee will assure the training of appropriate individuals with an operational role described in the emergency plan.
    - a. The emergency plan should establish that each facility will provide site-specific emergency response training for those offsite emergency organizations who may be called upon to provide assistance in the event of an emergency.
  - (2) The emergency plan should establish that training for individuals assigned to licensee first aid teams will include courses equivalent to Red Cross First Aid, cardiopulmonary resuscitation, automated defibrillators for lay responders or equivalent (see Section C.2.1.2).
  - (3) The emergency plan should provide for the initial and annual retraining of emergency responders and other appropriate individuals with an operational role described in the emergency plan.
- p. Responsibility for the Planning Effort: Development, Periodic Review and Distribution of Emergency Plans
  - (1) The emergency plan should provide for the training of individuals responsible for the planning effort.
  - (2) The emergency plan should identify by title/position the individual with the overall authority and responsibility for radiological emergency response planning.
  - (3) The emergency plan should identify by title/position the individual with responsibility for the development and updating of emergency plans and coordination of these plans with other response organizations.
  - (4) The emergency plan should provide that the licensee will update its plan and agreements as needed, review and certify it to be current on an annual basis. The update should take into account changes identified by drills and exercises.
  - (5) The emergency response plans and approved changes to the plans should be distributed to all organizations and appropriate individuals with responsibility for implementation of the plans. Revised pages should be dated and marked to show where changes have been made.
  - (6) The emergency plan should contain a listing, by title, of procedures required to implement the plan. The listing should include the section(s) of the plan to be implemented by each procedure.
  - (7) The emergency plan should contain a specific table of contents.
  - (8) The emergency plan should describe that the licensee will provide for updating telephone numbers in emergency procedures at least quarterly.
  - (9) The emergency plan should provide provisions for addressing the requirements of 10 CFR 50.54(t)(1).

### ISFSI Only Emergency Plans

3. A 10 CFR Part 50 or 10 CFR Part 52 licensee transitioning to onsite dry cask storage must have a 10 CFR Part 72 general license or specific license. The requirements for emergency planning for these two groups of licensees differ as follows:
- **General license:** A 10 CFR Part 72 general license is issued by regulation to anyone authorized to possess or operate a nuclear power reactor under 10 CFR Part 50 or 10 CFR Part 52. A decommissioning nuclear power reactor licensee that maintains its 10 CFR Part 50 or 10 CFR Part 52 license can transition all spent fuel to dry cask storage onsite under its 10 CFR Part 72 general license. As required under 10 CFR 72.212(a)(10), the licensee must review the reactor emergency plan to determine if the effectiveness is decreased. In addition, the licensee must continue to comply with all applicable 10 CFR Part 50 or 10 CFR Part 52 requirements until the Part 50 or Part 52 license is terminated.
  - **Specific license:** If a power reactor licensee chooses to apply for a 10 CFR Part 72 specific license, the licensee would need to provide, as part of its application, an emergency plan that complies with the emergency planning requirements of 10 CFR 72.32.

After the NRC docket the licensee's certifications required under 10 CFR 50.82(a)(1) or 10 CFR 52.110(a) and after all spent fuel is in dry cask storage, the licensee has several options. The licensee may continue to maintain a PSEP, PDEP, or an emergency plan that meets the requirements of Appendix E to 10 CFR Part 50 and the planning standards of 10 CFR 50.47 for facilities holding a Part 72 general license, or, for a licensee that was issued a Part 72 specific license, an emergency plan that continues to follow and maintain the effectiveness of an IOEP that meets the requirements in 10 CFR 72.32(a). Licensees choosing to revise their Part 50 emergency plans may make changes to their emergency plans related to staffing, emergency classification and EALs, emergency equipment, protective response, and exercises, as described below.

Licensees should refer to 10 CFR 50.54(q)(8) when making initial emergency plan changes to comply with the requirements of 10 CFR 72.32(a). Licensees must submit these plan changes to the NRC at least 60 days prior to implementation, consistent with the requirements under 10 CFR 50.4. The licensees should follow the guidance in Appendix B, "Emergency Plan Change Process for Facilities Transitioning to Decommissioning," of this RG.

Unlike the PSEP and PDEP, licensees may not need to transition to the IOEP because of the licensing circumstances specific to the site. For example, a decommissioning Part 50 licensee may already have a specific license ISFSI onsite, so the licensee would already have an emergency plan that complies with Part 72. Therefore, an IOEP would be in place ahead of transition. Similarly, a Part 50 licensee that does not have an ISFSI onsite may decide to ship waste offsite rather than storing onsite. Therefore, no transition to an IOEP would be needed.

An IOEP prepared in accordance with 10 CFR 72.32(a) should meet the following criteria.

a. Assignment of Responsibility

(1) The emergency plan should continue to follow guidance in Section C.2.a of this RG, with the following exception:

a. The revised wording of the evaluation criterion under Section C.2.a(3) for IOEPs is as follows: The emergency plan should provide for 24-hour per day emergency response.

b. Onsite Emergency Organization

(1) The emergency plan should continue to follow guidance in Section C.2.b of this RG, with the following exception:

a. The revised wording of the evaluation criterion under Section C.2.a(4) for IOEPs is as follows: The emergency plan should 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, the emergency plan should describe specific assignments made for all shifts and for plant staff members, both onsite and away from the site. The emergency plan should provide for augmented staff within 4 hours after declaration of an emergency (see Table B-1-ISFSI).

Table B-1-ISFSI

Minimum Staffing Requirements for ISFSI Only Emergency Plans

MAJOR FUNCTIONAL AREA	MAJOR TASKS	EMERGENCY POSITION, TITLE, OR EXPERTISE	ON-SHIFT	AUGMENTED STAFF CAPABILITY FOR RESPONSE IN 2 HOURS	AUGMENTED STAFF CAPABILITY FOR RESPONSE IN 4 HOURS
Emergency Direction and Control	Emergency Coordinator	Shift Supervisor	1		
Notification/Communication	Notify State and Federal personnel	Communicator	*		
Radiological Accident Assessment	Emergency Classification Assessment	Radiological Assessor	*		
Support of Operational Accident Assessment	Onsite Dose Assessment and Monitoring	Health Physics Expertise		On-call	1**
Engineering Support	Technical Direction	Technical Expertise		On-call	
ISFSI Condition Evaluation, Repair and Corrective Action	Repair, Mitigation and Corrective Action	Repair Personnel			As needed
Security	Security	Per Security Plan			

\* May be provided by shift personnel assigned other functions.

\*\* If emergency declaration was based on confinement boundary damage.

- c. Emergency Response Support and Resources
  - (1) The emergency plan should continue to follow guidance in Section C.2.c of this RG.
- d. Emergency Classification System
  - (1) The emergency plan should describe facility EALs consistent with Attachment 3, “Independent Spent Fuel Storage Installation Only Emergency Plan Emergency Action Level Scheme,” of Appendix A of this RG.
- e. Notification Methods and Procedures
  - (1) The emergency plan should continue to follow guidance in Section C.2.e of this RG.
- f. Emergency Communications
  - (1) The emergency plan should continue to follow guidance in Section C.2.f of this RG.
- g. Public Education and Information
  - (1) The emergency plan should continue to follow guidance in Section C.2.g of this RG.
- h. Emergency Facilities and Equipment
  - (1) The emergency plan should continue to follow guidance in Section C.2.h of this RG, with the following exceptions:
    - a. The revised wording of the evaluation criterion under Section C.2.h(3) for IOEPs is as follows: The emergency plan should identify and establish onsite-monitoring systems that are to be used to initiate emergency measures as well as those to be used for conducting assessment.  
  
The equipment should include:
      - i. geophysical phenomena monitors (e.g., meteorological); and
      - ii. radiological monitors (e.g., process, area, effluent and portable monitors, and sampling equipment).
    - b. The revised wording of the evaluation criterion under Section C.2.h(4) for IOEPs is as follows: The emergency plan should describe provisions to acquire data from, or for, emergency access to offsite monitoring and analysis equipment including:
      - i. geophysical phenomena monitors (e.g., meteorological).
- i. Accident Assessment
  - (1) The emergency plan should continue to follow guidance in Section C.2.i of this RG.



j. Protective Response

- (1) The emergency plan should continue to follow guidance in Section C.2.j of this RG, with the following exceptions:
  - a. The revised wording of the evaluation criterion under Section C.2.j(4) for IOEPs is as follows: The emergency plan should provide for a capability to account for all individuals onsite at the time of the emergency and ascertain the names of missing individuals.
  - b. The revised wording of the evaluation criterion under Section C.2.j(5) for IOEPs is as follows: The emergency plan should, for individuals remaining or arriving onsite during the emergency, make provisions for any personal protective equipment, including respiratory protection.

k. Radiological Exposure Control

- (1) The emergency plan should continue to follow guidance in Section C.2.k of this RG.

l. Medical and Public Health Support

- (1) The emergency plan should continue to follow guidance in Section C.2.l of this RG.

m. Recovery and Reentry Planning and Post-Accident Operations

- (1) The emergency plan should continue to follow guidance in Section C.2.m of this RG.

n. Exercises and Drills

- (1) The emergency plan should continue to follow guidance in Section C.2.n of this RG, with the following exception:
  - a. The revised wording of the evaluation criterion under Section C.2.n(1)a for IOEPs is as follows: The emergency plan should address the following:
    - i. An exercise is an event that tests the integrated capability and a major portion of the basic elements existing within EP plans and organizations. The emergency plan should provide that exercises will be conducted as set forth in 10 CFR 50.200.

o. Radiological Emergency Response Training

- (1) The emergency plan should continue to follow guidance in Section C.2.o of this RG.

p. Responsibility for the Planning Effort: Development, Periodic Review and Distribution of Emergency Plans

- (1) The emergency plan should continue to follow guidance in Section C.2.p of this RG.

## **D. IMPLEMENTATION**

The NRC staff may use this regulatory guide as a reference in its regulatory processes, such as licensing, inspection, or enforcement. However, the NRC staff does not intend to use the guidance in this regulatory guide to support NRC staff actions in a manner that would constitute backfitting as that term is defined in 10 CFR 50.109, “Backfitting,” or 10 CFR 72.62, “Backfitting,” and as described in NRC Management Directive 8.4, “Management of Backfitting, Forward Fitting, Issue Finality, and Information Requests,” (Ref. 17), nor does the NRC staff intend to use the guidance to affect the issue finality of an approval under 10 CFR Part 52, “Licenses, Certifications, and Approvals for Nuclear Power Plants.” The staff also does not intend to use the guidance to support NRC staff actions in a manner that constitutes forward fitting as that term is defined and described in Management Directive 8.4. If a licensee believes that the NRC is using this regulatory guide in a manner inconsistent with the discussion in this Implementation section, then the licensee may file a backfitting or forward fitting appeal with the NRC in accordance with the process in Management Directive 8.4.

## REFERENCES<sup>3</sup>

1. *U.S. Code of Federal Regulations (CFR)*, “Domestic Licensing of Production and Utilization Facilities,” Part 50, Chapter I, Title 10, “Energy<sup>4</sup>.”
2. CFR, “Licenses, Certifications, and Approvals for Nuclear Power Plants,” Part 52, Chapter I, Title 10, “Energy.”
3. CFR, “Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste,” Part 72, Chapter I, Title 10, “Energy.”
4. U.S. Nuclear Regulatory Commission (NRC), Regulatory Guide (RG) 1.219, “Guidance on Making Changes to Emergency Plans for Nuclear Power Reactors,” Washington, DC.
5. NRC, RG 3.67, “Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities,” Washington, DC.
6. NRC and U.S. Environmental Protection Agency (EPA) Task Force on Emergency Planning, NUREG-0396 (EPA 520/1-78-016), “Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants,” December 1978 (ADAMS Accession No. ML051390356).
7. NRC and the Federal Emergency Management Agency (FEMA), NUREG-0654/FEMA-REP-1, Revision 1, “Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants,” November 1980 (ADAMS Accession No. ML040420012).
8. NRC and the Federal Emergency Management Agency (FEMA), NUREG-0654/FEMA-REP-1, Revision 2, “Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants,” December 2019 (ADAMS Accession No. ML19347D139).
9. NRC, NUREG-0696, “Functional Criteria for Emergency Response Facilities,” February 1981, Washington, DC (ADAMS Accession No. ML051390358).
10. NRC, NSIR/DPR-ISG-01, “Interim Staff Guidance on Emergency Planning for Nuclear Power Plants,” November 2011, Washington, DC (ADAMS Accession No. ML113010523).
11. NRC, “Enhancements to Emergency Preparedness Regulations,” Final Rule, 76 FR 72560, November 23, 2011.

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<sup>3</sup> Publicly available NRC published documents are available electronically through the NRC Library under Document Collections on the NRC’s public Web site at <http://www.nrc.gov/reading-rm/doc-collections/> and through the NRC’s Agencywide Documents Access and Management System (ADAMS) at <http://www.nrc.gov/reading-rm/adams.html>. The documents can also be viewed online or printed for a fee in the NRC’s Public Document Room (PDR) at 11555 Rockville Pike, Rockville, MD. For problems with ADAMS, contact the PDR staff at 301-415-4737 or (800) 397-4209; fax (301) 415-3548; or e-mail [pdr.resource@nrc.gov](mailto:pdr.resource@nrc.gov).

<sup>4</sup> The Code of Federal Regulations may be obtained electronically from the U.S. Government Printing Office at: <http://www.gpo.gov/fdsys/browse/collectionCfr.action?collectionCode=CFR>

12. NRC, SFST-ISG-16, "Spent Fuel Storage and Transportation Interim Staff Guidance on Emergency Planning," June 2000, Washington, DC (ADAMS Accession No. ML003724570).
13. NRC, "Nuclear Regulatory Commission International Policy Statement," Federal Register, Vol. 79, No. 132, July 10, 2014, pp. 39415-39418.
14. NRC, Management Directive (MD) 6.6, "Regulatory Guides," Washington, DC, May 2, 2016 (ADAMS Accession No. ML18073A170).
15. International Atomic Energy Agency (IAEA), Safety Guide GS-R-7, "Preparedness and Response for a Nuclear or Radiological Emergency," IAEA, Vienna, Austria.<sup>5</sup>
16. CFR, "Standards for Protection Against Radiation," Part 20, Chapter I, Title 10, "Energy.
17. NRC, Management Directive 8.4, "Management of Facility-Specific Backfitting and Information Collection."

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<sup>5</sup> Copies of International Atomic Energy Agency (IAEA) documents may be obtained through their Web site: <https://www.iaea.org/> or by writing the International Atomic Energy Agency, P.O. Box 100 Wagramer Strasse 5, A-1400 Vienna, Austria.

## **APPENDIX A**

### **Development of an Emergency Action Level Scheme for Decommissioning Power Reactor Transitioning from Power Operations to All Spent Fuel in Dry Cask Storage**

Attachment 1: Post-Shutdown Emergency Plan Emergency Action Level Scheme

Attachment 2: Permanently Defueled Emergency Plan Emergency Action Level Scheme

Attachment 3: Independent Spent Fuel Storage Installation Only Emergency Plan Emergency Action Level Scheme

## EXECUTIVE SUMMARY

In Part 50, “Domestic Licensing of Production and Utilization Facilities” (Ref. 1) of Title 10 of the *Code of Federal Regulations* (10 CFR), 10 CFR 50.47, “Emergency Plans,” and 10 CFR 50.200, “Power reactor decommissioning emergency plans,” require that a nuclear power plant (NPP) licensee develop a scheme for the classification of emergency events and conditions. This scheme is a fundamental component of an emergency plan in that it provides the defined thresholds that will allow site personnel to rapidly implement a range of pre-planned emergency response measures. An emergency classification scheme also facilitates timely decision-making by an offsite response organization (ORO) concerning the implementation of precautionary or protective actions for the public.

Licensees that have permanently ceased operations and defueled may revise their emergency action level (EAL) scheme to a scheme appropriate for the risk posed to the public from spent fuel stored in a spent fuel pool or dry cask storage system, in accordance with 10 CFR 50.54(q)(8)(iii).

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# **DEVELOPMENT OF AN EMERGENCY ACTION LEVEL SCHEME FOR DECOMMISSIONING POWER REACTORS**

## **1. PURPOSE**

The purpose of this document is to provide guidance to NPP licensees for the development of a site-specific EAL scheme when the licensees cease operations and have transferred all the spent fuel into the spent fuel pool (SFP). The methodology described in this document is consistent with U.S. Nuclear Regulatory Commission (NRC) requirements and guidance. In particular, this methodology has been endorsed by the NRC as an acceptable approach to meeting the requirements of 10 CFR 50.200(a), (b)(4), and (c)(1)(ii)(A) and paragraph 72.32(a)(3) of 10 CFR Part 72, “Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-level Radioactive Waste, and Reactor-Related Greater than Class C Waste” (Ref. 3), related to emergency action levels.

This document contains a set of initiating conditions (ICs) and EALs. It also includes supporting technical basis information, developer notes, and recommended classification instructions for users. Users should implement ICs, EALs and thresholds that are as close as possible to the material presented in this document with allowance for changes necessary to address site-specific considerations such as plant design, location, and terminology.

Properly implemented, this guidance provides a site-specific emergency classification scheme with clearly defined and readily observable EALs and thresholds. Other benefits include the development of a sound basis document, the adoption of industry-standard instructions for emergency classification, and incorporation of features to improve human performance. An emergency classification using this scheme will be appropriate to the risk posed to plant workers and the public, and should be the same as that made by another decommissioned site at the same level of decommissioning in response to a similar event.

The individuals responsible for developing an emergency classification scheme are strongly encouraged to review all applicable NRC requirements and guidance prior to beginning their efforts. Questions concerning this document may be directed to the NRC.

## **2. REGULATORY BACKGROUND**

### **2.1 OPERATING POWER REACTORS**

Chapter I of 10 CFR contains the NRC regulations that apply to, among other entities, nuclear power facilities. Several of these regulations govern various aspects of an emergency classification scheme. A review of the relevant sections listed below will aid the reader in understanding the key terminology provided in this document.

- 10 CFR 50.47(a)(1)(i)
- 10 CFR 50.47(b)(4)
- 10 CFR 50.54(q)
- 10 CFR 50.72(a)
- 10 CFR Part 50, Appendix E, IV.B, Assessment Actions



- 10 CFR Part 50, Appendix E, IV.C, Activation of Emergency Organization

The above regulations are supplemented by various regulatory guidance documents. Three documents of particular relevance to operating reactors are:

- NUREG-0654/FEMA-REP-1, Revision 1, “Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, October 1980” (Ref. 5), [refer to Appendix 1, Emergency Action Level Guidelines for Nuclear Power Plants];
- NUREG-1022, “Event Reporting Guidelines 10 CFR 50.72 and 50.73” (Ref. 6);
- Regulatory Guide (RG) 1.101, “Emergency Response Planning and Preparedness for Nuclear Power Reactors” (Ref. 7).

The above regulatory guidance documents are supplemented by EAL scheme development guidance developed by the NEI in coordination with, and endorsed by, the NRC. These documents are:

- NEI 99-01, “Development of Emergency Action Levels for Non-Passive Reactors,” dated November 2012; Revision 4 (Ref. 8); Revision 5 (Ref. 9); Revision 6;
- NUMARC/NESP-007, “Methodology for Development of Emergency Action Levels,” dated April 1990 (Ref. 10);
- NEI 07-01, “Methodology for Development of Emergency Action Levels – Advanced Passive Light Water Reactors,” dated July 2009 (Ref. 11).

## **2.2 DECOMMISSIONING POWER REACTORS**

The EALs needed for each level of nuclear power reactor decommissioning may be changed commensurate with the reduced risk to the health and safety of the public from a radiological event. This guidance provides an EAL scheme appropriate for each of the decommissioning levels, which includes: (1) post-shutdown emergency plan (PSEP); (2) permanently defueled emergency plan (PDEP); and (3) independent spent fuel storage installation-only (ISFSI) emergency plan (IOEP).

This guidance is applicable to a nuclear power reactor licensee that has docketed certifications of permanent cessation of operations and permanent removal of fuel from the reactor vessel pursuant to 10 CFR 50.82, “Termination of license,” or 10 CFR 52.110, “Termination of license” of 10 CFR Part 52, “Licenses, Certifications, and Approvals for Nuclear Power Plants” (Ref. 12). As the licensee transitions to a new level of decommissioning (i.e., PSEP, PDEP, or IOEP), changes to EALs based on plant conditions that are physically unrealizable or instrumentation that is no longer in service due to decommissioning are not reductions in effectiveness provided that the evaluation under 10 CFR 50.54(q)(3) demonstrates that these changes do not reduce the capability of the emergency plan to take timely and appropriate protective actions. A licensee desiring to change its entire EAL scheme must submit an application for an amendment to its license and receive NRC approval before implementing the change.

## 2.3 REGULATORY PROCESS

The various regulatory processes to follow for the levels of decommissioning are discussed in detail in other regulatory documents. This document is intended to provide a method for the development of an acceptable EAL scheme for each level of decommissioning. While licensees may consider alternatives to the guidance provided herein, compliance with this guidance will reduce regulatory burden and effort.

## 2.4 APPLICABILITY TO SMALL MODULAR REACTOR DESIGNS AND OTHER NEW TECHNOLOGY

There are significant design and operating differences between large light water reactors and small modular reactors (SMRs) and other new technology (ONTs) (e.g., differences in source term). For this reason, this document is not applicable to SMRs or ONTs.

## 2.5 EMERGENCY CLASSIFICATION LEVELS

Emergency classification levels (ECLs) are one of a set of titles established by the NRC for grouping off-normal events or conditions according to (1) potential or actual effects or consequences, and (2) resulting onsite and offsite response actions. The ECLs, in ascending order of severity, are:

- (1) **Notification of Unusual Event (NOUE):** The purpose of this classification is to assure that the first step in future response has been carried out; to bring the operations staff to a state of readiness; and to provide systematic handling of unusual event (UE) information and decision-making. This term is sometimes shortened to UE or other similar site-specific terminology. The terms NOUE and UE are used interchangeably throughout this document.
- (2) **Alert:** The purpose of this classification is to assure that emergency personnel are readily available to respond if the situation becomes more serious or to perform confirmatory radiation monitoring if required, and provide offsite authorities current information on plant status and parameters.
- (3) **Site Area Emergency (SAE):** The purpose of the SAE declaration is to assure that emergency response centers are staffed; to assure that monitoring teams are dispatched; to assure that personnel required for evacuation of near-site areas are at duty stations if the situation becomes more serious; to provide consultation with offsite authorities; and to provide updates to the public through government authorities.
- (4) **General Emergency (GE):** The purpose of the GE declaration is to initiate predetermined protective actions for the public; to provide continuous assessment of information from the licensee and offsite organizational measurements; to initiate additional measures as indicated by actual or potential releases; to provide consultation with offsite authorities; and to provide updates for the public through government authorities.

## 3. GENERAL GUIDANCE

### 3.1 DECOMMISSIONED NUCLEAR REACTOR EAL SCHEMES

There are three distinct levels of licensee emergency plans, including emergency action levels (EAL) schemes, for nuclear reactors to implement when undergoing decommissioning. While many of these EALs are redundant between the three levels, this guidance depicts them as separate EAL schemes for ease of use and to aid in understanding. Also note that the three individual EALs applicable to IOEPs are

included under Attachment 1 (PSEPs) and Attachment 2 (PDEPs) because many licensees may need a PSEP or PDEP EAL scheme in parallel with having some spent fuel already in the ISFSI. When the licensee transitions to an IOEP EAL scheme, then only the three IOEP EALs would remain. The intent for this approach is for each EAL scheme to be used as a stand-alone reference for each level of decommissioning rather than combining all decommissioning EALs into one attachment.

### **3.2 INSTRUMENTATION USED FOR EALS**

Instrumentation used for EALs need not be safety-related, addressed by a Technical Specification or Offsite Dose Calculation (Assessment) Manual (ODCM/RETS) control requirement, nor powered from an emergency power source; however, EAL developers should strive to incorporate instrumentation that is reliable and routinely maintained in accordance with site programs and procedures. Alarms referenced in EAL statements should be those that are the most operationally significant for the described event or condition.

Scheme developers should ensure that specified values used as EAL setpoints are within the calibrated range of the referenced instrumentation and consider any automatic instrumentation functions that may impact accurate EAL assessment. In addition, EAL setpoint values should not use terms such as “off-scale low” or “off-scale high” since that type of reading may not be readily differentiated from an instrument failure.

### **3.3 INTEGRATION OF ICS/EALS WITH PLANT PROCEDURES**

A rigorous integration of IC and EAL references into plant operating procedures is not recommended. This approach would greatly increase the administrative controls and workload for maintaining procedures. On the other hand, performance challenges may occur if recognition of meeting an IC or EAL is based solely on the memory of a licensed operator or an Emergency Director, especially during periods of high stress.

Developers should consider placing appropriate visual cues in plant procedures alerting the reader or user to consult the site emergency classification procedure. Visual cues could be placed in emergency procedures or alarm response procedures.

### **3.4 EAL BASIS DOCUMENT**

A basis document is an integral part of an emergency classification scheme. The material in this document supports proper emergency classification decision-making by providing background and development information in a readily accessible format. It can be referred to in training situations and when making an actual emergency classification, if necessary. The document is also useful for establishing configuration management controls for EP-related equipment and explaining an emergency classification to offsite authorities. The content of the basis document should include, at a minimum, the following:

- (1) A discussion of the emergency classification and declaration. This material may be edited as needed to align with site-specific emergency plan and implementing procedure requirements.
- (2) Each IC along with the associated EALs, notes, and basis information.
- (3) A listing of acronyms and defined terms. This material may be edited as needed to align with site-specific characteristics.

- (4) Any site-specific background or technical appendices that the developers believe would be useful in explaining or using elements of the emergency classification scheme.

A basis section should not contain information that could modify the meaning or intent of the associated IC or EAL. Such information should be incorporated within the IC or EAL statements, or as an EAL note. Information in the basis should only clarify and inform decisionmaking for an emergency classification.

Basis information should be readily available to be referenced, if necessary, by the Emergency Director. For example, a copy of the basis document could be maintained in the appropriate emergency response facility(ies).

Because the information in a basis document can affect emergency classification decisionmaking, the NRC staff expects that changes to the basis document will be evaluated in accordance with the provisions of 10 CFR 50.54(q).

### **3.5 VALID INDICATIONS**

All emergency classification assessments should be based upon valid indications, reports, or conditions. A valid indication, report, or condition is one that has been verified through appropriate means such that there is no doubt regarding the indicator's operability, the condition's existence, or the report's accuracy. For example, validation could be accomplished through an instrument channel check, response on related or redundant indicators, or direct observation by plant personnel. The validation of indications should be completed in a manner that supports timely emergency declaration.

### **3.6 ECL DECLARATION TIMING**

For ICs and EALs that have a stipulated time duration, the Emergency Director should not wait until the applicable time has elapsed but should declare the event as soon as it is determined that the condition has exceeded, or will likely exceed, the applicable time. If an ongoing radiological release is detected and the release start time is unknown, it should be assumed that the release duration specified in the IC/EAL has been exceeded, absent data to the contrary.

When assessing an EAL that specifies a time duration for the off-normal condition, the "clock" for the EAL time duration runs concurrently with the emergency classification process "clock."

### **3.7 PLANNED WORK ACTIVITIES**

A planned work activity that results in an expected event or condition which meets or exceeds an EAL does not warrant an emergency declaration provided that (1) the activity proceeds as planned and (2) the plant remains within the limits imposed by the license. Such activities include planned work to test, manipulate, repair, maintain, or modify a system or component. In these cases, the controls associated with the planning, preparation and execution of the work will ensure that compliance is maintained with all aspects of the license provided that the activity proceeds and concludes as expected. Events or conditions of this type may be subject to the reporting requirements of 10 CFR 50.72.

### **3.8 EALS BASED UPON ANALYSES**

The assessment of some EALs is based on the results of analyses that are necessary to ascertain whether a specific EAL threshold has been exceeded (e.g., dose assessments, chemistry sampling, etc.); the EAL and/or the associated basis discussion will identify the necessary analysis. In these cases, the declaration period starts with the availability of the analysis results that show the threshold to be exceeded (i.e., this is

the time that the EAL information is first available). The NRC expects licensees to establish the capability to initiate and complete EAL-related analyses within a reasonable period of time as stated in the applicable emergency plan or emergency plan implementing procedures.

### **3.9 EMERGENCY DIRECTOR JUDGMENT**

While the EALs have been developed to address a full spectrum of possible events and conditions which may warrant emergency classification, a provision for classification based on operator/management experience and judgment is still necessary. The schemes provide the Emergency Director with the ability to classify events and conditions based upon judgment using EALs that are consistent with the ECL definitions. The Emergency Director will need to determine if the effects or consequences of the event or condition reasonably meet or exceed a particular ECL definition.

### **3.10 INDEPENDENT SPENT FUEL STORAGE INSTALLATION**

The analysis of potential onsite and offsite consequences of accidental releases associated with the operation of an ISFSI is contained in NUREG-1140, "A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees" (Ref. 13). NUREG-1140 concluded that the postulated worst-case accident involving an ISFSI has insignificant consequences to the public health and safety. This evaluation shows that the maximum offsite dose to a member of the public due to an accidental release of radioactive materials would not exceed 1 rem effective dose equivalent (EDE).

### **3.11 CLASSIFICATION OF MULTIPLE EVENTS AND CONDITIONS**

When multiple emergency events or conditions are present, the user will identify all met or exceeded EALs. The highest applicable ECL identified during this review is declared. Note that the EALs are not additive.

### **3.12 CLASSIFICATION OF IMMINENT CONDITIONS**

Although EALs provide specific thresholds, the Emergency Director must remain alert to events or conditions that could lead to meeting or exceeding an EAL within a relatively short period of time (i.e., a change in the ECL is IMMINENT). If, in the judgment of the Emergency Director, meeting an EAL is IMMINENT, the emergency classification should be made as if the EAL has been met. While applicable to all ECLs, this approach is particularly important at the higher ECL since it provides additional time for implementation of protective measures.

### **3.13 ECL UPGRADING AND DOWNGRADING**

An ECL may be downgraded when the event or condition that meets the highest IC and EAL no longer exists, and other site-specific downgrading requirements are met. If downgrading the ECL is deemed appropriate, the new ECL would then be based on a lower applicable IC(s) and EAL(s). The ECL may also simply be terminated.

The following approach to downgrading or terminating an ECL is recommended:

ECL	Action When Condition No Longer Exists
UNUSUAL EVENT	Terminate the emergency in accordance with plant procedures.
ALERT	Downgrade or terminate the emergency in accordance with plant procedures.

### 3.14 CLASSIFICATION OF SHORT LIVED EVENTS

Event-based ICs and EALs define a variety of specific occurrences that have potential or actual safety significance. By their nature, some of these events may be short-lived and, thus, over before the emergency classification assessment can be completed. If an event occurs that meets or exceeds an EAL, the associated ECL must be declared regardless of its continued presence at the time of declaration. Examples of such events would be an earthquake or an explosion.

### 3.15 AFTER-THE-FACT DISCOVERY OF AN EMERGENCY EVENT OR CONDITION

In some cases, an EAL may be met but the emergency classification was not made at the time of the event or condition. This situation can occur when personnel discover that an event or condition existed which met an EAL, but no emergency was declared, and the event or condition no longer exists at the time of discovery. This may be due to the event or condition not being recognized at the time or an error that was made in the emergency classification process.

In these cases, no emergency declaration is warranted; however, the guidance contained in NUREG-1022 is applicable. Specifically, the event should be reported to the NRC in accordance with 10 CFR 50.72, "Immediate notification requirements for operating nuclear power reactors," within one hour of the discovery of the undeclared event or condition. The licensee should also notify appropriate State and local agencies in accordance with the agreed upon arrangements.

### 3.16 RETRACTION OF AN EMERGENCY DECLARATION

Guidance on the retraction of an emergency declaration reported to the NRC is provided in NUREG-1022.

#### 4. ACRONYMS AND ABBREVIATIONS

10 CFR.....	Title 10 of the <i>Code of Federal Regulations</i> (10 CFR)
CDE .....	Committed dose equivalent
CEDE.....	Committed effective dose equivalent
CFR.....	Code of Federal Regulations
DEGF .....	Degrees Fahrenheit
EAL.....	Emergency action level
ECL.....	Emergency classification level
EDE.....	Effective dose equivalent
ENS.....	Emergency notification system
EPA.....	U.S. Environmental Protection Agency
ERO .....	Emergency response organization
FAA .....	Federal Aviation Administration
FBI.....	Federal Bureau of Investigation
GE.....	General emergency
HOO.....	Headquarters operations officer
IC .....	Initiating condition
INPO .....	Institute of Nuclear Power Operations
IOEP.....	ISFSI only emergency plan
ISFSI.....	Independent spent fuel storage installation
mR, mRem, mrem, mREM.....	milli-roentgen equivalent man
NEI.....	Nuclear Energy Institute
NORAD .....	North American Aerospace Defense Command
NOUE .....	Notification of unusual event
NPP .....	Nuclear Power Plant
NRC .....	U. S. Nuclear Regulatory Commission

OCA.....	Owner controlled area
ODCM/ODAM .....	Offsite Dose Calculation (Assessment) Manual
ONT .....	Other New Technology
ORO.....	Offsite response organization
PA .....	Protected area
PAG .....	Protective action guideline
PAR.....	Protective action recommendation
PDEP.....	Permanently defueled emergency plan
PSEP .....	Post-shutdown emergency plan
RETS.....	Radiological effluent technical specifications
RG.....	Regulatory Guide
RIS .....	Regulatory Issue Summary
SAE.....	Site area emergency
SFP.....	Spent fuel pool
SMR.....	Small modular reactor
TEDE .....	Total effective dose equivalent
UE.....	Unusual event



## 5. DEFINITIONS

**ALERT:** Events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life-threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the U.S. Environmental Protection Agency (EPA) protective action guideline (PAG) exposure levels.

**CONFINEMENT BOUNDARY:** The barrier(s) between spent fuel and the environment for fuel stored in dry cask storage casks.

**DECON:** A decommissioning option that involves the removal of radioactive components, total dismantlement of the facility, and decontamination of remaining structures to a level that permits release for unrestricted use and termination of the license. DECON is the most extensive type of decommissioning activity. The NRC requires only that residual radioactivity be removed to levels acceptable for release of the facility to unrestricted access. Non-radioactive structures may remain onsite.

**EMERGENCY ACTION LEVEL:** A pre-determined, site-specific, observable threshold for an IC that, when met or exceeded, places the plant in a given ECL.

**EMERGENCY CLASSIFICATION LEVEL:** One of a set of names or titles established by the NRC for grouping off-normal events or conditions according to: (1) potential or actual effects or consequences, and (2) resulting onsite and offsite response actions. The ECLs, in ascending order of severity, are: NOUE, Alert, SAE, and GE.

**FIRE:** Combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do not constitute FIRES. Observation of flame is preferred but is NOT required if large quantities of smoke and heat are observed.

**GENERAL EMERGENCY:** Events are in progress or have occurred which involve actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity or HOSTILE ACTION that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA PAG exposure levels offsite for more than the immediate site area.

**HOSTAGE:** A person(s) held as leverage against the licensee to ensure that demands will be met by the licensee.

**HOSTILE ACTION:** 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. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the owner controlled area (OCA)).

### **NOTE**

A Hostile Action-Based program is not necessary for permanently defueled nuclear power reactors; however, the consideration of HOSTILE ACTIONS for EAL purposes is still applicable.

**HOSTILE FORCE:** One or more individuals who are engaged in a determined assault, overtly or by stealth and deception, equipped with suitable weapons capable of killing, maiming, or causing destruction.

**IMMINENT:** The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

**INDEPENDENT SPENT FUEL STORAGE INSTALLATION:** A complex that is designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage.

**INITIATING CONDITION:** An event or condition that aligns with the definition of one of the four ECLs by virtue of the potential or actual effects or consequences.

**LEVEL 1:** In accordance with NRC Order EA-12-051, "Issuance of Order to Modify Licenses With Regard to Reliable Spent Fuel Pool Instrumentation" (Ref. 14) SFP Level 1 is that SFP level that is adequate to support operation of the normal SFP cooling system.

**LEVEL 2:** In accordance with NRC Order EA-12-051, SFP Level 2 is that SFP level that is adequate to provide substantial radiation shielding for a person standing on the SFP operating deck.

**LEVEL 3:** In accordance with NRC Order EA-12-051, SFP Level 3 is that SFP level where fuel remains covered and actions to implement make-up water addition should no longer be deferred.

**NORMAL LEVELS:** As applied to radiological IC/EALs, the average reading for the past 24 hours excluding the current peak value.

**OWNER CONTROLLED AREA:** (Insert a site-specific definition for this term.) Developer Note – This term is typically taken to mean the site property owned by, or otherwise under the control of, the licensee. In some cases, it may be appropriate for a licensee to define a smaller area with a perimeter closer to the plant Protected Area (PA) perimeter (e.g., a site with a large OCA where some portions of the boundary may be a significant distance from the PA). In these cases, developers should consider using the boundary defined by the Restricted or Secured Owner Controlled Area. The area and boundary selected for scheme use must be consistent with the description of the same area and boundary contained in the Security Plan.

**PROTECTED AREA:** (Insert a site-specific definition for this term.) Developer Note – This term is typically taken to mean the area under continuous access monitoring and control, and armed protection as described in the site Security Plan.

**SAFSTOR:** Often considered "delayed DECON," SAFSTOR involves initially removing all fuel and radioactive wastes and liquids, maintaining the facility in a condition that allows the decay of radioactivity to reduce radiation levels at the facility, and then decontaminating and dismantling the facility. In general, prior to decontamination and dismantlement, only those tasks that are required to place the facility in a state of protective storage are performed.

**SECURITY CONDITION:** Any security event as listed in the approved security contingency plan that constitutes a threat/compromise to site security, threat/risk to site personnel, or a potential degradation to the level of safety of the plant. A SECURITY CONDITION does not involve a HOSTILE ACTION.

**SITE AREA EMERGENCY:** Events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or HOSTILE ACTION that results in intentional damage or malicious acts: (1) toward site personnel or equipment that could lead to the likely failure of, or (2) that prevent effective access to equipment needed for the protection of the public. Any releases are not expected to result in exposure levels which exceed EPA PAG exposure levels beyond the site boundary.

**UNPLANNED:** A parameter change or an event that is not: (1) the result of an intended evolution, or (2) an expected plant response to a transient. The cause of the parameter change, or event may be known or unknown.

**UNUSUAL EVENT<sup>6</sup>:** Events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.

**VALID INDICATIONS:** All emergency classification assessments should be based upon valid indications, reports, or conditions. A valid indication, report, or condition is one that has been verified through appropriate means such that there is no doubt regarding the indicator's operability, the condition's existence, or the report's accuracy. For example, validation could be accomplished through an instrument channel check, response on related or redundant indicators, or direct observation by plant personnel. The validation of indications should be completed in a manner that supports timely emergency declaration.

**VISIBLE DAMAGE:** Damage to a component or structure that is readily observable with measurements, testing, or analyses. This visible damage should be significant enough to reasonably question the reliability of the affected component or structure.

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<sup>6</sup> This term is sometimes shortened to UE or other similar site-specific terminology.

## 6. REFERENCES

1. *U.S. Code of Federal Regulations (CFR)*, “Domestic Licensing of Production and Utilization Facilities,” Part 50, Chapter I, Title 10, “Energy.”
2. U.S. Nuclear Regulatory Commission (NRC), NUREG-1738, “Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants,” January 2001 (ADAMS Accession No. ML010430066).
3. CFR, “Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste,” Part 72, Chapter I, Title 10, “Energy.”
4. Nuclear Energy Institute (NEI), NEI 99-01, Revision 6, “Development of Emergency Action Levels for Non-Passive Reactors,” November 2012 (ADAMS Accession No. ML12326A805).
5. NRC and the Federal Emergency Management Agency (FEMA), NUREG-0654/FEMA-REP-1, Revision 1, “Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants,” November 1980 (ADAMS Accession No. ML040420012).
6. NRC, NUREG-1022, Revision 3, “Event Reporting Guidelines 10 CFR 50.72 and 50.73,” dated January 2013 (ADAMS Accession No. ML13032A220), and Supplement 1, dated September 2014 (ADAMS Accession No. ML14267A447).
7. NRC, RG 1.101, Revision 2, “Emergency Planning and Preparedness for Nuclear Power Reactors,” October 1981 (ADAMS Accession No. ML090440294), Revision 3, August 1992 (ADAMS Accession No. ML003740302), and Revision 4, July 2003 (ADAMS Accession No. ML032020276).
8. NEI, NEI 99-01 Revision 4, “Methodology for Development of Emergency Action Levels,” dated January 2003 (ADAMS Accession No. ML041470143).
9. NEI, NEI 99-01, Revision 5, “Methodology for Development of Emergency Action Levels,” February 2008 (ADAMS Accession No. ML080450149).
10. Nuclear Management and Resources Council, Inc. (NUMARC), NUMARC/NESP-007, “Methodology for Development of Emergency Action Levels,” Revision 2, January 1992 (ADAMS Accession No ML041120174).
11. NEI, NEI 07-01, Revision 0, “Methodology for Development of Emergency Action Levels – Advanced Passive Light Water Reactors,” July 2009 (ADAMS Accession No. ML092030210).
12. CFR, “Licenses, Certifications, and Approvals for Nuclear Power Plants,” Part 52, Chapter I, Title 10, “Energy.”
13. NRC, NUREG-1140, “A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees,” January 1988 (ADAMS Accession No. ML101460227).
14. NRC Order EA-12-051, “Issuance of Order to Modify Licenses With Regard to Reliable Spent Fuel Pool Instrumentation,” March 12, 2012 (ADAMS Accession No. ML1205A679).

15. NRC, Generic Letter (GL), GL 89-01, "Implementation of Programmatic Controls for Radiological Effluent Technical Specifications in the Administrative Controls Section of the Technical Specifications and the Relocation of Procedural Details of RETS to the Offsite Dose Calculation Manual or to the Process Control Program," January 31, 1989 (ADAMS Accession No. ML031140051).
16. CFR, "Standards for Protection Against Radiation," Part 20, Chapter I, Title 10, "Energy."
17. NEI 12-02, Revision 1, "Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," August 2012 (ADAMS Accession No. ML122400399).
18. CFR, "Physical Protection of Plants and Materials," Part 73, Chapter I, Title 10, "Energy."
19. NEI 03-12, Revision 7, "Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan, [and Independent Spent Fuel Storage Installation Security Program]," October 11, 2011 (ADAMS Accession No. ML112800379).
20. CFR, "Agency Rules of Practice and Procedure," Part 2, Chapter I, Title 10, "Energy."

**ATTACHMENT 1**

**POST-SHUTDOWN EMERGENCY PLAN EMERGENCY ACTION LEVEL SCHEME**

**ECL:** Unusual Event (UE)

**IC:** An uncontrolled release of gaseous or liquid radioactivity for 60 minutes or longer.

**Applicability:** Decommissioned – PSEP

**Notes:**

- The Emergency Director should declare the event promptly upon determining that the allotted time has been exceeded or will likely be exceeded.
- If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the allotted time.
- If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

**Emergency Action Levels:** (1 or 2)

- (1) Reading on any effluent radiation monitor (installed or temporary) greater than two times the (site-specific effluent release controlling document) limits, or two times the alarm setpoint (as established by current radioactivity discharge permit), for 60 minutes or longer.
- (2) Sample analysis for a gaseous or liquid release indicates a concentration or release rate greater than two times the (site-specific effluent release controlling document) limits for 60 minutes or longer.

**Basis:**

This initiating condition (IC) addresses a potential decrease in the level of safety of the plant as indicated by a low-level radiological release that exceeds regulatory commitments for an extended period of time (e.g., an uncontrolled release). It includes any gaseous or liquid radiological release, monitored or unmonitored, including those for which a radioactivity discharge permit is normally prepared.

Nuclear power plants (NPPs) incorporate design features intended to control the release of radioactive effluents to the environment. Further, there are administrative controls established to prevent unintentional releases, and to control and monitor intentional releases. The occurrence of an extended, uncontrolled radioactive release to the environment is indicative of degradation in these features and/or controls.

Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

Releases should not be prorated or averaged. For example, a release exceeding four times release limits for 30 minutes does not meet the Emergency Action Level (EAL).

EAL #1 - This EAL addresses normally occurring continuous radioactivity releases from monitored gaseous or liquid effluent pathways, as well as radioactivity releases that cause effluent radiation monitor readings to exceed two times the limit established by a radioactivity discharge permit.

EAL #2 - This EAL addresses uncontrolled gaseous or liquid releases that are detected by sample analyses or environmental surveys, particularly on unmonitored pathways (e.g., spills of radioactive liquids into storm drains, heat exchanger leakage in river water systems).

Escalation of the ECL would be via IC DA1.

### **Developer Notes:**

The “site-specific effluent release controlling document” is the Radiological Effluent Technical Specifications (RETS) or, for plants that have implemented Generic Letter 89-01 (Ref. 15), the Offsite Dose Calculation Manual (ODCM). These documents implement regulations related to effluent controls (e.g., Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20, “Standards for Protection Against Radiation” (Ref. 16), and Appendix I, “Numerical Guidelines for Design Objectives and Limiting Conditions for Operation to Meet the Criterion ‘As low as is Reasonable Achievable’ for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents,” to 10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities”). As appropriate, the RETS or ODCM methodology should be used for establishing the monitor thresholds for this IC.

Listed monitors, as applicable, should include the effluent monitors described in the RETS or ODCM.

Developers may also consider including installed monitors associated with other potential effluent pathways that are not described in the RETS or ODCM.<sup>7,8</sup> If included, EAL values for these monitors should be determined using the most applicable dose/release limits presented in the RETS or ODCM. It is recognized that a calculated EAL value may be below what the monitor can read; in that case, the monitor does not need to be included in the list. Also, some monitors may not be governed by Technical Specifications or other license-related requirements; therefore, it is important that the associated EAL and basis section clearly identify any limitations on the use or availability of these monitors.

Radiation monitor readings should reflect values that correspond to a radiological release exceeding two times a release control limit. The controlling document typically describes methodologies for determining effluent radiation monitor setpoints; these methodologies should be used to determine EAL values. In cases where a methodology is not adequately defined, developers should determine values consistent with effluent control regulations (e.g., 10 CFR Part 20, and Appendix I to 10 CFR Part 50) and related guidance.

For EAL #1 - Values in this EAL should be two times the setpoint established by the radioactivity discharge permit to warn of a release that is not in compliance with the specified limits. Indexing the value in this manner ensures consistency between the EAL and the setpoint established by a specific discharge permit.

Developers should research radiation monitor design documents or other information sources to ensure that: (1) the EAL value being considered is within the usable response and display range of the instrument, and (2) there are no automatic features that may render the monitor reading invalid (e.g., an auto-purge feature triggered at a particular indication level).

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<sup>7</sup> This includes consideration of the effluent monitors described in the site emergency plan section(s) which address the requirements of 10 CFR 50.47(b)(8) and (9).

<sup>8</sup> Developers should keep in mind the requirements of 10 CFR 50.54(q) and the guidance provided by Institute of Nuclear Power Operations (INPO) related to emergency response equipment when considering the addition of other effluent monitors.



It is recognized that the condition described by this IC may result in a radiological effluent value beyond the operating or display range of the installed effluent monitor. In those cases, EAL values should be determined with a margin sufficient to ensure that an accurate monitor reading is available. For example, an EAL monitor reading might be set at 90 percent to 95 percent of the highest accurate monitor reading. This provision notwithstanding, if the estimated/calculated monitor reading is greater than approximately 110 percent of the highest accurate monitor reading, then developers may choose not to include the monitor as an indication and identify an alternate EAL threshold.

**ECL:** Alert

**IC:** An uncontrolled release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 milli-roentgen equivalent man (mrem) total effective dose equivalent (TEDE).

**Applicability:** Decommissioned – PSEP

**Notes:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded or will likely be exceeded.
- If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes.
- If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.
- The pre-calculated effluent monitor values presented in EAL #1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

**Emergency Action Levels:** (1 or 2 or 3 or 4)

- (1) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer: (site-specific monitor list and threshold values).
- (2) Dose assessment using actual meteorology indicates doses greater than 10 mrem TEDE at or beyond (site-specific dose receptor point).
- (3) Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses greater than 10 mrem TEDE for one hour of exposure at or beyond (site-specific dose receptor point).
- (4) Field survey results indicate closed window dose rates greater than 10 mrem/hr at or beyond (site-specific dose receptor point) for one hour of exposure.

**Basis:**

This IC addresses a release of gaseous or liquid radioactivity that results in projected or actual offsite doses greater than or equal to 1 percent of the EPA PAGs. It includes both monitored and un-monitored releases. Releases of this magnitude represent an actual or potential substantial degradation of the level of safety of the plant as indicated by a radiological release that significantly exceeds regulatory limits (e.g., a significant uncontrolled release).

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at 1 percent of the EPA PAG of 1,000 mrem.

Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

Escalation of the ECL would be via IC DS1.

**Developer Notes:**

The EPA PAGs are expressed in terms of the sum of the effective dose equivalent (EDE) and the committed effective dose equivalent (CEDE). For the purpose of these IC/EALs, the dose quantity TEDE, as defined in 10 CFR Part 20, is used in lieu of "...sum of EDE and CEDE...".

The "site-specific monitor list and threshold values" should be determined with consideration of the following:

- (1) Selection of the appropriate installed gaseous and liquid effluent monitors.
- (2) The effluent monitor readings should correspond to a dose of 10 mrem TEDE at the "site-specific dose receptor point" (consistent with the calculation methodology employed) for one hour of exposure.
- (3) Monitor readings will be calculated using a set of assumed meteorological data or atmospheric dispersion factors; the data or factors selected for use should be the same as those employed to calculate the monitor readings for ICs DS1 and DG1. Acceptable sources of this information include, but are not limited to, the RETS/ODCM and values used in the site's emergency dose assessment methodology.
- (4) The calculation of monitor readings will also require use of an assumed release isotopic mix; the selected mix should be the same as that employed to calculate monitor readings for ICs DS1 and DG1. Acceptable sources of this information include, but are not limited to, the RETS/ODCM and values used in the site's emergency dose assessment methodology.
- (5) Depending upon the methodology used to calculate the EAL values, there may be overlap of some values between different ICs. Developers will need to address this overlap by adjusting these values in a manner that ensures a logical escalation in the ECL.

The "site-specific dose receptor point" is the distance(s) and/or locations used by the licensee to distinguish between onsite and offsite doses. The selected distance(s) and/or locations should reflect the content of the emergency plan, and the procedural methodology used to determine offsite doses and Protective Action Recommendations (PARs). The variation in selected dose receptor points means there may be some differences in the distance from the release point to the calculated dose point from site to site.

Developers should research radiation monitor design documents or other information sources to ensure that: (1) the EAL value being considered is within the usable response and display range of the instrument, and (2) there are no automatic features that may render the monitor reading invalid (e.g., an auto-purge feature triggered at a particular indication level).

It is recognized that the condition described by this IC may result in a radiological effluent value beyond the operating or display range of the installed effluent monitor. In those cases, EAL values should be determined with a margin sufficient to ensure that an accurate monitor reading is available. For example, an EAL monitor reading might be set at 90 percent to 95 percent of the highest accurate monitor reading. This provision notwithstanding, if the estimated/calculated monitor reading is greater than approximately 110 percent of the highest accurate monitor reading, then developers may choose not to include the monitor as an indication and identify an alternate EAL threshold.

Although the IC references TEDE, field survey results are generally available only as a “whole body” dose rate. For this reason, the field survey EAL specifies a “closed window” survey reading.

**ECL:** Site Area Emergency (SAE)

**IC:** Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE.

**Applicability:** Decommissioned – PSEP

**Notes:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded or will likely be exceeded.
- If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes.
- If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.
- The pre-calculated effluent monitor values presented in EAL #1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

**Emergency Action Levels:** (1 or 2 or 3)

- (1) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer: (site-specific monitor list and threshold values).
- (2) Dose assessment using actual meteorology indicates doses greater than 100 mrem TEDE at or beyond (site-specific dose receptor point).
- (3) Field survey results indicate closed window dose rates greater than 100 mR/hr at or beyond (site-specific dose receptor point) for one hour of exposure.

**Basis:**

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to 10 percent of the EPA PAGs. It includes both monitored and un-monitored releases. Releases of this magnitude are associated with the failure of plant systems needed for the protection of the public.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at 10 percent of the EPA PAG of 1,000 mrem.

Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

Escalation of the ECL would be via IC DG1.

**Developer Notes:**

The EPA PAGs are expressed in terms of the sum of the EDE and the CEDE. For the purpose of these IC/EALs, the dose quantity TEDE, as defined in 10 CFR Part 20, is used in lieu of "...sum of EDE and CEDE....".

The "site-specific monitor list and threshold values" should be determined with consideration of the following:

- Selection of the appropriate installed gaseous effluent monitors.
- The effluent monitor readings should correspond to a dose of 100 mrem TEDE at the "site-specific dose receptor point" (consistent with the calculation methodology employed) for one hour of exposure.
- Monitor readings will be calculated using a set of assumed meteorological data or atmospheric dispersion factors; the data or factors selected for use should be the same as those employed to calculate the monitor readings for ICs DA1 and DG1. Acceptable sources of this information include, but are not limited to, the RETS/ODCM and values used in the site's emergency dose assessment methodology.
- The calculation of monitor readings will also require use of an assumed release isotopic mix; the selected mix should be the same as that employed to calculate monitor readings for ICs DA1 and DG1. Acceptable sources of this information include, but are not limited to, the RETS/ODCM and values used in the site's emergency dose assessment methodology.
- Depending upon the methodology used to calculate the EAL values, there may be overlap of some values between different ICs. Developers will need to address this overlap by adjusting these values in a manner that ensures a logical escalation in the ECL.

The "site-specific dose receptor point" is the distance(s) and/or locations used by the licensee to distinguish between onsite and offsite doses. The selected distance(s) and/or locations should reflect the content of the emergency plan and the procedural methodology used to determine offsite doses and PARs. The variation in selected dose receptor points means there may be some differences in the distance from the release point to the calculated dose point from site to site.

Developers should research radiation monitor design documents or other information sources to ensure that: (1) the EAL value being considered is within the usable response and display range of the instrument, and (2) there are no automatic features that may render the monitor reading invalid (e.g., an auto-purge feature triggered at a particular indication level).

It is recognized that the condition described by this IC may result in a radiological effluent value beyond the operating or display range of the installed effluent monitor. In those cases, EAL values should be determined with a margin sufficient to ensure that an accurate monitor reading is available. For example, an EAL monitor reading might be set at 90 percent to 95 percent of the highest accurate monitor reading. This provision notwithstanding, if the estimated/calculated monitor reading is greater than approximately 110 percent of the highest accurate monitor reading, then developers may choose not to include the monitor as an indication and identify an alternate EAL threshold.

Although the IC references TEDE, field survey results are generally available only as a “whole body” dose rate. For this reason, the field survey EAL specifies a “closed window” survey reading.

**ECL:** General Emergency (GE)

**IC:** Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE.

**Applicability:** Decommissioned – PSEP

**Notes:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded or will likely be exceeded.
- If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes.
- If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.
- The pre-calculated effluent monitor values presented in EAL #1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

**Emergency Action Levels:** (1 or 2 or 3)

- (1) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer: (site-specific monitor list and threshold values).
- (2) Dose assessment using actual meteorology indicates doses greater than 1,000 mrem TEDE at or beyond (site-specific dose receptor point).
- (3) Field survey results indicate closed window dose rates greater than 1,000 mR/hr at or beyond (site-specific dose receptor point) for one hour of exposure.

**Basis:**

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to the EPA PAGs. It includes both monitored and un-monitored releases. Releases of this magnitude will require implementation of protective actions for the public.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at the EPA PAG of 1,000 mrem.

Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.



## Developer Notes:

The effluent ICs/EALs are included to provide a basis for classifying events that cannot be readily classified on the basis of plant conditions alone. The inclusion of both types of ICs/EALs more fully addresses the spectrum of possible events and accidents.

The EPA PAGs are expressed in terms of the sum of the EDE and the CEDE, or as the thyroid committed dose equivalent (CDE). For the purpose of these IC/EALs, the dose quantity TEDE, as defined in 10 CFR Part 20, is used in lieu of "...sum of EDE and CEDE...".

The "site-specific monitor list and threshold values" should be determined with consideration of the following:

- Selection of the appropriate installed gaseous effluent monitors.
- The effluent monitor readings should correspond to a dose of 1,000 mrem TEDE at the "site-specific dose receptor point" (consistent with the calculation methodology employed) for one hour of exposure.
- Monitor readings will be calculated using a set of assumed meteorological data or atmospheric dispersion factors; the data or factors selected for use should be the same as those employed to calculate the monitor readings for ICs DA1 and DS1. Acceptable sources of this information include, but are not limited to, the RETS/ODCM and values used in the site's emergency dose assessment methodology.
- The calculation of monitor readings will also require use of an assumed release isotopic mix; the selected mix should be the same as that employed to calculate monitor readings for ICs DA1 and DS1. Acceptable sources of this information include, but are not limited to, the RETS/ODCM and values used in the site's emergency dose assessment methodology.
- Depending upon the methodology used to calculate the EAL values, there may be overlap of some values between different ICs. Developers will need to address this overlap by adjusting these values in a manner that ensures a logical escalation in the ECL.

The "site-specific dose receptor point" is the distance(s) and/or locations used by the licensee to distinguish between onsite and offsite doses. The selected distance(s) and/or locations should reflect the content of the emergency plan, and procedural methodology used to determine offsite doses and PARs. The variation in selected dose receptor points means there may be some differences in the distance from the release point to the calculated dose point from site to site.

Developers should research radiation monitor design documents or other information sources to ensure that: (1) the EAL value being considered is within the usable response and display range of the instrument, and (2) there are no automatic features that may render the monitor reading invalid (e.g., an auto-purge feature triggered at a particular indication level).

It is recognized that the condition described by this IC may result in a radiological effluent value beyond the operating or display range of the installed effluent monitor. In those cases, EAL values should be determined with a margin sufficient to ensure that an accurate monitor reading is available. For example, an EAL monitor reading might be set at 90 percent to 95 percent of the highest accurate monitor reading. This provision notwithstanding, if the estimated/calculated monitor reading is greater than approximately

110 percent of the highest accurate monitor reading, then developers may choose not to include the monitor as an indication and identify an alternate EAL threshold.

Although the IC references TEDE, field survey results are generally available only as a “whole body” dose rate. For this reason, the field survey EAL specifies a “closed window” survey reading.

**ECL:** Unusual Event

**IC:** UNPLANNED loss of water level in the SFP.

**Applicability:** Decommissioned – PSEP

**Note:**

- The cause of the loss in SFP level is not relevant to this IC. Anything that causes an UNPLANNED loss in SFP level, including natural hazards such as earthquakes, flooding, etc., will result in consideration of this IC.

**Emergency Action Level:**

- (1) UNPLANNED water level drop in the SFP as indicated by (site-specific SFP level indications) to, or below, (site specific Level 2 SFP level).

**Basis:**

This IC addresses a decrease in SFP water level to the Level 2 SFP level. SFP water level at this value is within the lower end of the level range necessary to prevent significant dose consequences from direct gamma radiation to personnel performing operations in the vicinity of the SFP. This condition reflects an unplanned/uncontrolled loss of SFP water inventory.

A water level decrease will be primarily determined by indications from available level instrumentation. Other sources of level indications may include reports from plant personnel or video camera observations (if available). A significant drop in the water level may also cause an increase in the radiation levels of adjacent areas that can be detected by monitors in those locations.

Note that this EAL is applicable only in cases where the elevated reading is due to an UNPLANNED loss of water level.

Escalation of the ECL would be via IC DA2.

**Developer Notes:**

The “site-specific level indications” are those indications that may be used to monitor water level in the various portions of the SFP.

In accordance with NRC Order EA-12-051, “Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation,” the “site-specific Level 2 value” is usually the SFP level that is within the lower end of the level range necessary to prevent significant dose consequences from direct gamma radiation to personnel performing operations in the vicinity of the SFP. This condition reflects an unplanned/uncontrolled loss of SFP water inventory. This site-specific level is determined in accordance with NRC Order EA-12-051 and NEI 12-02, “Industry Guidance for Compliance with NRC Order EA-12-051, ‘To Modify Licenses with Regard to Reliable Spent Fuel Instrumentation’” (Ref. 17), and applicable owners group guidance.

Developers should modify the EAL and/or basis section to reflect any site-specific constraints or limitations associated with the design or operation of instrumentation used to determine the Level 2 value.

**ECL:** Alert

**IC:** Significant lowering of SFP water level.

**Applicability:** Decommissioned – PSEP

**Emergency Action Levels:** (1 or 2)

- (1) Lowering of SFP level to (site-specific Level 3 value).

**Basis:**

This IC addresses events that have caused a significant lowering of water level within the SFP. These events present radiological safety challenges to plant personnel and are precursors to a release of radioactivity to the environment. As such, they represent an actual or potential substantial degradation of the level of safety of the plant.

This IC applies to irradiated fuel that is licensed for dry storage up to the point that the loaded storage cask is sealed. Once sealed, damage to a loaded cask causing loss of the CONFINEMENT BOUNDARY is classified in accordance with independent spent fuel storage installation (ISFSI) EALs.

Escalation of the emergency would be based on IC DS1.

SFP water level at this value is usually that SFP level where fuel remains covered and actions to implement make-up water addition should no longer be deferred. This condition reflects a significant loss of SFP water inventory and, thus, it is also a precursor to a loss of the ability to adequately cool the irradiated fuel assemblies stored in the pool.

**Developer Notes:**

In accordance with NRC Order EA-12-051, the “site-specific Level 3 value” is usually the SFP level where spent fuel is still covered but actions to restore level should not be deferred. This site-specific level is determined in accordance with NRC Order EA-12-051 and NEI 12-02, and applicable owners group guidance.

Developers should modify the EAL and/or basis section to reflect any site-specific constraints or limitations associated with the design or operation of instrumentation used to determine the Level 3 value.

**ECL:** Unusual Event

**IC:** Confirmed SECURITY CONDITION or threat.

**Applicability:** Decommissioned – PSEP

**Emergency Action Levels:** (1 or 2 or 3)

- (1) A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the (site-specific security shift supervision).
- (2) Notification of a credible security threat directed at the site.
- (3) A validated notification from the NRC providing information of an aircraft threat.

**Basis:**

This IC addresses events that pose a threat to plant personnel and, thus, represent a potential degradation in the level of plant safety. Security events which do not meet one of these EALs are adequately addressed by the requirements of 10 CFR 73.71, “Reporting of safeguards events,” of 10 CFR Part 73, “Physical Protection of Plants and Materials” (Ref. 18), or 10 CFR 50.72, “Immediate notification requirements for operating nuclear power reactors.” Security events assessed as HOSTILE ACTIONS are classifiable under ICs DA3 or DS3.

Timely and accurate communications between security shift supervision and the Control Room is essential for proper classification of a security-related event. Classification of these events will initiate appropriate threat-related notifications to plant personnel and OROs.

Security plans and terminology are based on the guidance provided by NEI 03-12, “Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan (and Independent Spent Fuel Storage Installation Security Program)” (Ref. 19).

Security related events at the ISFSI are bound by ICs EU1 and EA1.

EAL #1 references (site-specific security shift supervision) because these are the individuals trained to confirm that a security event is occurring or has occurred. Training on security event confirmation and classification is controlled due to the nature of safeguards and 10 CFR 2.390, “Public inspections, exemptions, requests for withholding,” information.

EAL #2 addresses the receipt of a credible security threat. The credibility of the threat is assessed in accordance with (site-specific procedure).

EAL #3 addresses the threat from the impact of an aircraft on the plant. The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may also be provided by the North American Aerospace Defense Command (NORAD) through the NRC. Validation of the threat is performed in accordance with (site-specific procedure).

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the ECL would be via IC DA3.

**Developer Notes:**

The (site-specific security shift supervision) is the title of the on-shift individual responsible for supervision of the on-shift security force.

The (site-specific procedure) is the procedure(s) used by Control Room and/or security personnel to determine if a security threat is credible, and to validate receipt of aircraft threat information.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

With due consideration given to the above developer note, EALs may contain alpha or numbered references to selected events described in the Security Plan and associated implementing procedures. Such references should not contain a recognizable description of the event. For example, an EAL may be worded as “Security event #2, #5 or #9 is reported by the (site-specific security shift supervision).”

**ECL:** Alert

**IC:** HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes.

**Applicability:** Decommissioned – PSEP

**Emergency Action Levels:** (1 or 2)

- (1) A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA as reported by the (site-specific security shift supervision).
- (2) A validated notification from NRC of an aircraft attack threat within 30 minutes of the site.

**Basis:**

This IC addresses the occurrence of a HOSTILE ACTION within the OWNER CONTROLLED AREA or notification of an aircraft attack threat. This event will require rapid response and assistance due to the possibility of the attack progressing to the PROTECTED AREA, or the need to prepare the plant and staff for a potential aircraft impact.

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event.

Security plans and terminology are based on the guidance provided by NEI 03-12.

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (e.g., evacuation, dispersal, or sheltering). The Alert declaration will also heighten the awareness of OROs, allowing them to be better prepared should it be necessary to consider further actions.

This IC does not apply to incidents that are accidental events, acts of civil disobedience, or otherwise are not a HOSTILE ACTION perpetrated by a HOSTILE FORCE. Examples include the crash of a small aircraft, shots from hunters, physical disputes between employees, etc. Reporting of these types of events is adequately addressed by other EALs, or the requirements of 10 CFR 73.71 or 10 CFR 50.72.

Security related events at the ISFSI are bound by ICs EU1 and EA1.

EAL #1 is applicable for any HOSTILE ACTION occurring, or that has occurred, in the OWNER CONTROLLED AREA.

EAL #2 addresses the threat from the impact of an aircraft on the plant, and the anticipated arrival time is within 30 minutes. The intent of this EAL is to ensure that threat-related notifications are made in a timely manner so that plant personnel and OROs are in a heightened state of readiness. This EAL is met when the threat-related information has been validated in accordance with (site-specific procedure).

The NRC HOO will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may be provided by NORAD through the NRC.

In some cases, it may not be readily apparent if an aircraft impact within the OWNER CONTROLLED AREA was intentional (i.e., a HOSTILE ACTION). It is expected, although not certain, that notification by an appropriate Federal agency to the site would clarify this point. In this case, the appropriate Federal agency is intended to be NORAD, Federal Bureau of Investigation (FBI), Federal Aviation Administration (FAA), or NRC. The emergency declaration, including one based on other ICs/EALs, should not be unduly delayed while awaiting notification by a Federal agency.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the ECL would be via IC DS3.

**Developer Notes:**

The (site-specific security shift supervision) is the title of the on-shift individual responsible for supervision of the on-shift security force.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

With due consideration given to the above developer note, EALs may contain alpha or numbered references to selected events described in the Security Plan and associated implementing procedures. Such references should not contain a recognizable description of the event. For example, an EAL may be worded as “Security event #2, #5 or #9 is reported by the (site-specific security shift supervision).”



**ECL:** Site Area Emergency

**IC:** HOSTILE ACTION within the PROTECTED AREA.

**Applicability:** Decommissioned – PSEP

**Emergency Action Level:**

- (1) A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the (site-specific security shift supervision).

**Basis:**

This IC addresses the occurrence of a HOSTILE ACTION within the PROTECTED AREA. This event will require rapid response and assistance due to the possibility for damage to plant equipment.

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event.

Security plans and terminology are based on the guidance provided by NEI 03-12.

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (e.g., evacuation, dispersal, or sheltering). The SAE declaration will mobilize ORO resources and have them available to develop and implement public protective actions in the unlikely event that the attack is successful in impairing multiple safety functions.

Security related events at the ISFSI are bound by ICs EU1 and EA1.

This IC does not apply to incidents that are accidental events, acts of civil disobedience, or otherwise are not a HOSTILE ACTION perpetrated by a HOSTILE FORCE. Examples include the crash of a small aircraft, shots from hunters, physical disputes between employees, etc. Reporting of these types of events is adequately addressed by other EALs, or the requirements of 10 CFR 73.71 or 10 CFR 50.72.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

**Developer Notes:**

The (site-specific security shift supervision) is the title of the on-shift individual responsible for supervision of the on-shift security force.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

With due consideration given to the above developer note, EALs may contain alpha or numbered references to selected events described in the Security Plan and associated implementing procedures. Such references should not contain a recognizable description of the event. For example, an EAL may be worded as “Security event #2, #5 or #9 is reported by the (site-specific security shift supervision).”

**ECL:** Unusual Event

**IC:** Other conditions exist which in the judgment of the Emergency Director warrant declaration of a UE.

**Applicability:** Decommissioned – PSEP

**Emergency Action Level:**

Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.

**Basis:**

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the ECL description for a notification of unusual event (NOUE).

**ECL:** Alert

**IC:** Other conditions exist which in the judgment of the Emergency Director warrant declaration of an Alert.

**Applicability:** Decommissioned – PSEP

**Emergency Action Level:**

- (1) Other conditions exist which, in the judgment of the Emergency Director, indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life-threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the EPA PAG exposure levels.

**Basis:**

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the ECL description for an Alert.

**ECL:** Site Area Emergency

**IC:** Other conditions exist which in the judgment of the Emergency Director warrant declaration of an SAE.

**Applicability:** Decommissioned – PSEP

**Emergency Action Level:**

- (1) Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or HOSTILE ACTION that results in intentional damage or malicious acts: (1) toward site personnel or equipment that could lead to the likely failure of, or (2) that prevent effective access to equipment needed for the protection of the public. Any releases are not expected to result in exposure levels which exceed EPA PAG exposure levels beyond the site boundary.

**Basis:**

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the ECL description for an SAE.

**ECL:** General Emergency

**IC:** Other conditions exist which in the judgment of the Emergency Director warrant declaration of a GE.

**Applicability:** Decommissioned – PSEP

**Emergency Action Level:**

- (1) Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve actual or imminent spent fuel degradation or HOSTILE ACTION that results in intentional damage or malicious acts: (1) toward site personnel or equipment that could lead to the likely failure of, or (2) that prevent effective access to equipment needed for the protection of the public. Any releases are not expected to result in exposure levels which exceed EPA PAG exposure levels beyond the site boundary.

**Basis:**

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the ECL description for a GE.

**ECL:** Unusual Event

**IC:** Loss of all onsite or offsite communications capabilities.

**Applicability:** Decommissioned – PSEP

**Emergency Action Levels:** (1 or 2 or 3)

- (1) Loss of ALL of the following onsite communication methods: (site-specific list of communications methods).
- (2) Loss of ALL of the following ORO communications methods: (site-specific list of communications methods).
- (3) Loss of ALL of the following NRC communications methods: (site-specific list of communications methods).

**Basis:**

This IC addresses a significant loss of onsite or offsite communications capabilities. While not a direct challenge to plant or personnel safety, this event warrants prompt notifications to OROs and the NRC.

This IC should be assessed only when extraordinary means are being utilized to make communications possible (e.g., use of non-plant, privately owned equipment; relaying of onsite information via individuals or multiple radio transmission points; individuals being sent to offsite locations).

EAL #1 addresses a total loss of the communications methods used in support of routine plant operations.

EAL #2 addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The OROs referred to here are (see Developer Notes).

EAL #3 addresses a total loss of the communications methods used to notify the NRC of an emergency declaration.

The use of cell phones, radios, and satellite phones must consider their impact on plant equipment due to radio frequency interference. In addition, the use of alternative communication methods must consider their effectiveness (e.g., how effective satellite phones would be inside a building).

**Developer Notes:**

EAL #1 - The “site-specific list of communications methods” should include all communications methods used for routine plant communications. This listing should include installed plant equipment and components, and not items owned and maintained by individuals (e.g., personal cell phones).

EAL #2 - The “site-specific list of communications methods” should include all communications methods used to perform initial emergency notifications to OROs as described in the site Emergency Plan. The listing should include installed plant equipment and components, and not items owned and maintained by individuals (e.g., personal cell phones). Examples are ring-down/dedicated telephone lines, commercial telephone lines, radios, satellite telephones and internet-based communications technology.

In the Basis section, insert the site-specific listing of the OROs requiring notification of an emergency declaration from the Control Room in accordance with the site Emergency Plan, and typically within 15 minutes.

EAL #3 – The “site-specific list of communications methods” should include all communications methods used to perform initial emergency notifications to the NRC as described in the site Emergency Plan. The listing should include installed plant equipment and components, and not items owned and maintained by individuals (e.g., personal cell phones). These methods are typically the dedicated Emergency Notification System (ENS) telephone line and commercial telephone lines.



## DU6

**ECL:** Unusual Event

**IC:** Loss of all power to SFP equipment or instrumentation for 60 minutes or longer.

**Applicability:** Decommissioned – PSEP

**Note:**

- The Emergency Director should declare the event promptly upon determining that 60 minutes has been exceeded or will likely be exceeded.

**Emergency Action Levels:** (1 or 2)

- (1) Loss of ALL power to equipment needed to maintain level or temperature in the SFP for 60 minutes or longer (site-specific list of the electrical buses that supply the power to SFP equipment, or list of the equipment).
- (2) Loss of ALL power to SFP temperature or level instrumentation such that SFP temperature or level cannot be monitored from the Control Room, and the loss is expected to continue for 60 minutes or longer (site-specific list of the electrical buses that supply power to this instrumentation, or list of the instruments).

**Basis:**

EAL #1 addresses a loss of power to equipment needed to maintain SFP level or temperature regardless of whether or not SFP level is decreasing. A decrease in SFP level will result in ICs DU2 or DA2 being declared as stated in these ICs. The intent of IC DU6 is to inform OROs and the NRC when a loss of power occurs for an extended period of time.

EAL #2 addresses a loss of power to SFP temperature or level instrumentation which results in the Control Room being unable to monitor SFP temperature or level for an extended period of time. The intent of IC DU6 is to inform OROs and the NRC when the Control Room cannot monitor SFP temperature or level for an extended period of time.

The escalation path for this IC is via IC DA2.

**Developer Notes:**

For EAL #1, licensees can either list the electrical busses that supply the equipment needed to maintain SFP level or temperature or can list the equipment directly.

For EAL #2, licensees can either list the electrical buses that supply the SFP temperature or level instrumentation or can list the SFP instrumentation.

**ECL:** Unusual Event

**IC:** Hazardous events.

**Applicability:** Decommissioned – PSEP

**Note:**

- EAL #3 does not apply to routine traffic impediments such as fog, snow, ice, vehicle breakdowns, or vehicle accidents.

**Emergency Action Levels:** (1 or 2 or 3)

- (1) A hazardous event that results in **VISIBLE DAMAGE** to equipment needed to maintain SFP level or temperature.
- (2) Movement of personnel within the **PROTECTED AREA** is impeded due to an offsite event involving hazardous materials (e.g., an offsite chemical spill or toxic gas release).
- (3) A hazardous event that results in onsite conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles.

**Basis:**

This IC addresses hazardous events that are considered to represent a potential degradation of the level of safety of the plant by limiting the mobility of site personnel or by preventing the response of the emergency response organization (ERO), or other plant staff, if necessary. In addition, a hazardous event that results in **VISIBLE DAMAGE** to equipment needed to maintain SFP level or temperature warrants this classification.

EAL #1 addresses a hazardous event that results in **VISIBLE DAMAGE** to equipment needed to maintain SFP level or temperature.

EAL #2 addresses a hazardous materials event originating from an offsite location and of sufficient magnitude to impede the movement of personnel within the **PROTECTED AREA**.

EAL #3 addresses a hazardous event that causes an onsite impediment to vehicle movement and is significant enough to prohibit the ERO, or plant staff, from accessing the site using personal vehicles. Examples of such an event may include site flooding caused by a hurricane, heavy rains, up-river water releases, or dam failure, or an onsite train derailment blocking the access road.

This EAL is not intended to apply to routine impediments such as fog, snow, ice, vehicle breakdowns, or vehicle accidents, but rather to more significant conditions such as the Hurricane Andrew strike on Turkey Point in 1992, the flooding around the Cooper Station during the Midwest floods of 1993, or the flooding around Ft. Calhoun Station in 2011.

**Developer Notes:**

None.

**ECL:** Unusual Event

**IC:** UNPLANNED increase in SFP temperature.

**Applicability:** Decommissioned – PSEP

**Emergency Action Level:**

- (1) UNPLANNED increase in SFP temperature to (site-specific temperature).

**Basis:**

This IC addresses a condition that is a precursor to a more serious event and, therefore, represents a potential degradation in the level of safety of the plant. If uncorrected, boiling in the SFP may occur, and may result in a loss of SFP level and potentially an increase in radiation levels.

Escalation of this event would be via DA1 or DA2.

**Developer Notes:**

The site-specific temperature is that calculated by the licensee to be where fuel damage is likely to begin. This value is typically derived in the safety analysis report and is typically between 125 and 150 degrees Fahrenheit (DEGF).

**ECL:** Unusual Event

**IC:** Confirmed SECURITY CONDITION, or threat, at the ISFSI.

**Applicability:** PSEP, as applicable

**Emergency Action Level:** (1 or 2 or 3)

1. A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the (site-specific security shift supervision) and is impacting the ISFSI.
2. Notification of a credible security threat directed at the ISFSI.
3. A validated notification from the NRC providing information of an aircraft threat.

**Basis:**

This IC addresses events that pose a threat to plant personnel and, thus, represents a potential degradation in the level of plant safety. Security events which do not meet one of these EALs are adequately addressed by the requirements of 10 CFR 73.71 or 10 CFR 50.72.

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event. Classification of these events will initiate appropriate threat-related notifications to plant personnel and OROs.

Security plans and terminology are based on the guidance provided by NEI 03-12.

EAL #1 references (site-specific security shift supervision) because these are the individuals trained to confirm that a security event is occurring or has occurred. Training on security event confirmation and classification is controlled due to the nature of safeguards and 10 CFR 2.390, "Public inspections, exemptions, requests for withholding," information.

EAL #2 addresses the receipt of a credible security threat directed at the ISFSI. The credibility of the threat is assessed in accordance with (site-specific procedure).

EAL #3 addresses the threat from the impact of an aircraft on the plant. The NRC HOO will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may also be provided by NORAD through the NRC. Validation of the threat is performed in accordance with (site-specific procedure).

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the ECL would be via IC EA1.

**Developer Notes:**

The (site-specific security shift supervision) is the title of the on-shift individual responsible for supervision of the on-shift security force.

The (site-specific procedure) is the procedure(s) used by Control Room and/or security personnel to determine if a security threat is credible, and to validate receipt of aircraft threat information.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

With due consideration given to the above developer note, EALs may contain alpha or numbered references to selected events described in the Security Plan and associated implementing procedures. Such references should not contain a recognizable description of the event. For example, an EAL may be worded as “Security event #2, #5 or #9 is reported by the (site-specific security shift supervision).”

**ECL:** Alert

**IC:** HOSTILE ACTION within the ISFSI or airborne attack threat within 30 minutes.

**Applicability:** PSEP, as applicable

**Emergency Action Levels:** (1 or 2)

1. A HOSTILE ACTION is occurring or has occurred within the ISFSI as reported by the (site-specific security shift supervision).
2. A validated notification from NRC of an aircraft attack threat within 30 minutes of the site.

**Basis:**

This IC addresses the occurrence of a HOSTILE ACTION within the ISFSI or notification of an aircraft attack threat. This event will require rapid response and assistance due to the possibility of the attack compromising stored spent fuel or damaging the storage casks, or the need to prepare the plant and staff for a potential aircraft impact.

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event.

Security plans and terminology are based on the guidance provided by NEI 03-12.

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of possible onsite protective measures (e.g., evacuation, dispersal, or sheltering). The Alert declaration will also heighten the awareness of OROs, allowing them to be better prepared should it be necessary to consider further actions.

This IC does not apply to incidents that are accidental events, acts of civil disobedience, or otherwise are not a HOSTILE ACTION perpetrated by a HOSTILE FORCE. Examples include the crash of a small aircraft, shots from hunters, physical disputes between employees, etc. Reporting of these types of events is adequately addressed by other EALs, or the requirements of 10 CFR 73.71 or 10 CFR 50.72.

EAL #1 is applicable for any HOSTILE ACTION occurring, or that has occurred, in the ISFSI.

EAL #2 addresses the threat from the impact of an aircraft on the plant, and the anticipated arrival time is within 30 minutes. The intent of this EAL is to ensure that threat-related notifications are made in a timely manner so that plant personnel and OROs are in a heightened state of readiness. This EAL is met when the threat-related information has been validated in accordance with (site-specific procedure).

The NRC HOO will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may be provided by NORAD through the NRC.

In some cases, it may not be readily apparent if an aircraft impact within the ISFSI was intentional (i.e., a HOSTILE ACTION). It is expected, although not certain, that notification by an appropriate Federal agency to the site would clarify this point. In this case, the appropriate Federal agency is intended to be

NORAD, FBI, FAA or NRC. The emergency declaration should not be unduly delayed while awaiting notification by a Federal agency.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

**Developer Notes:**

The (site-specific security shift supervision) is the title of the on-shift individual responsible for supervision of the on-shift security force.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

With due consideration given to the above developer note, EALs may contain alpha or numbered references to selected events described in the Security Plan and associated implementing procedures. Such references should not contain a recognizable description of the event. For example, an EAL may be worded as “Security event #2, #5 or #9 is reported by the (site-specific security shift supervision).”

**ECL:** Unusual Event

**IC:** Damage to a loaded cask CONFINEMENT BOUNDARY.

**Applicability:** PSEP, as applicable

**Emergency Action Level:**

- (1) Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by a radiation monitor reading greater than NORMAL background at or near the cask.

**Basis:**

This IC addresses an event that results in damage to the CONFINEMENT BOUNDARY of a storage cask containing spent fuel. It applies to irradiated fuel that is licensed for dry storage beginning at the point that the loaded storage cask is sealed. The issues of concern are the creation of a potential or actual release path to the environment, degradation of one or more fuel assemblies due to environmental factors, and configuration changes which could cause challenges in removing the cask or fuel from storage.

The existence of “damage” is determined by radiological survey. The emphasis for this classification is the degradation in the level of safety of the spent fuel cask and not the magnitude of the associated dose or dose rate. It is recognized that in the case of extreme damage to a loaded cask, the IC may be determined based on measurement of a dose rate at some distance from the cask.

Normal background is that which is averaged over a 24-hour period or based upon licensee expertise and history. The actual value is not as important as understanding that the radiation conditions have changed signifying a potential issue with the casks and spent fuel.

Note that the particular design of the storage cask is not relevant to this IC. Regardless of the design, a radiation measurement greater than normal background at or near the cask will result in in this IC being considered.

**Developer Notes:**

None.



**ATTACHMENT 2**

**PERMANENTLY DEFUELED EMERGENCY PLAN EMERGENCY ACTION LEVEL  
SCHEME**

**ECL:** Unusual Event (UE)

**IC:** An uncontrolled release of gaseous or liquid radioactivity for 60 minutes or longer.

**Applicability:** Decommissioned – PDEP

**Notes:**

- The Emergency Director should declare the event promptly upon determining that the allotted time has been exceeded or will likely be exceeded.
- If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the allotted time.
- If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

**Emergency Action Levels: (1 or 2)**

- (1) Reading on any effluent radiation monitor (installed or temporary) greater than two times the (site-specific effluent release controlling document) limits, or two times the alarm setpoint (as established by current radioactivity discharge permit), for 60 minutes or longer.
- (2) Sample analysis for a gaseous or liquid release indicates a concentration or release rate greater than two times the (site-specific effluent release controlling document) limits for 60 minutes or longer.

**Basis:**

This initiating condition (IC) addresses a potential decrease in the level of safety of the plant as indicated by a low-level radiological release that exceeds regulatory commitments for an extended period of time (e.g., an uncontrolled release). It includes any gaseous or liquid radiological release, monitored or unmonitored, including those for which a radioactivity discharge permit is normally prepared.

Nuclear power plants (NPPs) incorporate design features intended to control the release of radioactive effluents to the environment. Further, there are administrative controls established to prevent unintentional releases, and to control and monitor intentional releases. The occurrence of an extended, uncontrolled radioactive release to the environment is indicative of degradation in these features and/or controls.

Radiological effluent emergency action levels (EALs) are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

Releases should not be prorated or averaged. For example, a release exceeding four times release limits for 30 minutes does not meet the EAL.

EAL #1 - This EAL addresses normally occurring continuous radioactivity releases from monitored gaseous or liquid effluent pathways, as well as radioactivity releases that cause effluent radiation monitor readings to exceed two times the limit established by a radioactivity discharge permit.

EAL #2 - This EAL addresses uncontrolled gaseous or liquid releases that are detected by sample analyses or environmental surveys, particularly on unmonitored pathways (e.g., spills of radioactive liquids into storm drains, heat exchanger leakage in river water systems).

Escalation of the emergency classification level (ECL) would be via IC DA1.

### **Developer Notes:**

The “site-specific effluent release controlling document” is the Radiological Effluent Technical Specifications (RETS) or, for plants that have implemented Generic Letter 89-01, the Offsite Dose Calculation Manual (ODCM). These documents implement regulations related to effluent controls (e.g., Title 10 of the *Code of Federal Regulations* (CFR) Part 20, “Standards for Protection Against Radiation,” and Appendix I, “Numerical Guidelines for Design Objectives and Limiting Conditions for Operation to Meet the Criterion ‘As low as is Reasonable Achievable’ for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents,” to 10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities”). As appropriate, the RETS or ODCM methodology should be used for establishing the monitor thresholds for this IC.

Listed monitors, as applicable, should include the effluent monitors described in the RETS or ODCM.

Developers may also consider including installed monitors associated with other potential effluent pathways that are not described in the RETS or ODCM.<sup>9,10</sup> If included, EAL values for these monitors should be determined using the most applicable dose/release limits presented in the RETS or ODCM. It is recognized that a calculated EAL value may be below what the monitor can read; in that case, the monitor does not need to be included in the list. Also, some monitors may not be governed by Technical Specifications or other license-related requirements; therefore, it is important that the associated EAL and basis section clearly identify any limitations on the use or availability of these monitors.

Radiation monitor readings should reflect values that correspond to a radiological release exceeding two times a release control limit. The controlling document typically describes methodologies for determining effluent radiation monitor setpoints; these methodologies should be used to determine EAL values. In cases where a methodology is not adequately defined, developers should determine values consistent with effluent control regulations (e.g., 10 CFR Part 20 and Appendix I to 10 CFR Part 50) and related guidance.

For EAL #1 - Values in this EAL should be two times the setpoint established by the radioactivity discharge permit to warn of a release that is not in compliance with the specified limits. Indexing the value in this manner ensures consistency between the EAL and the setpoint established by a specific discharge permit.

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<sup>9</sup> This includes consideration of the effluent monitors described in the site emergency plan section(s) which address the requirements of 10 CFR 50.47(b)(8) and (9).

<sup>10</sup> Developers should keep in mind the requirements of 10 CFR 50.54(q) and the guidance provided by Institute of Nuclear Power Operations (INPO) related to emergency response equipment when considering the addition of other effluent monitors.

Developers should research radiation monitor design documents or other information sources to ensure that: (1) the EAL value being considered is within the usable response and display range of the instrument, and (2) there are no automatic features that may render the monitor reading invalid (e.g., an auto-purge feature triggered at a particular indication level).

It is recognized that the condition described by this IC may result in a radiological effluent value beyond the operating or display range of the installed effluent monitor. In those cases, EAL values should be determined with a margin sufficient to ensure that an accurate monitor reading is available. For example, an EAL monitor reading might be set at 90 percent to 95 percent of the highest accurate monitor reading. This provision notwithstanding, if the estimated/calculated monitor reading is greater than approximately 110 percent of the highest accurate monitor reading, then developers may choose not to include the monitor as an indication and identify an alternate EAL threshold.

**ECL:** Alert

**IC:** An uncontrolled release of gaseous or liquid radioactivity resulting in detectable levels at the site boundary.

**Applicability:** Decommissioned – PDEP

**Notes:**

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded or will likely be exceeded.
- If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes.
- If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

**Emergency Action Levels:** (1 or 2)

- (1) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer: (site-specific monitor list and threshold values).
- (2) Analysis of a liquid effluent sample, or gaseous release, indicates a concentration or release rate that would result in doses greater than 10 milli-roentgen equivalent man (mrem) total effective dose equivalent (TEDE) for one hour of exposure at or beyond (site-specific dose receptor point).

**Basis:**

This IC addresses a release of gaseous or liquid radioactivity that results in detectable levels offsite that are at, or above, 1 percent of the U.S. Environmental Protection Agency (EPA) protective action guidelines (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude represent an actual or potential substantial degradation of the level of safety of the plant as indicated by a radiological release that significantly exceeds regulatory limits (e.g., a significant uncontrolled release).

With the station being permanently shut down for more than 100 days, the only radionuclide of any significance available to be released in gaseous form is the noble gas Kr-85. Kr-85 decays emitting a low abundance gamma, and is, therefore, not a significant contributor to TEDE. The gaseous release portion of this IC (detected by either an effluent monitor or by sample analysis) is not based on any ODCM values of dose or dose rate but rather on the radiological release that results from damage to multiple fuel assemblies in the spent fuel pool (SFP). The liquid release portion of this IC is based on an uncontrolled release that exceeds 50 times the radiation monitor discharge permit limit or ODCM default value.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at 1 percent of the EPA PAG of 1,000 mrem.

Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

### **Developer Notes:**

The EPA PAGs are expressed in terms of the sum of the effective dose equivalent (EDE) and the committed effective dose equivalent (CEDE). For the purpose of these IC/EALs, the dose quantity TEDE, as defined in 10 CFR Part 20, is used in lieu of "...sum of EDE and CEDE....".

The "site-specific monitor list and threshold values" should be determined with consideration of the following:

- Selection of the appropriate installed gaseous and liquid effluent monitors.
- The effluent monitor readings should correspond to a dose of 10 mrem TEDE at the "site-specific dose receptor point" (consistent with the calculation methodology employed) for one hour of exposure.
- Monitor readings will be calculated using a set of assumed meteorological data or atmospheric dispersion factors; the data or factors selected for use should be the same as those employed to calculate the monitor readings for ICs DS1 and DG1. Acceptable sources of this information include, but are not limited to, the RETS/ODCM and values used in the site's emergency dose assessment methodology.
- The calculation of monitor readings will also require use of an assumed release isotopic mix. Acceptable sources of this information include, but are not limited to, the RETS/ODCM and values used in the site's emergency dose assessment methodology.

The "site-specific dose receptor point" is the distance(s) and/or locations used by the licensee to distinguish between onsite and offsite doses. The selected distance(s) and/or locations should reflect the content of the emergency plan, and the procedural methodology used to determine offsite doses and Protective Action Recommendations (PARs). The variation in selected dose receptor points means there may be some differences in the distance from the release point to the calculated dose point from site to site.

Developers should research radiation monitor design documents or other information sources to ensure that: (1) the EAL value being considered is within the usable response and display range of the instrument, and (2) there are no automatic features that may render the monitor reading invalid (e.g., an auto-purge feature triggered at a particular indication level).

It is recognized that the condition described by this IC may result in a radiological effluent value beyond the operating or display range of the installed effluent monitor. In those cases, EAL values should be determined with a margin sufficient to ensure that an accurate monitor reading is available. For example, an EAL monitor reading might be set at 90 percent to 95 percent of the highest accurate monitor reading. This provision notwithstanding, if the estimated/calculated monitor reading is greater than approximately 110 percent of the highest accurate monitor reading, then developers may choose not to include the monitor as an indication and identify an alternate EAL threshold.

**ECL:** Unusual Event

**IC:** UNPLANNED loss of water level in the SFP.

**Applicability:** Decommissioned – PDEP

**Note:**

- The cause of the loss in SFP level is not relevant to this IC. Anything that causes an UNPLANNED loss in SFP level, including natural hazards such as earthquakes, flooding, etc., will result in consideration of this IC.

**Emergency Action Level:**

- (1) UNPLANNED water level drop in the SFP as indicated by (site-specific SFP level indications) to, or below, (site-specific Level 2 SFP level).

**Basis:**

This IC addresses a decrease in SFP water level to the Level 2 SFP level. SFP water level at this value is within the lower end of the level range necessary to prevent significant dose consequences from direct gamma radiation to personnel performing operations in the vicinity of the SFP. This condition reflects an unplanned/uncontrolled loss of SFP water inventory.

A water level decrease will be primarily determined by indications from available level instrumentation. Other sources of level indications may include reports from plant personnel or video camera observations (if available). A significant drop in the water level may also cause an increase in the radiation levels of adjacent areas that can be detected by monitors in those locations.

Note that this EAL is applicable only in cases where the elevated reading is due to an UNPLANNED loss of water level.

Escalation of the ECL would be via IC DA2.

**Developer Notes:**

The “site-specific level indications” are those indications that may be used to monitor water level in the various portions of the SFP.

In accordance with NRC Order EA-12-051, the “site-specific Level 2 value” is usually the SFP level that is within the lower end of the level range necessary to prevent significant dose consequences from direct gamma radiation to personnel performing operations in the vicinity of the SFP. This condition reflects an unplanned/uncontrolled loss of SFP water inventory. This site-specific level is determined in accordance with NRC Order EA-12-051 and NEI 12-02, and applicable owners group guidance.

Developers should modify the EAL and/or Basis section to reflect any site-specific constraints or limitations associated with the design or operation of instrumentation used to determine the Level 2 value.

**ECL:** Alert

**IC:** Significant lowering of water level above, or damage to, irradiated fuel.

**Applicability:** Decommissioned – PDEP

**Emergency Action Levels:**

- (1) Lowering of SFP level to (site-specific Level 3 value).

**Basis:**

This IC addresses events that have caused a significant lowering of water level within the SFP. These events present radiological safety challenges to plant personnel and are precursors to a release of radioactivity to the environment. As such, they represent an actual or potential substantial degradation of the level of safety of the plant.

This IC applies to irradiated fuel that is licensed for dry storage up to the point that the loaded storage cask is sealed. Once sealed, damage to a loaded cask causing loss of the CONFINEMENT BOUNDARY is classified in accordance with independent spent fuel storage installation (ISFSI) EALs.

SFP water level at this value is usually that SFP level where fuel remains covered and actions to implement make-up water addition should no longer be deferred. This condition reflects a significant loss of SFP water inventory and thus it is also a precursor to a loss of the ability to adequately cool the irradiated fuel assemblies stored in the pool.

**Developer Notes:**

In accordance with NRC Order EA-12-051, the “site-specific Level 3 value” is usually the SFP level where spent fuel is still covered but actions to restore level should not be deferred. This site-specific level is determined in accordance with NRC Order EA-12-051 and NEI 12-02, and applicable owners group guidance.

Developers should modify the EAL and/or Basis section to reflect any site-specific constraints or limitations associated with the design or operation of instrumentation used to determine the Level 3 value.



**ECL:** Unusual Event

**IC:** Confirmed SECURITY CONDITION or threat.

**Applicability:** Decommissioned – PDEP

**Emergency Action Levels:** (1 or 2 or 3)

- (1) A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the (site-specific security shift supervision).
- (2) Notification of a credible security threat directed at the site.
- (3) A validated notification from the NRC providing information of an aircraft threat.

**Basis:**

This IC addresses events that pose a threat to plant personnel and, thus, represents a potential degradation in the level of plant safety. Security events which do not meet one of these EALs are adequately addressed by the requirements of 10 CFR 73.71 or 10 CFR 50.72. Security events assessed as HOSTILE ACTIONS are classifiable under ICs DA5 or DS5.

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event. Classification of these events will initiate appropriate threat-related notifications to plant personnel and offsite response organizations (OROs).

Security plans and terminology are based on the guidance provided by NEI 03-12 “Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan (and Independent Spent Fuel Storage Installation Security Program).”

Security related events at the ISFSI are bound by ICs EU1 and EA1.

EAL #1 references (site-specific security shift supervision) because these are the individuals trained to confirm that a security event is occurring or has occurred. Training on security event confirmation and classification is controlled due to the nature of safeguards and 10 CFR 2.390 information.

EAL #2 addresses the receipt of a credible security threat. The credibility of the threat is assessed in accordance with (site-specific procedure).

EAL #3 addresses the threat from the impact of an aircraft on the plant. The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may also be provided by North American Aerospace Defense Command (NORAD) through the NRC. Validation of the threat is performed in accordance with (site-specific procedure).

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the ECL would be via IC DA3.

**Developer Notes:**

The (site-specific security shift supervision) is the title of the on-shift individual responsible for supervision of the on-shift security force.

The (site-specific procedure) is the procedure(s) used by Control Room and/or security personnel to determine if a security threat is credible, and to validate receipt of aircraft threat information.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

With due consideration given to the above developer note, EALs may contain alpha or numbered references to selected events described in the Security Plan and associated implementing procedures. Such references should not contain a recognizable description of the event. For example, an EAL may be worded as “Security event #2, #5 or #9 is reported by the (site-specific security shift supervision).”

**ECL:** Alert

**IC:** HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes

**Applicability:** Decommissioned – PDEP

**Emergency Action Levels:** (1 or 2)

- (1) A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA as reported by the (site-specific security shift supervision).
- (2) A validated notification from NRC of an aircraft attack threat within 30 minutes of the site.

**Basis:**

This IC addresses the occurrence of a HOSTILE ACTION within the OWNER CONTROLLED AREA or notification of an aircraft attack threat. This event will require rapid response and assistance due to the possibility of the attack progressing to the PROTECTED AREA, or the need to prepare the plant and staff for a potential aircraft impact.

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event.

Security plans and terminology are based on the guidance provided by NEI 03-12.

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (e.g., evacuation, dispersal, or sheltering). The Alert declaration will also heighten the awareness of OROs, allowing them to be better prepared should it be necessary to consider further actions.

This IC does not apply to incidents that are accidental events, acts of civil disobedience, or otherwise are not a HOSTILE ACTION perpetrated by a HOSTILE FORCE. Examples include the crash of a small aircraft, shots from hunters, physical disputes between employees, etc. Reporting of these types of events is adequately addressed by other EALs, or the requirements of 10 CFR 73.71 or 10 CFR 50.72.

Security related events at the ISFSI are bound by ICs EU1 and EA1.

EAL #1 is applicable for any HOSTILE ACTION occurring, or that has occurred, in the OWNER CONTROLLED AREA.

EAL #2 addresses the threat from the impact of an aircraft on the plant, and the anticipated arrival time is within 30 minutes. The intent of this EAL is to ensure that threat-related notifications are made in a timely manner so that plant personnel and OROs are in a heightened state of readiness. This EAL is met when the threat-related information has been validated in accordance with (site-specific procedure).

The NRC HOO will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may be provided by NORAD through the NRC.

In some cases, it may not be readily apparent if an aircraft impact within the OWNER CONTROLLED AREA was intentional (i.e., a HOSTILE ACTION). It is expected, although not certain, that notification by an appropriate Federal agency to the site would clarify this point. In this case, the appropriate Federal agency is intended to be NORAD, Federal Bureau of Investigation (FBI), Federal Aviation Administration (FAA) or NRC. The emergency declaration, including one based on other ICs/EALs, should not be unduly delayed while awaiting notification by a Federal agency.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

**Developer Notes:**

The (site-specific security shift supervision) is the title of the on-shift individual responsible for supervision of the on-shift security force.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

With due consideration given to the above developer note, EALs may contain alpha or numbered references to selected events described in the Security Plan and associated implementing procedures. Such references should not contain a recognizable description of the event. For example, an EAL may be worded as “Security event #2, #5 or #9 is reported by the (site-specific security shift supervision).”

**ECL:** Unusual Event

**IC:** Other conditions exist which in the judgment of the Emergency Director warrant declaration of a UE.

**Applicability:** Decommissioned – PDEP

**Emergency Action Level:**

- (1) Other conditions exist which, in the judgment of the Emergency Director indicate that events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.

**Basis:**

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the ECL description for a notification of unusual event (NOUE).

**ECL:** Alert

**IC:** Other conditions exist which in the judgment of the Emergency Director warrant declaration of an Alert.

**Applicability:** Decommissioned – PDEP

**Emergency Action Level:**

- (1) Other conditions exist which, in the judgment of the Emergency Director, indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life-threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the EPA PAG exposure levels.

**Basis:**

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the ECL description for an Alert.

**ECL:** Unusual Event

**IC:** Loss of all onsite or offsite communications capabilities.

**Applicability:** Decommissioned – PDEP

**Emergency Action Levels:** (1 or 2 or 3)

- (1) Loss of ALL of the following onsite communication methods: (site-specific list of communications methods).
- (2) Loss of ALL of the following ORO communications methods: (site-specific list of communications methods).
- (3) Loss of ALL of the following NRC communications methods: (site-specific list of communications methods).

**Basis:**

This IC addresses a significant loss of onsite or offsite communications capabilities. While not a direct challenge to plant or personnel safety, this event warrants prompt notifications to OROs and the NRC.

This IC should be assessed only when extraordinary means are being utilized to make communications possible (e.g., use of non-plant, privately owned equipment; relaying of onsite information via individuals or multiple radio transmission points; individuals being sent to offsite locations).

EAL #1 addresses a total loss of the communications methods used in support of routine plant operations.

EAL #2 addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The OROs referred to here are (see Developer Notes).

EAL #3 addresses a total loss of the communications methods used to notify the NRC of an emergency declaration.

The use of cell phones, radios, and satellite phones must consider their impact on plant equipment due to radio frequency interference. In addition, the use of alternative communication methods must consider their effectiveness (e.g., how effective satellite phones would be inside a building).

**Developer Notes:**

EAL #1 - The “site-specific list of communications methods” should include all communications methods used for routine plant communications. This listing should include installed plant equipment and components, and not items owned and maintained by individuals (e.g., personal cell phones).

EAL #2 - The “site-specific list of communications methods” should include all communications methods used to perform initial emergency notifications to OROs as described in the site Emergency Plan. The listing should include installed plant equipment and components, and not items owned and maintained by individuals (e.g., personal cell phones). Examples are ring-down/dedicated telephone lines, commercial telephone lines, radios, satellite telephones and internet-based communications technology.

In the Basis section, insert the site-specific listing of the OROs requiring notification of an emergency declaration from the Control Room in accordance with the site Emergency Plan.

EAL #3 – The “site-specific list of communications methods” should include all communications methods used to perform initial emergency notifications to the NRC as described in the site Emergency Plan. The listing should include installed plant equipment and components, and not items owned and maintained by individuals (e.g., personal cell phones). These methods are typically the dedicated Emergency Notification System (ENS) telephone line and commercial telephone lines.



## DU6

**ECL:** Unusual Event

**IC:** Loss of all power to SFP equipment or instrumentation for 60 minutes or longer.

**Applicability:** Decommissioned – PDEP

**Note:**

- The Emergency Director should declare the event promptly upon determining that 60 minutes has been exceeded or will likely be exceeded.

**Emergency Action Levels:** (1 or 2)

- (1) Loss of ALL power to equipment needed to maintain level or temperature in the SFP for 60 minutes or longer (site-specific list of the electrical buses that supply the power to SFP equipment, or list of the equipment)
- (2) Loss of ALL power to SFP temperature or level instrumentation such that SFP temperature or level cannot be monitored from the Control Room, and the loss is expected to continue for 60 minutes or longer (site-specific list of the electrical buses that supply power to this instrumentation, or list of the instruments)

**Basis:**

EAL #1 addresses a loss of power to equipment needed to maintain SFP level or temperature regardless of whether or not SFP level is decreasing. A decrease in SFP level will result in ICs DU2 or DA2 as stated in these ICs. The intent of IC DU6 is to inform OROs and the NRC when a loss of power occurs for an extended period of time.

EAL #2 addresses a loss of power to SFP temperature or level instrumentation which results in the Control Room being unable to monitor SFP temperature or level for an extended period of time. The intent of IC DU6 is to inform OROs and the NRC when the Control Room cannot monitor SFP temperature or level for an extended period of time.

The escalation path for this IC is via IC DA2.

**Developer Notes:**

For EAL #1, licensees can either list the electrical busses that supply the equipment needed to maintain SFP level or temperature or can list the equipment directly.

For EAL #2, licensees can either list the electrical buses that supply the SFP temperature or level instrumentation or can list the SFP instrumentation.

**ECL:** Unusual Event

**IC:** Hazardous events.

**Applicability:** Decommissioned – PDEP

**Note:**

- EAL #3 does not apply to routine traffic impediments such as fog, snow, ice, vehicle breakdowns, or vehicle accidents.

**Emergency Action Levels:** (1 or 2 or 3)

- (1) A hazardous event that results in **VISIBLE DAMAGE** to equipment needed to maintain SFP level or temperature.
- (2) Movement of personnel within the **PROTECTED AREA** is impeded due to an offsite event involving hazardous materials (e.g., an offsite chemical spill or toxic gas release).
- (3) A hazardous event that results in onsite conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles.

**Basis:**

This IC addresses hazardous events that are considered to represent a potential degradation of the level of safety of the plant by limiting the mobility of site personnel or by preventing the response of the emergency response organization (ERO), or other plant staff, if necessary. In addition, a hazardous event that results in **VISIBLE DAMAGE** to equipment needed to maintain SFP level or temperature warrants this classification.

EAL #1 addresses a hazardous event that results in **VISIBLE DAMAGE** to equipment needed to maintain SFP level or temperature.

EAL #2 addresses a hazardous materials event originating from an offsite location and of sufficient magnitude to impede the movement of personnel within the **PROTECTED AREA**.

EAL #3 addresses a hazardous event that causes an onsite impediment to vehicle movement and significant enough to prohibit the ERO, or plant staff, from accessing the site using personal vehicles. Examples of such an event may include site flooding caused by a hurricane, heavy rains, up-river water releases, or dam failure, or an onsite train derailment blocking the access road.

This EAL is not intended apply to routine impediments such as fog, snow, ice, or vehicle breakdowns or accidents, but rather to more significant conditions such as the Hurricane Andrew strike on Turkey Point in 1992, the flooding around the Cooper Station during the Midwest floods of 1993, or the flooding around Ft. Calhoun Station in 2011.

**Developer Notes:**

None.

**ECL:** Unusual Event

**IC:** UNPLANNED increase in SFP temperature.

**Applicability:** Decommissioned – PDEP

**Emergency Action Level:**

- (1) UNPLANNED increase in SFP temperature to (site-specific temperature).

**Basis:**

This IC addresses a condition that is a precursor to a more serious event and, therefore, represents a potential degradation in the level of safety of the plant. If uncorrected, boiling in the SFP may occur, and may result in a loss of SFP level and potentially an increase in radiation levels.

Escalation of this event would be via DA1 or DA2.

**Developer Notes:**

The site-specific temperature is that calculated by the licensee to be where fuel damage is likely to begin. This value is typically derived in the safety analysis report (SAR) and is typically between 125- and 150-degrees Fahrenheit (DEGF).

**ECL:** Unusual Event

**IC:** Confirmed SECURITY CONDITION, or threat, at the independent spent fuel storage installation (ISFSI).

**Applicability:** PDEP, as applicable

**Emergency Action Level:** (1 or 2 or 3)

- (1) A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the (site-specific security shift supervision) and impacting the ISFSI.
- (2) Notification of a credible security threat directed at the ISFSI.
- (3) A validated notification from the NRC providing information of an aircraft threat.

**Basis:**

This IC addresses events that pose a threat to plant personnel and, thus, represents a potential degradation in the level of plant safety. Security events which do not meet one of these EALs are adequately addressed by the requirements of 10 CFR 73.71 or 10 CFR 50.72.

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event. Classification of these events will initiate appropriate threat-related notifications to plant personnel and OROs.

Security plans and terminology are based on the guidance provided by NEI 03-12.

EAL #1 references (site-specific security shift supervision) because these are the individuals trained to confirm that a security event is occurring or has occurred. Training on security event confirmation and classification is controlled due to the nature of safeguards and 10 CFR 2.390, "Public inspections, exemptions, requests for withholding," information.

EAL #2 addresses the receipt of a credible security threat directed at the ISFSI. The credibility of the threat is assessed in accordance with (site-specific procedure).

EAL #3 addresses the threat from the impact of an aircraft on the plant. The NRC HOO will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may also be provided by NORAD through the NRC. Validation of the threat is performed in accordance with (site-specific procedure).

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the ECL would be via IC EA1.

**Developer Notes:**

The (site-specific security shift supervision) is the title of the on-shift individual responsible for supervision of the on-shift security force.

The (site-specific procedure) is the procedure(s) used by Control Room and/or security personnel to determine if a security threat is credible, and to validate receipt of aircraft threat information.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

With due consideration given to the above developer note, EALs may contain alpha or numbered references to selected events described in the Security Plan and associated implementing procedures. Such references should not contain a recognizable description of the event. For example, an EAL may be worded as “Security event #2, #5 or #9 is reported by the (site-specific security shift supervision).”

**ECL:** Alert

**IC:** HOSTILE ACTION within the ISFSI or airborne attack threat within 30 minutes.

**Applicability:** PDEP, as applicable

**Emergency Action Levels:** (1 or 2)

- (1) A HOSTILE ACTION is occurring or has occurred within the ISFSI as reported by the (site-specific security shift supervision).
- (2) A validated notification from NRC of an aircraft attack threat within 30 minutes of the site.

**Basis:**

This IC addresses the occurrence of a HOSTILE ACTION within the ISFSI or notification of an aircraft attack threat. This event will require rapid response and assistance due to the possibility of the attack compromising stored spent fuel or damaging the storage casks, or the need to prepare the plant and staff for a potential aircraft impact.

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event.

Security plans and terminology are based on the guidance provided by NEI 03-12.

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of possible onsite protective measures (e.g., evacuation, dispersal, or sheltering). The Alert declaration will also heighten the awareness of OROs, allowing them to be better prepared should it be necessary to consider further actions.

This IC does not apply to incidents that are accidental events, acts of civil disobedience, or otherwise are not a HOSTILE ACTION perpetrated by a HOSTILE FORCE. Examples include the crash of a small aircraft, shots from hunters, physical disputes between employees, etc. Reporting of these types of events is adequately addressed by other EALs, or the requirements of 10 CFR 73.71 or 10 CFR 50.72.

EAL #1 is applicable for any HOSTILE ACTION occurring, or that has occurred, in the ISFSI.

EAL #2 addresses the threat from the impact of an aircraft on the plant, and the anticipated arrival time is within 30 minutes. The intent of this EAL is to ensure that threat-related notifications are made in a timely manner so that plant personnel and OROs are in a heightened state of readiness. This EAL is met when the threat-related information has been validated in accordance with (site-specific procedure).

The NRC HOO will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may be provided by NORAD through the NRC.

In some cases, it may not be readily apparent if an aircraft impact within the ISFSI was intentional (i.e., a HOSTILE ACTION). It is expected, although not certain, that notification by an appropriate Federal agency to the site would clarify this point. In this case, the appropriate Federal agency is intended to be

NORAD, FBI, FAA or NRC. The emergency declaration should not be unduly delayed while awaiting notification by a Federal agency.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

**Developer Notes:**

The (site-specific security shift supervision) is the title of the on-shift individual responsible for supervision of the on-shift security force.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

With due consideration given to the above developer note, EALs may contain alpha or numbered references to selected events described in the Security Plan and associated implementing procedures. Such references should not contain a recognizable description of the event. For example, an EAL may be worded as “Security event #2, #5 or #9 is reported by the (site-specific security shift supervision).”

**ECL:** Unusual Event

**IC:** Damage to a loaded cask CONFINEMENT BOUNDARY.

**Applicability:** PDEP, as applicable

**Emergency Action Level:**

- (1) Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by a radiation monitor reading greater than NORMAL background at or near the cask.

**Basis:**

This IC addresses an event that results in damage to the CONFINEMENT BOUNDARY of a storage cask containing spent fuel. It applies to irradiated fuel that is licensed for dry storage beginning at the point that the loaded storage cask is sealed. The issues of concern are the creation of a potential or actual release path to the environment, degradation of one or more fuel assemblies due to environmental factors, and configuration changes which could cause challenges in removing the cask or fuel from storage.

The existence of “damage” is determined by radiological survey. The emphasis for this classification is the degradation in the level of safety of the spent fuel cask and not the magnitude of the associated dose or dose rate. It is recognized that in the case of extreme damage to a loaded cask, the IC may be determined based on measurement of a dose rate at some distance from the cask.

Normal background is that which is averaged over a 24-hour period or based upon licensee expertise and history. The actual value is not as important as understanding that the radiation conditions have changed signifying a potential issue with the casks and spent fuel.

Note that the particular design of the storage cask is not relevant to this IC. Regardless of the design, a radiation measurement greater than normal background at or near the cask will result in in this IC being considered.

**Developer Notes:**

None.



**ATTACHMENT 3**

**ISFSI ONLY EMERGENCY PLAN EMERGENCY ACTION LEVEL SCHEME**

**ECL:** Unusual Event (UE)

**IC:** Confirmed SECURITY CONDITION, or threat, at the independent spent fuel storage installation (ISFSI).

**Applicability:** IOEP

**Emergency Action Level:** (1 or 2 or 3)

- (1) A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the (site-specific security shift supervision) and impacting the ISFSI.
- (2) Notification of a credible security threat directed at the ISFSI.
- (3) A validated notification from the U.S. Nuclear Regulatory Commission (NRC) providing information of an aircraft threat.

**Basis:**

This initiating condition (IC) addresses events that pose a threat to plant personnel and, thus, represents a potential degradation in the level of plant safety. Security events which do not meet one of these emergency action levels (EALs) are adequately addressed by the requirements of 10 CFR 73.71, "Reporting of safeguards events," or 10 CFR 50.72, "Immediate notification requirements for operating nuclear power reactors."

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event. Classification of these events will initiate appropriate threat-related notifications to plant personnel and offsite response organizations (OROs).

Security plans and terminology are based on the guidance provided by NEI 03-12 "Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]".

EAL #1 references (site-specific security shift supervision) because these are the individuals trained to confirm that a security event is occurring or has occurred. Training on security event confirmation and classification is controlled due to the nature of safeguards and 10 CFR 2.390, "Public inspections, exemptions, and requests for withholding," of 10 CFR Part 2, "Agency Rules of Practice and Procedure," information.

EAL #2 addresses the receipt of a credible security threat directed at the ISFSI. The credibility of the threat is assessed in accordance with (site-specific procedure).

EAL #3 addresses the threat from the impact of an aircraft on the plant. The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may also be provided by North American Aerospace Defense Command (NORAD) through the NRC. Validation of the threat is performed in accordance with (site-specific procedure).

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a

potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level (ECL) would be via IC EA1.

**Developer Notes:**

The (site-specific security shift supervision) is the title of the on-shift individual responsible for supervision of the on-shift security force.

The (site-specific procedure) is the procedure(s) used by Control Room and/or security personnel to determine if a security threat is credible, and to validate receipt of aircraft threat information.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

With due consideration given to the above developer note, EALs may contain alpha or numbered references to selected events described in the Security Plan and associated implementing procedures. Such references should not contain a recognizable description of the event. For example, an EAL may be worded as “Security event #2, #5 or #9 is reported by the (site-specific security shift supervision).”

**ECL:** Alert

**IC:** HOSTILE ACTION within the ISFSI or airborne attack threat within 30 minutes.

**Applicability:** IOEP

**Emergency Action Levels:** (1 or 2)

- (1) A HOSTILE ACTION is occurring or has occurred within the ISFSI as reported by the (site-specific security shift supervision).
- (2) A validated notification from NRC of an aircraft attack threat within 30 minutes of the site.

**Basis:**

This IC addresses the occurrence of a HOSTILE ACTION within the ISFSI or notification of an aircraft attack threat. This event will require rapid response and assistance due to the possibility of the attack compromising stored spent fuel or damaging the storage casks, or the need to prepare the plant and staff for a potential aircraft impact.

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event.

Security plans and terminology are based on the guidance provided by NEI 03-12.

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of possible onsite protective measures (e.g., evacuation, dispersal or sheltering). The Alert declaration will also heighten the awareness of OROs, allowing them to be better prepared should it be necessary to consider further actions.

This IC does not apply to incidents that are accidental events, acts of civil disobedience, or otherwise are not a HOSTILE ACTION perpetrated by a HOSTILE FORCE. Examples include the crash of a small aircraft, shots from hunters, physical disputes between employees, etc. Reporting of these types of events is adequately addressed by other EALs, or the requirements of 10 CFR 73.71 or 10 CFR 50.72.

EAL #1 is applicable for any HOSTILE ACTION occurring, or that has occurred, in the ISFSI.

EAL #2 addresses the threat from the impact of an aircraft on the plant, and the anticipated arrival time is within 30 minutes. The intent of this EAL is to ensure that threat-related notifications are made in a timely manner so that plant personnel and OROs are in a heightened state of readiness. This EAL is met when the threat-related information has been validated in accordance with (site-specific procedure).

The NRC HOO will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may be provided by NORAD through the NRC.

In some cases, it may not be readily apparent if an aircraft impact within the ISFSI was intentional (i.e., a HOSTILE ACTION). It is expected, although not certain, that notification by an appropriate Federal agency to the site would clarify this point. In this case, the appropriate Federal agency is intended to be

NORAD, Federal Bureau of Investigation (FBI), Federal Aviation Administration (FAA) or NRC. The emergency declaration should not be unduly delayed while awaiting notification by a Federal agency.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

**Developer Notes:**

The (site-specific security shift supervision) is the title of the on-shift individual responsible for supervision of the on-shift security force.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

With due consideration given to the above developer note, EALs may contain alpha or numbered references to selected events described in the Security Plan and associated implementing procedures. Such references should not contain a recognizable description of the event. For example, an EAL may be worded as “Security event #2, #5 or #9 is reported by the (site-specific security shift supervision).”

**ECL:** Unusual Event

**IC:** Damage to a loaded cask CONFINEMENT BOUNDARY.

**Applicability:** IOEP

**Emergency Action Level:**

- (1) Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by a radiation monitor reading greater than NORMAL background at or near the cask.

**Basis:**

This IC addresses an event that results in damage to the CONFINEMENT BOUNDARY of a storage cask containing spent fuel. It applies to irradiated fuel that is licensed for dry storage beginning at the point that the loaded storage cask is sealed. The issues of concern are the creation of a potential or actual release path to the environment, degradation of one or more fuel assemblies due to environmental factors, and configuration changes which could cause challenges in removing the cask or fuel from storage.

The existence of “damage” is determined by radiological survey. The emphasis for this classification is the degradation in the level of safety of the spent fuel cask and not the magnitude of the associated dose or dose rate. It is recognized that in the case of extreme damage to a loaded cask, the IC may be determined based on measurement of a dose rate at some distance from the cask.

Normal background is that which is averaged over a 24-hour period, or based upon licensee expertise and history. The actual value is not as important as understanding that the radiation conditions have changed signifying a potential issue with the casks and spent fuel.

Note that the particular design of the storage cask is not relevant to this IC. Regardless of the design, a radiation measurement greater than normal background at or near the cask will result in in this IC being considered.

**Developer Notes:**

None.

## APPENDIX B

### Emergency Plan Change Process for Facilities Transitioning to Decommissioning

#### B-1.0 Reason for Revision

This Appendix B is being issued to provide guidance on emergency plan changes for facilities transitioning to a post-shutdown emergency plan (PSEP) or permanently defueled emergency plan (PDEP). Although based on Regulatory Guide (RG) 1.219, “Guidance on Making Changes to Emergency Plans for Nuclear Power Reactors,” Revision 1 (Ref. 1), this guidance for power reactors transitioning to decommissioning is needed because of differences in regulatory requirements applicable to operating reactors. This guidance provides an acceptable method for implementing the requirements in 10 CFR 50.54(q)(7) and 10 CFR 50.200, “Power reactor decommissioning emergency plans.”

These emergency preparedness (EP) requirements applicable to power reactors transitioning to decommissioning are to be implemented in levels that align with significant milestones in the reduction of the radiological risk. The graded approach described in 10 CFR 50.200 establishes the following levels of decommissioning: (1) permanent cessation of operations and removal of all fuel from the reactor vessel; (2) fuel in the spent fuel pool (SFP) has sufficiently decayed such that it would not reach ignition temperature within 10 hours under adiabatic heat-up conditions; (3) all fuel is in dry storage; and (4) all fuel is removed from the site. Section B of this regulatory guide describes each level of decommissioning, and the corresponding emergency plan needed (PSEP, PDEP, and independent spent fuel storage installation-only emergency plan).

A licensee may transition between levels of decommissioning, without prior U.S. Nuclear Regulatory Commission (NRC) approval, if the established prerequisites for that level are met. Once the transition is made, the licensee may implement the revised requirements associated with that level as defined in 10 CFR 50.47(b), Appendix E, “Emergency Planning and Preparedness for Production and Utilization Facilities,” to 10 CFR Part 50, or 10 CFR 50.200, as applicable. Licensees should continue to refer to 10 CFR 50.54(q)(8) when making initial emergency plan changes to comply with the requirements of 10 CFR 50.200(a), 10 CFR 50.200(b), or 10 CFR 72.32(a).

10 CFR 50.54(q) contains emergency plan change requirements that apply to, among other entities, nuclear power reactor licensees that have submitted the certifications required under 10 CFR 50.82(a)(1) or 10 CFR 52.110(a)(1), as applicable. These requirements are:

- 10 CFR 50.54(q)(7)(i) supplements 10 CFR 50.54(q)(2) by including a reference to 10 CFR 50.200 planning standards and requirements for a licensee’s existing decommissioning level.
- 10 CFR 50.54(q)(8)(ii) and (iii) supplements 10 CFR 50.54(q)(3) by allowing decommissioning facilities to consider information developed in other change processes described in 10 CFR Part 50 or 10 CFR Part 52, as applicable, when performing the analysis required by 10 CFR 50.54(q)(3) to determine whether a proposed change constitutes a reduction in effectiveness of the emergency plan. Other change process requirements do not replace the analysis, reporting, or documentation required by 10 CFR 50.54(q).
- 10 CFR 50.54(q)(8)(i) provides that initial plan changes made to comply with the requirements of 10 CFR 50.200 or 10 CFR 72.32(a) as permitted by 10 CFR 50.54(q)(7) are not reductions in

effectiveness of the plan and do not need to be submitted to the NRC for prior approval under 10 CFR 50.54(q)(4).

The emergency planning functions used in this guide were derived from the emergency planning functions tabulated in RG 1.219. Although the Reactor Oversight Process (ROP) does not apply to facilities that have been permanently shut down, the emergency planning functions remain applicable to 10 CFR 50.54(q)(3) analyses unless the NRC has granted the licensee an exemption from the associated planning standard.

### **B-1.1 Emergency Plan Changes at Decommissioning Facilities**

- a. The change process established in 10 CFR 50.54(q)(3) and the guidance in this RG are applicable to holders of production and utilization facility licenses issued under 10 CFR Part 50 and 10 CFR Part 52. This includes those licensed facilities that have certified the permanent cessation of operations but have not had their license terminated. This section does not replace the guidance elsewhere in this guide but clarifies the role of the 10 CFR 50.54(q)(3) change process at decommissioning facilities.
- b. The plant configuration and design basis will change over the duration of decommissioning as the licensee puts modifications into place authorized under the applicable change processes, such as 10 CFR 50.59, “Changes, tests, and experiments.” The 10 CFR 50.54(q)(2) requirement to maintain the effectiveness of the emergency plan that meets the requirements in Appendix E to Part 50 and the planning standards of 10 CFR 50.47(b) or the appropriate section of 10 CFR 50.200 remains in force until the emergency plan is no longer required, the licensee receives an exemption under 10 CFR 50.12, “Specific exemptions,” or the license is terminated. During this period, the NRC must continue to have reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency.
- c. The planning basis for EP was not based on any particular accident, but rather, a spectrum of accidents including minor transients, design-basis events, and severe accidents. The NRC’s emergency planning regulations, regulatory guidance, and the emergency plan approvals are rooted, in part, in this planning basis. The planning put in place to address design-basis accidents, such as the large break loss-of-coolant accident, provides a substantial base for responding to the more severe events encompassed in the EP planning basis.
- d. Although certain design-basis accidents analyzed in the facility’s licensing basis may no longer be applicable because of the permanent cessation of operation, or because of changes to the facility (as reflected in the Final Safety Analysis Report), the need for incident planning remains as long as licensed radioactive material remains onsite. A licensee considering reductions in resources, capabilities, and methods described in its plans must consider whether these reductions involve a reduction in effectiveness of the emergency plan to maintain the capability to mount an adequate response to the remaining transients, design-basis accidents, and severe accidents.



## **B-1.2 Relationship between 10 CFR 50.54(q), the Graded Approach to EP, and the NRC's Reasonable Assurance Finding**

- a. The NRC's EP requirements in 10 CFR 50.47(a) preclude the issuance of an operating or combined license if the NRC cannot make a finding that it has reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. Once an operating license is issued, the licensee is required to maintain the effectiveness of its emergency plan (per 10 CFR 50.54(q)(2)) until the license is terminated. Inspections conducted under Inspection Manual Chapter 2561, "Decommissioning Power Reactor Inspection Program" (Ref. 4), evaluate whether the licensee continues to be capable of implementing adequate protective measures. The NRC also uses the reports submitted under 10 CFR 50.54(q)(5) to oversee changes made to the emergency plan. If at any time the NRC determines that the licensee's state of EP does not offer the requisite assurance and the licensee does not correct the deficiency within four months, the Commission will determine whether enforcement actions would be appropriate (see 10 CFR 50.54(s)(2)(ii)).
- b. Some changes that a licensee may make to its approved emergency plan warrant prior NRC approval to ensure that the changes would not adversely affect the NRC's reasonable assurance determination. For example, changes that reduce the number of personnel available to respond to emergencies or lengthen the time it takes to staff and activate emergency response facilities could affect the NRC's reasonable assurance determination and would require prior NRC staff approval. Minor administrative changes, such as correcting position titles and spelling errors and updating document numbers, would not warrant prior NRC staff review. Between these extremes is a range of possible changes for which the licensee is required to perform and document a detailed, objective evaluation pursuant to 10 CFR 50.54(q)(3).
- c. The change process under 10 CFR 50.54(q) does not establish whether a proposed change would affect reasonable assurance determinations; the change process establishes only whether the licensee has the authority to carry out the proposed change without prior NRC approval. The change process uses the characteristic "reduction in effectiveness" to determine the need for prior NRC approval. In cases where changes would not reduce the effectiveness of the licensee's plan, the NRC expects a minimal effect on the agency's reasonable assurance determination. A licensee's determination that the proposed change would reduce the effectiveness of its plan requires an NRC evaluation of the effect of the change on the reasonable assurance determination. A licensee's determination that a proposed change would reduce the effectiveness of the emergency plan does not mean that the licensee could not or would not carry out appropriate measures to protect public health and safety during an accident but does mean that prior NRC review is required. The licensee should submit a license amendment application in accordance with 10 CFR 50.90 for prior NRC approval of a change that it believes will reduce the effectiveness of its emergency plan. Based on its review, the NRC may conclude that the changes: (1) do not reduce the effectiveness of the plan; (2) do reduce the effectiveness of the plan but that the NRC continues to have reasonable assurance that adequate protective measures can and will be taken; or (3) unacceptably affect the NRC's reasonable assurance determination.
- d. The capability to complete an activity within the specified timeframe depends on several factors, including the availability of adequate qualified personnel to perform the activity; the number of multiple duties assigned to these personnel; augmentation time by off shift personnel; and sufficient procedures, tools, instrumentation, equipment, and other material necessary to complete the activity. The licensee needs to evaluate the proposed changes that affect these factors for their effect on the timely completion of emergency planning functions during an emergency response.

### **B-1.3 Role of the NRC's Review of Emergency Action Level and Emergency Plan Changes Submitted under 10 CFR 50.54(q)(5)**

The NRC staff screens emergency plan changes, including emergency action level changes, and reviews a sample of changes submitted under 10 CFR 50.54(q)(5), that could reduce effectiveness. These reviews do not constitute the NRC's approval of the plan changes, and all such changes remain subject to future inspection and enforcement actions. The NRC documents its approval of plan changes in its decisions to grant license amendment requests.

### **B-1.4 Role of the Facility Licensing Basis**

- a. The licensee cannot properly evaluate a proposed change to the emergency plan if it has not considered the basis for the staff's approval of the original plan or the basis for any subsequent change, whether it has been approved by the staff or put into place by the licensee under 10 CFR 50.54(q).
- b. The NRC's approval of the original emergency plan (or subsequent revisions to that plan) established the licensing basis of the emergency plan. The 10 CFR 50.54(q) change process, the four-level approach established in 10 CFR 50.200, and the 10 CFR 50.12 process are the only means available to the licensee to change the NRC-approved emergency plan and, hence, its licensing basis. Other regulatory change processes (e.g., 10 CFR 50.59) do not offer authorization for changes to the emergency plan or its licensing basis, unless evaluated in accordance with 10 CFR 50.54(q)(8)(ii) and (iii).

### **References**

1. U.S. Nuclear Regulatory Commission (NRC), Regulatory Guide (RG) 1.219, "Guidance on Making Changes to Emergency Plans for Nuclear Power Reactors."
2. U.S. *Code of Federal Regulations* (CFR), "Domestic Licensing of Production and Utilization Facilities," Part 50, Chapter I, Title 10, "Energy."
3. CFR, "Licenses, Certifications, and Approvals for Nuclear Power Plants," Part 52, Chapter I, Title 10, "Energy."
4. NRC, Inspection Manual Chapter (IMC) 2561, "Decommissioning Power Reactor Inspection Program," April 2003.

## APPENDIX C

### Guidance for Performing a Spent Fuel Assembly Adiabatic Heat-up Calculation

#### Introduction and Objectives

10 CFR 50.54(q)(7)(ii)(A) of Title 10 of the *Code of Federal Regulations* Part 50, “Domestic Licensing of Production and Utilization Facilities” (Ref. 1), provides licensees with the option of submitting a site-specific analysis that allows licensees to transition to a permanently defueled emergency plan sooner than the required 10 months for a boiling water reactor (BWR) or 16 months for a pressurized water reactor (PWR) after permanent cessation of operations and once the NRC docket the licensee’s certifications required under 10 CFR 50.82(a)(1) or 10 CFR 52.110(a). 10 CFR 50.54(q)(7)(ii)(B) requires licensees to submit a site-specific alternative spent fuel decay period if fuel does not meet the criteria of 50.54(q)(7)(ii). The objective of this guidance is to provide a procedure for performing the spent fuel assembly adiabatic heat-up analysis to a limiting condition of 900 degrees Celsius (°C) informed by the analysis documented in RES/DSA/FSCB 2016-03 “Spent Fuel Assembly Heat Up Calculations in Support of Task 2 of User Need NSIR-2015-001” (Ref. 2).

- The guidance includes a list of assumptions, initial conditions, and acceptable calculation methods necessary to perform an analysis of the cooling time needed after permanent cessation of operations such that spent fuel in the spent fuel pool will not reach the limiting temperature condition of 900°C within 10 hours.
- BWR/PWR specific guidance is provided as needed.

#### Technical Procedure

The steps in performing the heat-up calculations are given below and follow the procedure in RES/DSA/FSCB 2016-03.

- a. The adiabatic heat-up calculation should be performed based on the decay heat of the hottest assembly discharged from the reactor. One method to estimate decay heat is to use the data in NUREG/CR-7227, “US Commercial Spent Nuclear Fuel Assembly Characteristics: 1968–2013” (Ref. 3), which provides decay heat data for various burnups of reference spent nuclear fuel. For BWR assemblies, Figure 21 and Table A.3 in NUREG/CR-7227 provide the decay heat based on 1 metric ton of initial heavy metal loading (MTHM)<sup>11</sup>. Figure 22 and Table B.3 in NUREG/CR-7227 provide the data for PWR assemblies, and corresponding results for mixed oxide fuel assemblies are given in Figure 23 and Table C.3 of NUREG/CR-7227. The decay heat scaling factors in Table D.2 of NUREG/CR-7227 should be applied to the decay heat powers discussed above to obtain the data for the hottest assembly. Licensees should describe in their analysis the method used to determine the decay heat value.
- b. The normal operating pool temperature can be used as the initial condition for the fuel assembly (assumed 30°C in RES/DSA/FSCB 2016-03).

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<sup>11</sup> The mass unit MTU is interchangeable with MTHM in the context of Uranium dioxide (UO<sub>2</sub>) fuel. These results can be converted to an assembly basis by multiplying the quantities by the actual initial loading of uranium or heavy metal of a given assembly.

- c. The adiabatic heat-up of an assembly should be calculated based on Equation (1) in RES/DSA/FSCB 2016-03, which was benchmarked against MELCOR<sup>12</sup> calculations using adiabatic boundary conditions.
- The input decay heat is obtained from step a above.
  - The mass of the fuel rods (UO<sub>2</sub>, Zr) as well as the rack should be taken into account. The mass of the poison materials should be neglected due to possible degradation and melting at low temperatures.
  - The MELCOR calculations as well as experimental data (see NUREG/CR-7215, “Spent Fuel Pool Project Phase 1: Pre-Ignition and Ignition Testing of a Single Commercial 17x17 Pressurized Water Reactor Spent Fuel Assembly under Complete Loss of Coolant Accident Conditions” (Ref. 4)) suggest that both fuel rods and the racks heat-up together with only a slight temperature difference between them as long as adiabatic boundary conditions are imposed. Therefore, the use of a single temperature for all components is justified.
  - The specific heat as a function of temperature should be specified and used in the heat up calculation considering the variation with temperature of different components. The inclusion of a temperature dependent specific heat is straightforward in Equation (1) of RES/DSA/FSCB 2016-03. The values used were based on the SAND 2017-0876 O, “MELCOR Computer Code Manuals” (Ref. 5).

## References

1. U.S. *Code of Federal Regulations*, “Domestic Licensing of Production and Utilization Facilities,” Part 50, Chapter I, Title 10, “Energy.”
2. U.S. Nuclear Regulatory Commission (NRC), RES/DSA/FSCB 2016-03, “Spent Fuel Assembly Heat Up Calculations in Support of Task 2 of User Need NSIR-2015-001,” April 2016 (ADAMS Accession Number ML16110A431).
3. NUREG/CR-7227, ORNL/TM-2015/619, J. Hu, et al. “US Commercial Spent Nuclear Fuel Assembly Characteristics: 1968–2013,” September 2016 (ADAMS Accession No. ML16267A351).
4. NUREG/CR-7215, “Spent Fuel Pool Project Phase 1: Pre-Ignition and Ignition Testing of a Single Commercial 17x17 Pressurized Water Reactor Spent Fuel Assembly under Complete Loss of Coolant Accident Conditions,” April 2016 (ADAMS Accession No. ML16112A022).
5. Sandia National Laboratories, SAND 2017-0876 O, “MELCOR Computer Code Manuals, Vol. 2: Reference Manual, Version 2.2.9541,” January 2017 (ADAMS Accession No. ML17040A420).

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<sup>12</sup> MELCOR is a fully integrated, engineering-level computer code developed by Sandia National Laboratories for the U.S. Nuclear Regulatory Commission to model the progression of severe accidents in nuclear power plants.