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10 CFR 50.47(b)
10 CFR 50, Appendix E
10 CFR 50.54(q)
10 CFR 50.90
10 CFR 72.32
10 CFR 72.44(f)

RS-26-153

October 2, 2026

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Christopher M. Crane Clean Energy Center
Renewed Facility License No. DPR-50
NRC Docket No. 50-289

Three Mile Island Nuclear Station, Unit 2
Possession Only License No. DPR-73
NRC Docket No. 50-320

Subject: Christopher M. Crane Clean Energy Center, Response to Request for Additional Information for Proposed Changes to Christopher M. Crane Clean Energy Center (CCEC) Site Emergency Plan and Emergency Action Level Scheme for an Operating Facility and Exemption Rescission Request dated October 31, 2025

References:

1. Letter from Dennis M. Moore (Constellation Energy Generation, LLC) to U.S. Nuclear Regulatory Commission, “License Amendment Request - Proposed Changes to Christopher M. Crane Clean Energy Center (CCEC) Site Emergency Plan and Emergency Action Level Scheme for an Operating Facility and Exemption Rescission Request” dated October 31, 2025. (ML25304A098)

2. E-Mail from Brent Ballard (U.S. Nuclear Regulatory Commission) to Dennis Moore (Constellation Energy Generation, LLC), “Crane Clean Energy Center - Final RAI for Emergency Plan LAR (EPID L-2025-LLA-0162)” dated September 21, 2026. (ML26267A189)

In Reference 1, CEG submitted a license amendment request (LAR) for the Christopher M. Crane Clean Energy Center (CCEC) to revise the Emergency Plan and Emergency Action Level Scheme to support resumption of power operations at CCEC.

The NRC staff determined that additional information was needed to complete the review of the Emergency Plan LAR submitted in Reference 1. The NRC’s Final Request for Additional Information was provided in Reference 2.

Attachment 1 to this letter includes the NRC RAIs followed by the CEG responses. As a result of the RAIs, the Emergency Plan (EP-CR-1000), Radiological Emergency Plan Annex (EP-AA-1009), and Emergency Action Levels (EP-AA-1009 Addendum 3), submitted as Enclosures with the Reference 1 submittal, are revised. The enclosures provided in this letter entirely replace Enclosures 1A, 1B, 1C, 2A, 2B, and 2C provided with Reference 1.

There are no new regulatory commitments contained in this letter.

For questions related to this submittal, please contact Christian Williams via email at Christian.Williams@constellation.com.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 2nd day of October 2026.

Respectfully,

Moore, Dennis M
Digitally signed by Moore, Dennis M
Date: 2026.10.02 15:23:10 -04'00'

Dennis M. Moore
Senior Manager, Licensing
Constellation Energy Generation, LLC

Attachment 1 – NRC Requests for Additional Information followed by CEG Responses

Enclosures 1A/2A – EP-CR-1000 Rev. 1: “Crane Clean Energy Center (Crane) Radiological Emergency Plan” (Markup/Clean)

Enclosures 1B/2B – EP-AA-1009 Rev. 33: “Radiological Emergency Plan Annex For Crane Clean Energy Center” (Markup/Clean)

Enclosures 1C/2C – EP-AA-1009 Addendum 3 Rev. 3: “Emergency Action Levels For Crane Clean Energy Center” (Markup/Clean)

Enclosure 3 – Change Summary

cc: w/Enclosures

NRC Regional Administrator – Region I
NRC Director, NRR
NRC Deputy Office Director for Licensing Projects
NRC Project Manager, NRR – Christopher M. Crane Clean Energy Center
NRC Project Manager, NMSS – Christopher M. Crane Clean Energy Center
Director, Bureau of Radiation Protection – Pennsylvania Department of Environmental Protection
Chairman, Board of County Commissioners of Dauphin County
Chairman, Board of Supervisors of Londonderry Township

Attachment 1

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
BY THE OFFICE OF NUCLEAR REACTOR REGULATION
CRANE CLEAN ENERGY CENTER - LICENSE AMENDMENT TO RESTORE EMERGENCY PLAN TO SUPPORT POTENTIAL RESTART
CONSTELLATION ENERGY NUCLEAR GROUP, LLC
CRANE CLEAN ENERGY CENTER, UNIT 1
DOCKET NO. 05000289
ISSUE DATE: 09/18/2026

By application dated October 31, 2025 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML25304A098) Constellation Energy Generation, LLC (CEG), requested the U.S. Nuclear Regulatory Commission (NRC, the Commission) review and approval of a license amendment request (LAR) to revise the Christopher M. Crane Clean Energy Center (CCEC) Renewed Facility Operating License DPR-50. Specifically, the proposed LAR would revise the CCEC site emergency plan (SEP) and Emergency Action Level (EAL) scheme and return the CCEC to the Operating Reactor Licensing Basis.

The following requests for additional information (RAI) are needed for the NRC staff to complete the technical review. The NRC staff requests as part of the submitted response, please provide a markup of the affected pages for the staff's review.

For the review of the proposed EAL scheme, NRC staff used the February 13, 2017 "EP-AA-1009, Addendum 3, Revision 2, "Emergency Action Levels for Three Mile Island (TMI) Station"" (ML17052A660) for comparison based upon Attachment 2: Evaluation Of Proposed Changes of the October 31, 2025, submittal (ML25304A098). Specifically, Section 3.1.4 which states "In 2017 Crane updated the EAL classification methodology to that published in NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non- Passive Reactors."" And Section 3.4.3 which states:

CEG proposes to reinstate the version of the Three Mile Island EAL scheme that was in effect just prior to the 10 CFR 50.82(a)(1) certifications in 2019. The EAL scheme is based on the guidance in NEI 99-01, Revision 6. Since the shutdown in 2019, Crane has since received approval for a set of EAL's utilizing NEI 99-01, Revision 6 methodology associated with radiological events at the ISFSI. The proposed changes will combine the operational EAL's and the ISFSI EAL's into a single operational EAL scheme.

RAI 1:
Requirement:

- 10 CFR 50 Appendix E.IV.E.8.c(3) requires the capability to support response to events occurring simultaneously at more than one nuclear power reactor site if the emergency operations facility serves more than one site.

Issue: The Crane LAR, Attachment 2, "Summary of Regulatory Commitments" states Constellation will conduct an Evaluated Exercise at Crane, currently scheduled for the first quarter of 2027, to demonstrate that no loss of EP function will result due to the proposed changes in the ERO and to demonstrate reasonable assurance that the Crane ERO can protect the public in the event of a radiological emergency. The exercise will include each of the Emergency Response Facilities described in the Emergency Plan (i.e., MCR (Simulator), TSC, OSC, EOF and JIC).

Additionally, the Crane LAR Enclosure 1A, Section N provides a description of the drill and exercise program, however, it does not provide a discussion on multi-site drill or exercises or when those are to be conducted.

Request: Provide a discussion on how the emergency exercise that is scheduled for the first quarter of 2027 demonstrates the capability to support a response to events occurring simultaneously at more than one nuclear power reactor site as required by Appendix E.IV.E.8.c(3) or alternatively conduct a multi-site exercise. In your response, provide evidence or analysis that demonstrates historical data for dual site exercises with offsite response organizations, the criteria to be used to evaluate multi-site drills or exercises and what periodicity those are intended to be conducted to ensure compliance with Appendix E requirements.

CEG Response:
The capability of the Coatesville Emergency Operations Facility (EOF) to support responses to events occurring simultaneously at more than one nuclear power reactor site, consistent with the intent of 10 CFR 50, Appendix E, Section IV.E.8.c.(3), which states '(3) the capability to support response to events occurring simultaneously at more than one nuclear power reactor site if the emergency operations facility serves more than one site,' has been demonstrated through multiple evaluated drills and exercises since the facility began supporting multiple sites in 1992.

Most recently, on November 15, 2019, Exelon conducted an evaluated multi-site drill involving Calvert Cliffs Nuclear Power Plant (CCNPP) and Peach Bottom Atomic Power Station (PBAPS). The drill evaluated the ability of the Coatesville EOF organization to perform its required emergency response functions during a multi-site event. All selected objectives and EOF facility objectives were successfully demonstrated. NRC inspection reports documenting observation of the exercise identified no findings or violations associated with EOF performance.

- Calvert Cliffs / Peach Bottom LAR Demonstration Drill Evaluation Report, dated 11/15/2019
- Calvert Cliffs Nuclear Power Plant, Units 1 and 2 – Integrated Inspection Report 05000317/201904 and 05000318/2019004, dated February 14, 2020
- Peach Bottom Atomic Power Station, Units 2 and 3 – Integrated Inspection report 05000277/2019004 and 05000278/2019004, dated February 12, 2020

At the time of the 2019 demonstration, Three Mile Island Unit 1 utilized the Coatesville EOF under the same shared EOF construct that supported the evaluated multi-site response. In accordance with emergency preparedness implementing procedures, participation by every station assigned to the EOF is not required to demonstrate EOF functionality during a simulated multi-site event. Rather, successful demonstration of EOF functions provides reasonable assurance that the organization, facilities, staffing, communications capabilities, procedures, and decision-making processes can support simultaneous events affecting multiple sites served by the EOF.

The planned first quarter 2027 biennial exercise will evaluate the ability of the Crane Clean Energy Center emergency response organization to perform required emergency response functions in accordance with the approved Emergency Plan and implementing procedures. The exercise will utilize the same Coatesville EOF facility, organizational structure, staffing model, communications systems, and emergency response processes that have been successfully

demonstrated during previous NRC-observed exercises. Performance during the 2027 exercise will therefore provide additional confirmation that the EOF remains capable of supporting Crane Clean Energy Center emergency response activities while operating within the established multi-site EOF framework.

The capability to support simultaneous site events is periodically assessed through the emergency preparedness drill and exercise program established by procedure EP-AA-122-100, Drill and Exercise Planning and Scheduling, and EP-AA-122-F-02, Drills and Exercises – Definitions, Frequencies, and Minimum Objectives. These procedures require periodic multi-site drill validation for the Coatesville EOF and establish the performance objectives used to evaluate EOF effectiveness. Evaluation criteria include, but are not limited to:

- Command and control of EOF emergency response activities.
- Timely assessment of plant conditions and event classification information from multiple sites.
- Performance of dose assessment and consequence assessment functions.
- Development, review, and communication of site-specific protective action recommendations.
- Coordination and communication with affected station emergency response organizations and offsite response organizations.
- Resource management and prioritization necessary to support concurrent emergency response activities.
- Maintenance of adequate staffing and functional capabilities throughout the duration of a simulated multi-site event.

These activities are evaluated using established emergency preparedness performance standards and are assessed through formal critique and corrective action processes consistent with the site's Emergency Preparedness Program.

In addition, the guidance provided in NSIR/DPR-ISG-01, Interim Staff Guidance Emergency Planning for Nuclear Power Plants, provides the following guidance: ‘The functions that an EOF has to address include the capability to obtain and display plant data and radiological information for each unit or plant that the facility serves. A consolidated facility also needs to be capable of effectively responding to events at more than one site simultaneously. The ability to simultaneously display information for multiple plants will also enhance effective response to events occurring at more than one site. In some cases, an EOF could serve units or plants involving more than one type of reactor technology, such as pressurized water reactors and boiling water reactors, or more than one design of the same reactor type. The EOF staff needs to be capable of understanding plant conditions for each type of reactor and translating technical information into a useful form for offsite officials and media relations staff.’

Furthermore, the following was added to the above guidance in Subsection 4.3 to address demonstration of the additional consolidated EOF functions described in Subsection 4.1: ‘in order to function effectively, the EOF staff personnel must be aware of their responsibilities during an accident. To maintain proficiency, the EOF staff shall participate in EOF activation drills, which shall be conducted periodically in accordance with the licensee’s emergency plan. These drills shall include operation of all facilities that will be used to perform EOF functions, including any support facilities located outside the EOF. Prior to the initial operation of a co-located or consolidated EOF and in at least one drill or exercise per exercise cycle thereafter, the EOF staff will demonstrate the ability to perform the additional co-located or consolidated

EOF functions set forth in Subsection 4.1.'

The restart of the Crane Clean Energy Center does not represent the initial operation of a co-located EOF. EP-AA-122-F-02 requires a multi-site drill to be conducted at least once during each eight-year drill and exercise cycle for facilities supported by the Coatesville EOF and that universal credit is given to any station with a participating common EOF that performs a Multi-Site drill once in an exercise cycle. This programmatic requirement ensures periodic verification of the capability required by 10 CFR 50, Appendix E, Section IV.E.8.c.(3). Crane Clean Energy Center will be incorporated into this established drill and exercise program upon restart. The last successful performance was in 2019 at the beginning of the 8-year cycle, and the next required completion is at the end of 2027. Currently Peach Bottom Clean Energy Center and Calvert Cliffs Clean Energy Center are scheduled to perform a multi-site exercise on June 15th, 2027. Periodicity requirements are not discussed in Federal Regulation or the Interim staff guidance discussed above.

Both Limerick and Peach Bottom Clean Energy Centers are General Electric BWR-4, with Limerick being Mark II and Peach Bottom Mark I. Calvert Cliffs is a Combustion Engineering design pressurized water reactor, while Crane is of the Babcock & Wilcox design. Each facility's information can be displayed in the Coatesville EOF, and the staff are trained and exercised on the differences in design.

In order to be more concise in the language used in EP-CR-1000, Crane Clean Energy Center (Crane) Emergency Plan (Enclosures 1A/2A), the following has been added to Section H.2, second paragraph:

> "The EOF in the MA region is capable of responding to events occurring simultaneously at more than one nuclear power reactor site since the emergency operations facility serves more than one site."

Based on (1) over 30 years of successful operation of the Coatesville EOF as a shared EOF supporting multiple sites, (2) successful NRC-observed demonstrations of simultaneous multi-site response capability, including the 2019 CCNPP/PBAPS exercise, (3) the continued use of substantially unchanged EOF facilities, organizations, and emergency response processes, and (4) the established procedural requirement to periodically validate multi-site response capability through the drill and exercise program, the Emergency Preparedness Program provides reasonable assurance that the Coatesville EOF can effectively support responses to events occurring simultaneously at more than one reactor site in accordance with 10 CFR 50 Appendix E requirements.

RAI 2:
Requirement:

- 10 CFR 50 Appendix E.IV.A.9 states that for nuclear power reactor licensees, a detailed analysis demonstrating that on-shift personnel assigned emergency plan implementation functions are not assigned responsibilities that would prevent the timely performance of their assigned functions as specified in the emergency plan.

Issue: The Crane LAR, Attachment 2, section 2.1.2 states that an on-shift staffing analysis (OSA) utilizing the methodology in NEI 10-05, "Assessment of On-Shift Emergency Response

Organization Staffing and Capabilities," was performed and concluded that the proposed changes did not result in conflicting duties for on-shift ERO personnel.

The on-shift staffing analysis was not provided or included in the LAR.

Additionally, the Crane proposed SEP, section B, “Constellation Nuclear Emergency Response Organization” does not provide a description for who would be performing the on-shift Dose Assessment function.

The Crane LAR, Section 3.2.5, “Dose Assessment” states that

> “Crane will maintain a Shift Dose Assessor on-shift to perform dose assessments/projections and provide input to applicable PAR decisionmaker functions. This function will be performed by available qualified personnel (e.g., the on-shift RP Technician). Additionally, an OSA under 10 CFR 50, Appendix E, Section IV.A.9 was performed to ensure that the Dose Assessment function on shift can be performed by one of the two (2) RP staff on shift without any additional competing priorities.”

The Crane LAR Attachment 2, Section 3.2.5, “Emergency plan change assessment” states that the Shift Dose Assessment Function will be annotated as being performed by the on-shift Chemistry Technician as a collateral duty in EP-CR-1000.” This information is not reflected in the Crane proposed SEP, Table 5-1, Emergency Response Organization (ERO) Staffing and Augmentation Plan.” These documents use different terms for use of on-shift RP Technicians.

For example, it’s unclear whether Crane intends to use the on-shift RP Technicians or on-shift Chemistry Technicians for the Shift Dose Assessment Function.

If Crane intends to use on-shift RP Technicians for the Shift Dose Assessment Function, the LAR has not provided a discussion on how the Radiation Protection functions in NUREG 0654, Revision 2, Table B-1 are maintained.

Request:

a. Provide evidence or analysis that demonstrates that the on-shift RP Technician will be able to perform the dose assessment function in addition to the other assigned emergency response functions.
b. Provide evidence or analysis that demonstrates how the Radiation Protection functions for providing qualified radiation protection coverage for responders accessing potentially unknown radiological environments during emergency conditions, providing in plant surveys, and control dosimetry and radiologically controlled area access are maintained by one RP Technician if the second RP Technician is assigned the on-shift dose assessment function.

CEG Response:

The Crane Clean Energy Center On-Shift Staffing Analysis (OSSA), as approved on August 1, 2025, provides the technical basis supporting the Emergency Plan minimum on-shift staffing requirements and demonstrates the ability of shift personnel to perform assigned emergency response functions. The OSSA was completed using the NRC-endorsed guidance, NEI 10-05, ‘Assessment of On-Shift Emergency Response Organization Staffing Capabilities.’

Consistent with the requirements of 10 CFR Part 50, Appendix E, Section IV.A.9, the staffing analysis evaluated the responsibilities assigned to on-shift personnel and demonstrated that individuals are not assigned duties that would prevent the timely performance of emergency plan implementation functions.

In accordance with NUREG 0654, Revision 2, Table B-1, for Radiation Protection, three (3) Emergency Preparedness (EP) Functions are identified for Radiation Protection Personnel.

- Provide qualified radiation protection coverage for responders accessing potentially unknown radiological environments during emergency conditions.
- Provide in-plant surveys.
- Control dosimetry and radiologically controlled area access.

The On-shift staffing analysis appropriately takes into consideration those items listed in section 3.1.6 (Radiation Protection improvements) of Attachment 2 (Evaluation of Proposed Changes) to the License Amendment Request. The first being the use of electronic dosimetry and electronic access control, removing “Control dosimetry and radiologically controlled area access” as a required task. Second, plant process improvements to include the Area Radiation Monitors (ARMs) and the plant computer system allow for more rapid in-plant surveys from remote locations. This makes the function to “Provide in-plant surveys” much less time consuming such that the On-Shift Radiation Protection Technician can focus on providing radiation protection coverage for responders accessing potentially unknown radiological environments during emergency conditions. Through the On-Shift Staffing analysis this was shown to be successfully performed using a single On-Shift Radiation Protection Technician.

The on-shift staffing analysis determined that the Radiation Protection support workload can effectively be performed by a single Radiation Protection Technician prior to staff augmentation. However, when performance of the Dose Assessment function is required, a second Radiation Protection Technician is necessary to ensure that the dose assessment function can be performed independently without adversely affecting the ability to provide required Radiation Protection coverage discussed above. Accordingly, the second RP Technician is included in the minimum on-shift staffing complement. This analysis is technically justified in the on-shift staffing analysis, and supported by NUREG 0654, Rev. 2, Table B-1, Notes i, ii, iii, vi, and vii. It was determined that two Radiation Protection qualified personnel will be on shift (RP Shift Techs), satisfying the requirements of Table B-1 with one having the collateral duty of Dose Assessment. Associated “Note 1” for the Dose Assessment function requires the staffing analysis to support assignment of multiple roles. The Crane staffing analysis evaluated and supports one of two Radiation Protection Technicians performing the collateral duty of Dose Assessment.

The staffing analysis demonstrates that the RP Shift Tech assigned to Dose Assessment can be dedicated to that function for the duration necessary to complete required assessments while the second RP Shift Tech maintains Radiation Protection support activities. The analysis further demonstrates that all additional Radiation Protection and emergency response functions not required for immediate on-shift response are satisfied through the facility's augmentation strategy within established Emergency Plan staffing commitments.

RAI 3:
Requirement:

- 10 CFR 50.47(b)(2) states in part
  ... adequate staffing to provide initial facility accident response in key functional areas is maintained at all times, timely augmentation of response capabilities is available and the interfaces among various onsite response activities and offsite support and response activities are specified.

- 10 CFR 50, Appendix E.IV.A states, in part,
  The organization for coping with radiological emergencies shall be described, including definition of authorities, responsibilities, and duties of individuals assigned to the licensee's emergency organization and the means for notification of such individuals in the event of an emergency. Specifically, the following shall be included:

  ... 2. A description of the onsite emergency response organization (ERO) with a detailed discussion of:
  a. Authorities, responsibilities, and duties of the individual(s) who will take charge during an emergency;
  b. Plant staff emergency assignments;

- 10 CFR 50, Appendix-E.IV.A.5 states in part
  ... Identification, by position and function to be performed, of other employees of the licensee with special qualifications for coping with emergency conditions that may arise.

Issue: The Crane LAR, Enclosure 1A, Table 5-1, utilizes Radiation Protection Personnel for both the On-Shift ERO staffing and the augmentation personnel for the Radiation Protection Function. These inconsistencies in the Crane LAR and proposed emergency plan create uncertainty with what Crane is proposing in the emergency plan for on-shift, and augmented Radiation Protection Personnel. Additionally, it's not clear what qualifications Radiation Protection Personnel would have that are equivalent to ANSI 3.1 qualified RP Technicians. The proposed emergency plan is not clear on whether Crane intends to utilize Radiation Protection Supervisors and other RP staff members to fulfill the roles for the Radiation Protection Function, whether they would also have qualifications equivalent to ANSI 3.1 qualified RP Technicians or how they would maintain proficiency.

The Crane LAR, Attachment 2, section 3.2.3 states in part

> …for the purposes of this table, except as discussed below, RP Personnel consists of persons with an ANSI qualification. This includes RP Technicians or qualified RP Staff members.

The Crane LAR, Enclosure 1A, Section II.B.1 under "On-Shift Emergency Response Organization Assignments", "Radiation Protection", states that the Station Radiation Protection personnel are responsible for the handling and monitoring of radioactive materials. Included in this organization are Health Physicists, Radiation Protection Supervisors, and Technicians.

In addition, the Crane LAR, Enclosure 1A, section II.B.5, "Emergency Response Organization Positional Responsibilities" does not clearly specify what the emergency response responsibilities are for the Radiation Protection Personnel.

The Crane LAR, Enclosure 1A, Appendix 5, Table 5-1, Emergency Response Organization (ERO) Staffing and Augmentation Plan" refers to ERO staffing for the Radiation Protection function as "Radiation Protection Personnel" with a note that states

> Note for the purposes of this table, RP Personnel consists of RP Technicians or qualified RP Staff members.

The Crane LAR, Enclosure 1A, Section O, "Emergency Response Training" does not provide information to determine the level of training provided to RP Technicians, Radiation Protection Supervisors or RP Staff members or provide clarification to understand which ANSI standard is being referred to Attachment 2, section 3.2.3 and how proficiency is maintained.

Request: Provide objective evidence or analysis that demonstrates that the individuals proposed by Crane such as RP Technicians, Radiation Protection Supervisors and RP Staff members to fulfill the function of Radiation Protection are ANSI 3.1 qualified RP Technicians, maintain proficiency, and can fulfill the capabilities listed in NUREG 0654, Revision 2 for the Radiation Protection Function.

In your response, clearly identify the positions and titles Crane intends to utilize to fulfill the Radiation Protection function shown in Table B-1 of NUREG 0654, Revision 2 and ensure your response addresses the requirements under 10 CFR 50, Appendix E.

CEG Response:
CEG maintains a hierarchy of procedures which include fleet-wide, or "All-Area" (-AA-) procedures, which are applicable fleet-wide, and station specific procedures (-CR- or -TM-) which are only applicable to the individual site. The requirements for RP Technician qualifications are governed by CEG procedure HR-AA-1004, "Nuclear Staff ANSI Position Requirements and Organizational Structure Control". Exhibit 1 of HR-AA-1004 documents the ANSI 3.1-2014 Position Requirements.

From Exhibit 1 of HR-AA-1004, the ANSI referenced title, "*Technician - Radiation Protection*" is applicable to the following Constellation job titles: "*Rad Protection Tech", "Radiation Protection Tech", "Rad Ctrl Tech C-Nuc", "Rad Support Tech Jr-Nuc", "Journeyman RAD Technician-JAF", "Hp Tech I",* and *"Hp Tech II".*

In addition to the general requirements of HR-AA-1004, TQ-AA-160, "Radiation Protection / Chemistry Technician Training Programs" provides job-specific training requirements for CEG Radiation Protection and Chemistry Technicians independent of their assigned ERO positions. TQ-AA-160 includes initial training requirements as well as continuous and requalification requirements. Individuals assigned to the ERO position of "Shift RP Tech" are pulled from this population. When 'RP Background' is referenced for ERO qualification, the population listed in HR-AA-1004 Exhibit 1, and the requirements of TQ-AA-160 are applicable.

ERO position-specific training and qualification requirements are governed by TQ-AA-113, "ERO Training and Qualification". These are fleet-wide procedures which are applicable to Crane and the Crane Emergency Plan. For RP Technician specific activities, TQ-AA-113, Attachment 1 specifically states "ANSI qualification is required for RP Min Staff." Only the listed

positions in the table below require ANSI training and qualification to meet an Emergency Response position pre-requisite.

Appendix 5 to EP-CR-1000 (Enclosure 1A/2A) has been updated to reflect the Shift Radiation Protection Technician and the Radiation Protection Personnel assigned. Note 1 has been updated to state that one of the Shift Radiation Protection Technicians will be performing Dose Assessment as required. Additional Radiation Protection Personnel assigned is referred to in TQ-AA-113 as OSC Radiation Protection (Lead and Pool) as well as Off Site Field Team Radiation Protection, these are augmented personnel.

All individuals who fulfill Shift Radiation Protection Technician and Radiation Protection Personnel positions have their training and qualifications tracked via the Learning Management System (LMS). LMS maintains real-time tracking of the status of all training and other requirements that must be met to be considered qualified to fulfill these positions. Training and Qualification reminders are sent out periodically to individuals and their supervision to ensure they do not lapse in qualification. This is done far enough ahead of time that if for any reason requalification cannot be achieved other individuals can be substituted or trained and substituted for the position. Individuals are expected to verify their qualifications are maintained and current prior to performing qualified work.

A Supervisor or Manager in the Radiation Protection department, or another department may fill roles in the ERO specific to Radiation Protection Technicians ONLY if they meet the initial training and qualification requirements of TQ-AA-160 AND maintain proficiency, as tracked in LMS, in accordance with TQ-AA-113, section 4.3.10.

The table below lists each of the ERO responders requiring the training, qualification, and requalification as Radiation Protection Technicians as defined in TQ-AA-160.

Position	Initial Training	Requalification Training / Proficiency
Shift RP Tech (Performing Table B-1 functions)	-TQ-AA-160, Att 4. For Crane Compliant with HR-AA-1004 for ANSI 3.1 (step 4.2.1, ANSI Requirements) -No additional ERO training requirements for Shift RP Techs	-TQ-AA-160 Att 4 for Shift RP tech requal training and proficiency.
Shift Dose Assessor (Performing Table B-1 functions)	-TQ-AA-160 Att 4. For Crane compliant with HR-AA-1004 for ANSI 3.1 (step 4.2.1, ANSI Requirements) -TQ-AA-113-F005 For Crane Shift Dose Assessors	-TQ-AA-160 Att 4 for Shift RP tech requal training and proficiency. -TQ-AA-113, Att 2 for annual requal training. -TQ-AA-113, Att 3 for demonstrated proficiency.
OSC Radiation Protection (Lead and Pool)	-TQ-AA-160 Att 4. For Crane compliant with HR-AA-1004 for ANSI 3.1 (step 4.2.1, ANSI Requirements) -TQ-AA-113, Att 2 requirements for ERO qualification	-TQ-AA-160 Att 4 for Shift RP tech requal training and proficiency. -TQ-AA-113, Att 2 for annual requal training. -Demonstrate proficiency through Drill/Exercise performance
Off-Site Field Team - RP	-TQ-AA-160 Att 4. For Crane compliant with HR-AA-1004 for ANSI 3.1 (step 4.2.1, ANSI Requirements) -TQ-AA-113, Att 2 requirements for ERO qualification	-TQ-AA-160 Att 4 for Shift RP tech requal training and proficiency. -TQ-AA-113, Att 2 for annual requal training. -Demonstrate proficiency through Drill/Exercise performance

RAI 4:
Requirement:

- 10 CFR 50.47(b)(12) states
  Arrangements are made for medical services for contaminated injured individuals.

- 10 CFR 50.47(b)(15) states
  Radiological emergency response training is provided to those who may be called on to assist in an emergency.

- 10 CFR 50, Appendix-E.IV.F.1.b states in part
  ... This shall include a description of specialized initial training and periodic retraining programs to be provided to each of the following categories of emergency personnel: vi. First aid and rescue teams; vii. Medical support personnel

- NUREG-0654 Revision 1 Section 11.0.3 states
  Training for individuals assigned to licensee first aid teams shall include course equivalent to Red Cross Multi-Media.

Issue: Since the changes in minimum ERO staffing caused by the update to NUREG-0654 Revision 2, there have been multiple changes made to the areas of first aid staff and onsite medical support which appear to be inconsistent or not explained.

The Crane LAR, Enclosure 1[A] Section O # 3 states:
Selected station personnel are trained in accordance with the Constellation Nuclear approved First Aid Program.

The Crane LAR, Enclosure 1[A] Section O # 4.h states:
Onsite medical personnel receive specialized training in the handling of contaminated victims and hospital interface. Offsite ambulance and hospital personnel are offered annual training in accordance with a program provided by Emergency Preparedness.

The Crane LAR, Enclosure 1[A] Section L # 2 states in part:
In general, physicians or nurses are not staffed at Crane, and as such, medical treatment given to injured persons is of a "first aid" nature… Station personnel are also trained and qualified to administer first aid. At least two of these individuals are available on shift at all times…

The Crane LAR, Enclosure 1[B] Section 2.1 removed language which stated:
Medical emergencies and search and rescue operations will be the responsibility of the First Aid and Search and Rescue Teams. Specific personnel on each shift are trained in first aid techniques to ensure such assistance will be available 24 hours per day. Assistance will be requested from outside medical support personnel or organizations as deemed necessary.

The Crane LAR, Enclosure 1[B] Section 5.3.1 states in part:
… The next level of first aid equipment is found at first aid stations. The medical staff can also provide Advanced Life Support and routine trauma care.

Request:

a) Provide a discussion of "medical personnel" as defined in Enclosure 1a Section O #4.h. As necessary, update the Enclosure 1b Section 5.3.1 or 2.1 to better define this term.

b) Provide technical justification of why the wording from Enclosure 1b Section 2.1 is being removed when similar language is found Enclosure 1a Section L #2.
c) Provide a technical justification or analysis for the Constellation Nuclear approved First Aid Program as compared to Red Cross Multi-Media first aid training as specified in NUREG-0654 Revision 1.

CEG Response:

Part a) EP-CR-1000, "Radiological Emergency Response Plan" (Enclosures 1A/2A) Section O.4.h was updated to correct that the training described is applicable to "Offsite Medical Personnel". In accordance with the NUREG-0654, Rev. 2, Fire Brigade response personnel will perform first aid efforts to stabilize individuals prior to transport to Offsite Medical personnel for more advanced and specialized treatment. Any reference to beyond 'First-aid' and initial decontamination efforts are performed by Offsite Medical Personnel.

Part b) Crane Clean Energy Center is employing staffing methodology in accordance with NUREG 0654 Revision 2. The First Aid and Rescue Operations are no longer identified as an EP function. EP-CR-1000, "Radiological Emergency Response Plan" (Enclosures 1A/2A) identifies those tasks required by NUREG 0654 Revision 2, to be performed by the site, while EP-AA-1009, "Radiological Emergency Plan Annex" (1B/2B) indicates site specific requirements to meet staffing. The First Aid and Rescue function is no longer required EP staffing, but still must be identified for task performance, hence the difference in enclosure references.

Part c) A review of the Constellation First Aid and CPR training requirements was performed against the objectives of the Red Cross Multi-Media First Aid Training referenced in NUREG-0654 Revision 1. The Constellation program provides instruction and qualification in first aid response, CPR, victim assessment, stabilization of injured personnel, and medical response actions through initial and periodic requalification training. Because these competencies encompass the intent of the Red Cross training identified in NUREG-0654 Revision 1, the Constellation program provides equivalent or greater capability for onsite emergency response.

On-Shift Fire Brigade members are trained and qualified in First Aid and CPR as part of initial and requalification training as described in TQ-AA-173, "Emergency Services Training Programs". These training requirements are maintained from Equipment Operator levels to Licensed Operator levels in accordance with TQ-AA-150, "Operator Training Programs". The first aid and CPR training for operators (Fire Brigade) is based on The Red Cross and American Heart Association.

RAI 5:
Requirement:

- 10 CFR 50.90 Whenever a holder of a license, including a construction permit and operating license under this part, and an early site permit, combined license, and manufacturing license under part 52 of this chapter, desires to amend the license or permit, application for an amendment must be filed with the Commission, as specified in §§ 50.4 or 52.3 of this chapter, as applicable, fully describing the changes desired, and following as far as applicable, the form prescribed for original applications.

Issue: Multiple changes have been made without technical justification that details the reason behind the change between as indicated by red-line strikeouts or review of previously approved versions.

Examples:

a) REP Section F "Emergency Communications" removes information related to multiple communication lines including the Private Branch Exchange. However, in EALs MU7 And CU4, CEG identified Plant Telephone System providing onsite communication.
b) REP Section N "Drill and Exercise Program" removed the entire discussion of PreExercises and this removal was not identified in Enclosure 1[A] of the LAR.

Request: Provide technical justification for removal of these two examples. Review entire LAR and identify any other deletions that were not identified in Enclosure 1[A] or 1[B] with appropriate justifications.

CEG Response:

Example a) The removal of references to the Private Branch Exchange (PBX) system was previously evaluated under 10 CFR 50.54(q), Evaluation No. 19-65. The evaluation concluded that communication capabilities were maintained through replacement technologies, including VoIP and other redundant communication systems, and therefore did not constitute a reduction in effectiveness of the Emergency Plan. This change was implemented fleet-wide in EP-AA-1000 Rev. 32, in 2019. The change to the Crane Clean Energy Center Emergency Plan (EP-CR-1000) is made to align with the current fleet standard. References to the plant telephone system remain in applicable EALs as an available onsite communication method; however, specific references to the PBX system were removed because the technology is no longer utilized.

Example b) The removal of the discussion regarding pre-exercises was previously evaluated under 10 CFR 50.54(q), Evaluation No. 19-65. The evaluation determined that Pre-Exercises are drills utilized as practice prior to the performance of a graded exercise. The Pre-Exercise drills are not required by regulation nor prescribed in NUREG 0654, section II.N as a required drill. The recommendation to perform a pre-exercise drill is removed from the Emergency Plan to allow stations to have the flexibility to perform these drills only if desired. This change was implemented fleet-wide in EP-AA-1000 Rev. 32, in 2019. The change to the Crane Clean Energy Center Emergency Plan (EP-CR-1000) is being aligned with the current fleet standard.

CEG completed a comprehensive review of EP-CR-1000 (Enclosures 1A/1B), EP-AA-1009 (Enclosures 1B/2B), and EP-AA-1009 Addendum 3 (Enclosures 1C/2C). No other unidentified or unjustified deletions were found.

RAI 6:
Requirement:

10 CFR 50.47(b)(2) On-shift facility licensee responsibilities for emergency response are unambiguously defined, adequate staffing to provide initial facility accident response in key functional areas is maintained at all times, timely augmentation of response capabilities is available and the interfaces among various onsite response activities and offsite support and response activities are specified.

Issue: The Crane LAR, section 3.2.13 states,

> "Crane proposes to staff an IT Lead at the EOF as Minimum Staff; however, Crane proposes to staff the position within 90 minutes of an Alert or higher rather than 60 minutes of a Site Area Emergency."

If the IT Lead at the EOF is minimum staff, the response for this position is 30 minutes greater than the goal for activation stated in the proposed emergency plan for the EOF at 60 minutes of an Alert or higher classification. The following areas provide information regarding EOF activation in the Crane proposed SEP.

Crane LAR, Enclosure 1A, Section H states, in part,

> "…Activation of the EOF is mandatory within 60 minutes of declaration upon declaration of an Alert or higher classification."

In addition, the Crane LAR, Enclosure 1A, Section H states, in part,

> "…It is the goal of the organization to be capable of activating the applicable Emergency Response Facility upon achieving minimum staffing. The facility can be declared activated when the following conditions are met:
>
> a. Minimum staffing has been achieved.
>
> … The Director in charge may elect to activate their facility without meeting minimum staffing; if it has been determined that sufficient personnel are available to fully respond to the specific event (this would not constitute a successful minimum staff response)."

Request: Provide a discussion that clarifies whether the IT Lead is considered minimum staff for activation of the EOF. In your response, address how EOF activation will be maintained at 60 minutes of an Alert or higher emergency classification if the IT Lead is required as minimum staff and how the proposed emergency response organization staffing maintains alignment with NUREG 0654, Revision 2.

CEG Response:

The change in Computer Specialist (IT Lead) augmentation time requirements was previously reviewed under 10 CFR 50.54(q) Evaluation No. 19-29. The NRC previously approved the change for the CEG fleet via the Safety Evaluation and the referenced 50.54(q) incorporates the previously approved change. The changes revised the ERO staffing composition and increased the staffing augmentation time for the Computer Specialist in the EOF under EP-AA-1000 Rev. 31. The change aligned the Emergency Plan with (at that time) recent license amendments concerning staffing and augmentation.

The Emergency Plan change states how the Emergency Operations Facility becomes activated and then takes command and control when 60-minute staffing is met but also tracks the 90-minute requirement for Computer Specialist to respond. The Computer Specialist is minimum staffing but in the event facility activation is required prior to arrival of the Computer Specialist, the Corporate Emergency Director in the EOF is permitted by the CED Checklist (EP-AA-112-400-F-02) to activate the facility and take command and control while still tracking the Computer Specialist's 90 minute response time.

Revision 31 to EP-AA-1000 was made in late 2019 and did not affect Three Mile Island Unit #1. These changes were reflected in the Crane Clean Energy Center Emergency Response Plan as they align to previously approved and implemented fleet standard practices for implementation.

RAI 7:
Requirement:

- 10 CFR 50.47(b)(3) Arrangements for requesting and effectively using assistance resources have been made, arrangements to accommodate State and local staff at the licensee's Emergency Operations Facility have been made, and other organizations capable of augmenting the planned response have been identified.
- 10 CFR 50.47(b)(12) Arrangements are made for medical services for contaminated injured individuals.
- Appendix E to Part 50 (IV)(E)(5-7)

Issue: Section 5.4 of Enclosure 1b specifically identifies primary and backup hospitals for contaminated injured individuals and that "A Letter of Agreement is established for UPMC Pinnacle Harrisburg Hospital and Penn State Milton S. Hershey Medical Center to provide assistance in support of the Radiological Emergency Plan at Crane Clean Energy Center."

Additionally, this same section provides a discussion of release of emergency medical services by Dauphin County to help transport these individuals.

However, Appendix 2 to Enclosure 1b states that the Memorandum of Understanding (MOU) / Letters of Agreement (LOA) are still under development and have not been finalized yet for all supporting agencies to include, medical, firefighting, law enforcement, etc.

Request: Provide a discussion that describes the MOUs and LOAs by Constellation, and provide a copy, and ensure that the language identified in Enclosure 1[B] is accurate.

CEG Response:

Appendix 2 to EP-AA-1009 (Enclosures 1B/2B) has been updated to reflect all required and approved MOUs and LOAs. There are no remaining MOUs/LOAs under development or otherwise not yet finalized.

Signed MOUs and LOAs are available for inspection.

RAI 8:
Requirement:

10 CFR 50.47(b)(7) Information is made available to the public on a periodic basis on how they will be notified and what their initial actions should be in an emergency (e.g., listening to a local broadcast station and remaining indoors), the principal points of contact with the news media for dissemination of information during an emergency (including the physical location or locations) are established in advance, and procedures for coordinated dissemination of information to the public are established.

Issue:

a) The Crane LAR, Enclosure 1A, Section E states, in part,

> "The Alert and Notification System (ANS) for Crane relies on the Integrated Public Alert Warning System (IPAWS)-WEA (Wireless Emergency Alerts) and IPAWS-EAS (Emergency Alert System) as the primary means of alerting and

notifying the public, respectively, and an independent electronic Mass Notification System (MNS) as the backup means.

… The Integrated Public Alert Warning System (IPAWS) is operated by local governmental agencies and maintained by FEMA.

The Crane LAR and proposed SEP provides information that relies on individuals having electronic communication devices in order to receive information during declared emergencies, however the emergency plan does not specify what procedures or coordination methods have been established for those individuals within the EPZ that do not have electronic communication devices (i.e., Plain communities).

b) The Crane LAR, Enclosure 1A, Section P.3 states, in part:

The Emergency Preparedness Managers are assisted by regional corporate and Station Emergency Preparedness staff. Specific responsibilities include the following:

Facilities and Equipment
- Provide maintenance and administration of the Alert and Notification System (ANS).

As stated in Enclosure 1A, Section E, "The Integrated Public Alert Warning System (IPAWS) is operated by local governmental agencies and maintained by FEMA." Therefore, it is not clear what role Crane Emergency Preparedness Managers would have with respect to maintenance and administration of the ANS.

Request:

a) Provide a discussion on what procedures have been established for coordinated dissemination of information have been established to address those communities that do not rely upon electronic devices for receiving information during emergencies.
b) Provide a technical justification of the expectations for continued Crane maintenance and administration of the ANS.

CEG Response:

a) The following was added to EP-CR-1000 (Enclosure 1A/2A) Section E.6 to explain that county plans are utilized to ensure the notification of all residents within the plume exposure pathway:

"The use of IPAWS, WEA, and EAS strengthens the ability to alert populations, including residents, visitors, commuters, and individuals with access and functional needs. Counties also apply a whole community approach by identifying and addressing the communication needs of diverse populations and community groups, including individuals with limited access to technology, to help ensure emergency information reaches all segments of the public."

b) EP-CR-1000 (Enclosures 1A/2A) is revised to remove the requirement for maintenance and administration of the Alert and Notification System (ANS).

RAI 9:
Requirement:

10 CFR 50.72(a)(4) The licensee shall activate the Emergency Response Data System (ERDS) as soon as possible but not later than one hour after declaring an Emergency Class of alert, site area emergency, or general emergency. The ERDS may also be activated by the licensee during emergency drills or exercises if the licensee's computer system has the capability to transmit the exercise data.

Issue: The Crane LAR, Enclosure 1A, Section F states, in part,

> "Emergency Response Data System (ERDS): ERDS will continuously supply the NRC with selected plant data points on a near-real-time basis. The selected data points are transmitted automatically to the NRC at approximately 1-minute intervals.)"

The Crane proposed SEP provides information regarding the Emergency Response Data System (ERDS), however, the description indicates that an action is needed in order to provide the information to the NRC. The information provided does not specify under what conditions ERDS is activated and who is responsible for activating ERDS.

Request: Provide a discussion on what procedures have been established to activate ERDS and how Crane will ensure that ERDS data will be available to meet the requirements under 50.72(a)(4).

CEG Response:

Consistent with the Constellation Standard Emergency Plan practice, EP-AA-1000, Crane will maintain the ERDS data link to the NRC as always on and actively supplying data to the NRC.

- From Section E.2.b.2 of EP-AA-1000: "The Computerized data link to the NRC, referred to as the Emergency Response Data System (ERDS), continuously supplies specified plant data to the NRC."
- From Section F.1.b-d.5): "Emergency Response Data System (ERDS): ERDS will continuously supply the NRC with selected plant data points on a near-real-time basis. The selected data points are transmitted automatically to the NRC at approximately 1-minute intervals."

The Emergency Response Data System (ERDS) is identified in EP-AA-121, Equipment Important to Emergency Response (EITER). This guidance ensures that when equipment important to emergency response (EITER) is removed from service for maintenance or is in a degraded condition, the correct restoration priority is assigned, compensatory measures are implemented, and the equipment is promptly restored to a functional condition.

ERDS is subject to the requirements of EP-AA-124, "Inventories and Surveillances". Specifically, ERDS testing is performed quarterly.

- From Section 4.2.9 of EP-AA-124: 4.2.9 Emergency Response Data System (ERDS)

    1. DOCUMENT ERDS testing on EP-AA-124-F-01. ERDS testing is typically conducted

at the timeframes listed below:

- […]
- Three Mile Island on Thursday of the 1st full week of the quarter

In the event that ERDS is not active prior to facility activation, EP-AA-112-200, "TSC Activation and Operation", provides guidance to the TSC director to verify activation of the Emergency Response Data System.

From EP-AA-112-200, TSC Activation and Operation:

4.1.2 TSC Facility Support Group.

1. The TSC Director shall use EP-AA-112-200-F-02, TSC Director Checklist to perform the following actions:

[…]

- Verify activation of the Emergency Response Data System

The wording of the Crane Clean Energy Center Emergency Plan is specific and applies to the continuous operation of ERDS throughout the Constellation fleet. ERDS will not require activation as it is always on. This is be maintained through continuous monitoring in the EITER program with proceduralized compensatory actions if it is not in continuous operation.

RAI 10:
Requirement:

10 CFR 50.47(b)(6) Provisions exist for prompt communications among principal response organizations to emergency personnel and to the public

10 CFR 50, Appendix E, IV.E.9.d Provisions for communications by the licensee with NRC Headquarters and the appropriate NRC Regional Office Operations Center from the nuclear power reactor control room, the onsite technical support center, and the emergency operations facility. Such communications shall be tested monthly.

Issue: The Crane LAR, Enclosure 1A, Section N.2 "Drills" states in part that

> "Quarterly - The capability to notify the NRC Region, FEMA Region, American Nuclear Insurers (ANI) and federal emergency response organizations as listed in the Emergency Response Facilities (ERF) Telephone Directory are demonstrated from the EOF. Also, computer and critical communications equipment shall be functionally tested."

This does not meet the NRC requirements for monthly testing of communications to the NRC Regional Office Operations Center. The NRC has issued Information Notices (IN 85-44 and IN-86-97) that clarified what communication tests were necessary including any communication with the Regional Operations Center is completed through the HQ Operations Center.

Request:

a) Provide discussion of how the quarterly test with the NRC region is being conducted.
b) Provide technical justification for how quarterly testing meets the intent of NRC regulations and information notices.

CEG Response:

Testing of EP Communication equipment, including NRC monthly and quarterly testing, is governed by EP-AA-124, “Inventories And Surveillances”. This procedure identifies the required testing frequency and specific requirements for onsite (Main Control Room, Technical Support Center, Operations Support Center) as well as testing requirements for offsite Emergency Response Facilities (EOF and JIC). Like other sites in the Constellation fleet, Crane has a site-specific testing procedure in development. The Crane procedure will be modeled after other Constellation sites. The Crane procedure will satisfy the requirements of EP-CR-1000, Crane Clean Energy Center (Crane) Radiological Emergency Plan and EP-AA-124, Inventories And Surveillances.

EP-AA-124-F-23, “Mid-Atlantic Monthly NRC Communications Test From the EOF”, provides the specific communication testing instructions and requirements for testing of NRC communications at the EOF. This includes monthly testing of the ENS and HPN lines. This testing documents that the phones make and receive calls.

EP-PB-124-F-09, “Peach Bottom Monthly Communications Test”, provides the specific communication testing instructions and requirements for testing of NRC communications in the Control Room and TSC. This includes monthly testing of the ENS and HPN lines. This testing documents that the phones make and receive calls. (This example is provided for reference as EP-CR-124-F-09 is being modeled after EP-PB-124-F-09.)

10 CFR 50.47(b)(6) requires that provisions exist for prompt communications among principal response organizations to emergency personnel and the public. This is accomplished for the NRC through the ENS and HPN lines which are tested monthly in the Control Room, TSC, and EOF.

10 CFR 50, Appendix E.IV.E.9.d requires provisions for communications by the licensee with NRC Headquarters and the appropriate NRC Regional Office Operations Center from the nuclear power reactor control room, the onsite technical support center, and the emergency operations facility and that these communications be tested monthly. This is accomplished for the NRC through the ENS and HPN lines which are tested monthly in the Control Room, TSC, and EOF as described above.

NRC Information Notice (IN) 85-44 reminds licensees of their responsibility for satisfying the requirement for monthly testing of the ENS and HPN telephones. The NRC is responsible for testing ENS and HPN telephones located in the NRC Resident Inspector’s office and for testing the link between the NRC Operations Center and the Regional Office Operations Center since communications with the licensee via HPN and ENS are completed through the Headquarters Operations Center. The requirements will be met by adherence to EP-AA-124, specifically EP-AA-124-F-23 and EP-CR-124-F-09 (under development).

NRC IN 86-97 discusses the morning ENS test between 0400 and 0800 Eastern time, by the

Headquarters Operations Officer's placement of a call to each licensed facility to collect status information. However, this call does not fully satisfy 10 CFR Part 50, Appendix E, paragraph E.9.d, which requires each licensee to perform monthly testing from the control room, the technical support center (TSC) and the emergency operations facility (EOF). The monthly tests of the ENS and HPN instruments from all installed locations except the NRC Resident Inspector's office should be done at the initiative of the licensee. It should be noted that it is not necessary to conduct monthly tests of the ENS and HPN instruments to the NRC regional office because that connection is made through the Operations Center. In the case of the ENS, it is necessary for the licensee to call from each ENS location and establish contact with the NRC Headquarters Operations Officer. The Headquarters Operations Officer should be requested to return the licensee's call at each of the locations. All HPN instruments installed at the licensee's facilities should be tested by placing a local call to any other telephone and request a call back to ensure the instrument is working. No call to the NRC Operations Center is required. Documentation of the monthly test for the entire emergency communications system is required to be maintained by the licensee. The requirements will be met by adherence to EP-AA-124, specifically EP-AA-124-F-23 and EP-CR-124-F-09 (under development).

EP-CR-1000, Crane Clean Energy Center (Crane) Radiological Emergency Plan, Section N.2.a has been updated to ensure that NRC Region is contacted from all facilities where available as denoted below:

a) Communication Drills

- Monthly - The capability of the Nuclear Accident Reporting System (NARS) to notify the state and local government warning points and EOCs within the plume exposure pathway EPZ are demonstrated. Also, the capability to notify the NRC Region is demonstrated using the Emergency Notification System (ENS) and the Health Physics Network (HPN) where available.

RAI 11:
Requirement:

- 10 CFR 50.47(b)(4) requires a standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters, is in use by the nuclear facility licensee, and State and local response plans call for reliance on information provided by facility licensees for determinations of minimum initial offsite response measures.
- Section IV.B.1 of Appendix E to 10 CFR Part 50 states that the means to be used for determining the magnitude of, and for continually assessing the impact of, the release of radioactive materials shall be described, including emergency action levels that are to be used as criteria for determining the need for notification and participation of local and State agencies, the Commission , and other Federal agencies, and the emergency action levels that are to be used for determining when and what type of protective measures should be considered within and outside the site boundary to protect health and safety. The emergency action levels shall be based on in-plant conditions and instrumentation in addition to onsite and offsite monitoring.
- 10 CFR 50.90 Whenever a holder of a license, including a construction permit and operating license under this part, and an early site permit, combined license, and manufacturing license under part 52 of this chapter, desires to amend the license or permit, application for an amendment must be filed with the Commission, as specified

in §§ 50.4 or 52.3 of this chapter, as applicable, fully describing the changes desired, and following as far as applicable, the form prescribed for original applications.

Issue: Enclosure 1C EP-AA-1009 Addendum 3 Revision 3 “Emergency Action Levels for Crane Clean Energy Center” contains red-line strikeouts for changes made to the submitted EALs. These changes compared the proposed changes to previous versions. However, Constellation did not provide any justification for changes that were added or deleted. Additionally, some deletions and additions were not identified by Constellation as changes. Further, some proposed changes did not appear to be changes from the previous emergency plan.

Several examples are listed below:

a. Section 1.7 "Definitions" added in Confinement Boundary but did not identify as new add
b. EAL Matrix (Hot): RG 1, RS 1, RA 1 - added in "using actual meteorology are available" to the last note bullet.
c. Renaming of RU3 as RU4 in the submitted document
d. Removal of one of the four ICs (IC3) from RA 1 which was found in Revision 2 but is not found in proposed Revision 3. The IC removed stated:

   Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses greater than EITHER of the following at or beyond the site boundary
   a. 10 mRem TEDE for 60 minutes of exposure OR
   b. 50 mRem CDE Thyroid for 60 minutes of exposure

e. EAL Matrix (Hot): RG2 - Shows the Note has been updated however, the updated wording is present in the Rev 2 version.
f. EAL Matrix (Hot): FS1 - FS1 is listed twice as the second FS1 should be FA1.
g. EAL Matrix (Hot): Containment Loss Column - Row 4 Containment Integrity or Bypass 1.c - wording has been removed and uses the same wording as found in #2.
   (CGS RAI-1) EAL Matrix (Hot): MA4 Note changed from "The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded or will likely be exceeded." to "If it is determined that the conditions of MAS are not met then assess the event via HU3, HU4, or HU6."
h. EAL Matrix (Hot): HS2 shows a change in the EAL which was already present in the Rev EAL Scheme.
i. EAL Matrix (Cold): CAS shows a change in the EAL which was already present in the Rev 2 EAL Scheme
   (CGS RAI-2) CT4 Basis (continued): Appears the start of the sentence is missing as the second paragraph starts with "and 1.b - Containment integrity ... "
j. HU3 - Removed the Note - Escalation of the emergency classification level would be via IC CA2 or MAS
k. HU4 - Note states " .. . deemed appropriate by the Shift Manager or Emergency Director in < 15 mins of the event." This modifies the note as previous version's note was less than or equal to 15 minutes while this note is just less than.

Request: Review entire application to accurately identify proposed changes. Provide technical justification for all the proposed changes. For those changes that were additions or deletions that were added without identifying them, ensure appropriate technical justification is provided.

CEG Response:
Each of the above mentioned changes and/or differences are discussed in a change summary document provided as Enclosure 3 of this letter along with replaced Enclosures 1A/2A, 1B/2B, and 1C/2C. All items above are addressed in Enclosure 3.

Enclosure 3 also includes changes made between the pre-shutdown Three Mile Island Unit #1 Emergency Plan (1A), Annex (1B), and EALs (1C) and the proposed documents for the Crane Clean Energy Center (replaced Enclosures 2A, 2B & 2C).

RAI 12:
Requirement:

- 10 CFR 50.47(b)(4) requires a standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters, is in use by the nuclear facility licensee, and State and local response plans call for reliance on information provided by facility licensees for determinations of minimum initial offsite response measures.
- Section IV.B.1 of Appendix E to 10 CFR Part 50 states that the means to be used for determining the magnitude of, and for continually assessing the impact of, the release of radioactive materials shall be described, including emergency action levels that are to be used for determining when and what type of protective measures should be considered within and outside the site boundary to protect health and safety. The emergency action levels shall be based on in-plant conditions and instrumentation in addition to onsite and offsite monitoring.

Issue: Multiple EALs reference CCEC's emergency operating procedures (EOPs) either in the EAL (i.e. HA2 and HS2) or cited within the references. These EOPs may be using previous site name (Three Mile Island) such as OP-TM-EOP-020, whereas other references are being updated like EP-CR-1000. It is not clear if the EOPs cited or referenced in the EALs will be updated or remain the same.

Request: Clarify and confirm EOP titles and/or planned changes. Update EAL scheme as appropriate to reflect any changes as needed.

CEG Response:
All references made in the Crane Clean Energy Center Emergency Plans and Procedures are to the most current name and designation available for use. As these names and/or titles are updated, the applicable reference to the procedure in the Emergency Plan documents will be updated using existing processes including a review under 10 CFR 50.54(q).

It should be noted that Operator guidance recognizes and allows use of 'TM' in many cases including OP-TM-EOP-020. There is no immediate plan to revise OP-TM-EOP-020 or other procedures to replace 'TM' with 'CR'. Accordingly, the Emergency Plan may continue to reference OP-TM-EOP-020 and other 'TM' designation procedures as well as 'CR' designated procedures.

RAI 13:
Requirement:

- 10 CFR 50.47(b)(4) requires a standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters, is in use by the nuclear facility licensee, and State and local response plans call for reliance on
- information provided by facility licensees for determinations of minimum initial offsite response measures.
- Section IV.B.1 of Appendix E to 10 CFR Part 50 states that the means to be used for determining the magnitude of, and for continually assessing the impact of, the release of radioactive materials shall be described, including emergency action levels that are to be used as criteria for determining the need for notification and participation of local and State agencies, the Commission, and other Federal agencies, and the emergency action levels that are to be used for determining when and what type of protective measures should be considered within and outside the site boundary to protect health and safety. The emergency action levels shall be based on in-plant conditions and instrumentation in addition to onsite and offsite monitoring.

Issue: EAL E-HU1 indicates the damage to the loaded cask confinement boundary as indicated by an on-contact radiation reading greater than (2 times the site-specific cask specific technical specification allowable radiation level) on the surface of the spent fuel cask.

Constellation provided the values of
a. 240 mrem/hour gamma on the vertical concrete surfaces.
OR
b. 10 mrem/hour neutron on the vertical concrete surfaces.
OR
c. 900 mrem/hour (neutron + gamma) on the top.

These values correspond to NAC International, Inc.'s MAGNASTOR Amendment 9 Revision 2 certificate of compliance for maximum surface dose rate. Should there be any different design casks on site, these values may be different and potentially cause an EAL classification because of different allowable surface dose rates.

Request: Provide a discussion on whether Crane only has MAGNASTOR Amendment 9 Revision 2 casks onsite or provide the additional certificates of compliance for any other cask designs and confirm if E-HU1 values are still valid for emergency level classification. If values are different provide an updated E-HU1 and justification for the changes.

CEG Response:
Crane only has MAGNASTOR Amendment 9, Revision 2 casks onsite. No other spent fuel storage cask designs are present onsite; therefore, no additional Certificates of Compliance are applicable.

Because Crane only stores spent fuel in MAGNASTOR Amendment 9, Revision 2 casks and no changes have been made to spent fuel storage configurations since approval of Revision 2, the E-HU1 threshold values previously submitted remain valid and require no revision.

RAI 14:
Requirement:

- 10 CFR 50.47(b)(4) requires a standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters, is in use by the nuclear facility licensee, and State and local response plans call for reliance on information provided by facility licensees for determinations of minimum initial offsite response measures.
- Section IV.B.1 of Appendix E to 10 CFR Part 50 states that the means to be used for determining the magnitude of, and for continually assessing the impact of, the release of radioactive materials shall be described, including emergency action levels that are to be used as criteria for determining the need for notification and participation of local and State agencies, the Commission, and other Federal agencies, and the emergency action levels that are to be used for determining when and what type of protective measures should be considered within and outside the site boundary to protect health and safety. The emergency action levels shall be based on in-plant conditions and instrumentation in addition to onsite and offsite monitoring.
- 10 CFR 50.155(b)(1) requires mitigation strategies for beyond-design-basis external events-Strategies and guidelines to mitigate beyond-design-basis external events from natural phenomena that are developed assuming a loss of all ac power concurrent with either a loss of normal access to the ultimate heat sink or, for passive reactor designs, a loss of normal access to the normal heat sink.

Issue: The proposed EALs CU1, CA1, MA1, MS1, and MG1 are based on NEI 99-01, Revision 6 and identify specific onsite power sources. However, the primary point of emphasis for EALs CA1, MS1, MG1 is a complete loss of power, and identification of the standard emergency or station blackout generators even if mitigative strategies using other power sources are effective. This issue was described in Emergency Preparedness Frequently Asked Question (EPFAQ) 2015-015 (ML16166A191).

The EAL and/or Technical Basis section may specify the use of a non-safety-related power source provided the source is maintained in a formal maintenance program and able to power the bus loads associated with ECCS and decay heat removal functions. This includes sources that support implementation of strategies required by 10 CFR 50.155, “Mitigation of beyond-design-basis events.”

Request: Provide an analysis or technical justification to demonstrate that a loss of all onsite and offsite AC power does not result in a Site Area Emergency or General Emergency based on the loss of the listed power sources when other power sources may be available to power to the Vital AC safeguards buses or implement the guidance in EPFAQ 2015-015.

CEG Response:
In EPFAQ 2015-015 dated December 4th, 2015, the following question was submitted:

> “Should EALs SA1 and CU2 contain a list of power sources applicable for consideration and describe the criteria for what sources may be credited? In

> addition, should guidance be included to explain why a loss of sources is not necessary for EALs SS1 (CA2) and SG1 as these EALs are for a loss of ALL sources?"

The last paragraph of the NRC RESPONSE states:

> "In summary, the staff only considers EALs SA1 and CU2, as numbered in NEI 99-01 Revision 6, as needing a table of readily available onsite AC power sources. EAL SU1 may list the offsite AC power sources if desired. EALs CA2, SS1, SG1, and SG8 do not need to list sources"

From the proposed EAL scheme (EP-AA-1009 Addendum 3, Enclosure 2C) each of the loss of power EALs are aligned to this decision. SA1 (Crane MA1) and CU2 (Crane CU1) each list out the available power supplies as bullets. SU1 (Crane MU1) may contain a list but Constellation has chosen not to do so.

For CU1, CA1, MA1, MS1 and MG1 the offsite sources credited supply the 'D' and 'E' Emergency 4 kv buses responsible for Emergency Core Cooling, Decay Heat Removal, and supporting systems. That is done via Auxiliary Transformers 1A and 1B to their respective trains. The onsite sources credited are the two Emergency Diesel Generators (EG-Y-1A & EG-Y-1B) as well as the Station Blackout Emergency Diesel Generator (SBO) (EG-Y-4). The SBO can only supply one Emergency 4KV bus and that decision would be made by the control room. The 1A Auxiliary Transformer, 1A EDG, and SBO can power the A Emergency Bus, while the 1B Auxiliary Transformer, 1B EDG, and SBO can power the B Emergency Bus.

Each alternate source listed, the Station Emergency Diesel Generators and the SBO has adequate capacity for the loads on the Emergency Bus, can be rapidly connected to the associated bus, and supports ECCS and Decay Heat Removal functions. Each can be made available within the timing assumed by the EAL. The only non-safety related source is the SBO which is maintained through a formal maintenance program.

If offsite power is lost, the normal supply through Auxiliary Transformers 1A and 1B would be unavailable, but by design both EDGs will start and load onto the Emergency Bus and MU1 would be declared. If the same event occurred and one of the EDGs failed and the SBO could not be aligned to that bus within 15 minutes MA1 would be declared. If both EDGs failed and the SBO could not be aligned within 15 minutes, MS1 would be declared. And finally, following these failures, power could not be restored to at least one Emergency 4KV bus within 4 hours or superheat exceeds 25° F, MG1 would be declared.

The listed sources encompass all sources relevant to the classification. Any alternate source being credited meets the EPFAQ criteria. The vital AC safeguards buses and required ECCS/decay heat removal loads can be powered. The EALs cannot improperly escalate to SAE or GE solely because the named generators are lost while an acceptable alternate source is supplying the required loads. A true loss of all qualifying AC power will still result in the appropriate classification.

In order to make the basis for MG1, MG2, MS1, and CA1 more easily determinable by Emergency Managers, in accordance with EPFAQ 2015-015 the following text was added:

- MG1 – "*If ANY mitigative strategy is effective in supplying power to ANY one Emergency 4KV bus in < 4 hours, escalation to General Emergency shall not*

be considered."

- MG2 – "*If ANY mitigative strategy is effective in supplying power to ANY one Emergency 4KV bus AND ANY one Vital DC bus (voltage >105 VDC) within 15 minutes, escalation to General Emergency shall not be considered."*
- MS1 – "*If ANY mitigative strategy is effective in supplying power to ANY one Emergency 4KV bus within 15 minutes from the time of loss of both offsite and onsite AC power, escalation to Site Area Emergency shall not be considered."*
- CA1 – "*If ANY mitigative strategy is effective in supplying power to ANY one Emergency 4KV bus within 15 minutes from the time of loss of both offsite and onsite AC power, escalation to Alert shall not be considered."*

RAI 15:
Requirement:

- 10 CFR 50.47(b)(4) requires a standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters, is in use by the nuclear facility licensee, and State and local response plans call for reliance on information provided by facility licensees for determinations of minimum initial offsite response measures.
- Section IV.B.1 of Appendix E to 10 CFR Part 50 states that the means to be used for determining the magnitude of, and for continually assessing the impact of, the release of radioactive materials shall be described, including emergency action levels that are to be used as criteria for determining the need for notification and participation of local and State agencies, the Commission , and other Federal agencies, and the emergency action levels that are to be used for determining when and what type of protective measures should be considered within and outside the site boundary to protect health and safety. The emergency action levels shall be based on in-plant conditions and instrumentation in addition to onsite and offsite monitoring.

Issue: Administrative discrepancies have surfaced during the review of the EALs that preclude accurate review of the application, in some cases the discrepancies are associated with references or setpoints.

a) FC3: The unit of measure in the basis has a square followed by Ci/gm which appears to be different than the IC #2 which states Coolant activity > 300uCi/gm Dose Equivalent I-131.

b) OP-TM-EOP-002: The title for this EOP lists this as Loss of 25°F Subcooling Margin, however some EALs (example CT4 and MU8) reference it as Loss of 250F Subcooling Margin.

c) MA3 Basis: In the 3rd paragraph there is a paragraph return which could create confusion as indicative of the ideas not being connected.

Request: Clarify and identify the units of measurement, titles of references, or wording to eliminate any potential confusion.

CEG Response:

Each of the above-mentioned discrepancies are discussed in a change summary document provided as Enclosure 3 of this letter along with replaced Enclosures 1A/2A, 1B/2B, and 1C/2C. All items above are addressed in Enclosure 3.

Enclosure 3 includes all other differences between the original Three Mile Island Unit #1 Emergency Plan, Emergency Plan Annex, and EALs. and the proposed documents for the Crane Clean Energy Center.

ENCLOSURE 1A

Markup Version of EP-CR-1000

Crane Clean Energy Center
Renewed Facility License No. DPR-50

CONSTELLATION NUCLEAR

CRANE CLEAN ENERGY CENTER (CRANE) RADIOLOGICAL EMERGENCY PLAN

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STATION ANNEX

The Station Annex subject to the requirements of this plan is as follows:

EP-AA-1009: Radiological Emergency Plan Annex for Crane Clean Energy Center

REVISION HISTORY

REVISION	EFFECTIVE DATE	DOCUMENT
0	March 2018	EP-TM-1000
1	December 2018	EP-TM-1000
2	September 2019	EP-TM-1000
3	September 2020	EP-TM-1000
0	TBD	EP-CR-1000
1	TBD	EP-CR-1000

Revision History Summary:

In 2017, Constellation (at the time Exelon) announced the intent to permanently shut down the operating Unit-1 reactor at Three Mile Island Station by the fall of 2019. Constellation revised the station Emergency Plan to establish the Three Mile Island Station Emergency Plan as an independent Emergency Plan separated and de-linked from the fleet Standardized Radiological Emergency Plan (Standard Plan). This allowed decommissioning changes to be made to the Station Emergency Plan without impacting the Standard Plan.

A new Emergency Plan procedure was created for Three Mile Island. It contained regulatory commitments applicable to Three Mile Island which were in the fleet Standardized Radiological Emergency Plan. The new procedure was EP-TM-1000, *Three Mile Island (TMI) Station Radiological Emergency Plan*. The 10CFR.54(q) evaluation #17-122 evaluated the changes between the Standard Plan, the Station Annex, and EP-TM-1000.

Upon implementation, the revised Three Mile Island Emergency Plan was independent of the fleet Emergency Plan. The new Three Mile Island Emergency Plan formed the regulatory basis for developing and submitting License Amendment Requests to the NRC to support decommissioning.

In 2024 Constellation announced the intent to restart Three Mile Island Station Unit 1 as the Crane Clean Energy Center, pending NRC approval. Constellation is revising the station Emergency Plan to support restart. The Emergency Plan in place at the time operations were halted was EP-TM-1000 Revision 0. EP-TM-1000 Revision 1 updated the List of Corporate LOAs and update the definition of the Exercise Cycle to eight years. Subsequent revisions to EP-TM-1000 implemented approved regulatory exemptions as the station progressed through the stages of decommissioning. EP-AA-1009, TMI Radiological Emergency Plan Annex, Revision 29 was in effect at the time. As with EP-TM-1000, subsequent revisions to EP-AA-1009 reflected the station's progression through the stages of decommissioning.

The Emergency Plan document was renumbered and revised to reflect the transition from EP-TM-1000 Rev. 1 to EP-CR-1000 Rev. 0. The station annex was revised to reflect the transition from EP-AA-1009 Rev. 29 to EP-AA-1009 Rev. 32.

Section A: Purpose

As required in the conditions set forth by the Nuclear Regulatory Commission (NRC) for the operating licenses for the Constellation Nuclear Stations, the management of Constellation recognizes its responsibility and authority to operate and maintain the nuclear power stations in such a manner as to provide for the safety of the general public. This document describes the Crane Clean Energy Center, henceforth known as CRANE, Emergency Preparedness Program. The philosophy that guides the development and maintenance of this program is the protection of the health and safety of the general public in the communities around the station and the personnel who work at the plant.

The Crane Clean Energy Center Radiological Emergency Plan establishes the concepts, evaluation and assessment criteria, and protective actions that are necessary in order to limit and mitigate the consequences of potential or actual radiological emergencies. It has been prepared to establish the procedures and practices for management control over unplanned or emergency events that may occur at CRANE. It also provides the necessary pre-arrangements, directions and organization so that all nuclear emergencies can be effectively and efficiently resolved.

The Crane Clean Energy Center Emergency Preparedness Program consists of the Emergency Plan, the Station Annex, emergency plan implementing procedures, and associated program administrative documents. The CRANE Emergency Plan outlines the basis for response actions that would be implemented in an emergency. This document is not intended to be used as a procedure.

The Crane Annex contains information and guidance that are unique to the station. The annex addresses site-specific criteria, including:

- Emergency Action Levels (EALs) located in Addendum 3 to the Annex,
- Deviations from the Emergency Plan (such as station specific on-shift staffing, unique aspects of ERO augmentation, and so forth).
- Facility geography and location for a full understanding and representation of the station’s emergency response capabilities.
- Plant specific facilities and equipment associated with the Emergency Preparedness Program.

The Station Annex and its Addenda are part of the plan and are subject to the same review and audit requirements as the plan. In the areas where the Station Annex deviates from the general requirements of the Emergency Plan, the Station Annex shall serve as the controlling document.

Detailed Emergency Plan implementing procedures are maintained separately and are used to guide those responsible for implementing emergency actions.

Section B: Background

In the context of the Emergency Plan, the Station Annex, and implementing procedures, Constellation Nuclear manages the operations of the NRC licensed facility designated as Crane Clean Energy Center.

The primary hazard consideration at the nuclear power station is the potential unplanned release of radioactive material resulting from an accident. The probability of such a release is considered very low due to plant design and strict operational guidelines enforced by the NRC. Notwithstanding, federal regulations require that a solid emergency preparedness program exist for each commercial nuclear power station. A detailed description of the station is in the Updated Final Safety Analysis Report (UFSAR).

In order to minimize the number of ad-hoc decisions made during an emergency and to ensure that necessary equipment, supplies, and essential services are available to meet the needs of an emergency, Constellation Nuclear has developed this Emergency Plan for the Crane Clean Energy Center. The Emergency Plan considers the consequences of radiological emergencies, as required by 10 CFR 50, Paragraph 50.47 and Appendix E.

Additionally, it addresses the guidance and adheres to the intent of the criteria established and provided within NUREG-0654 Rev. 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants". The Emergency Plan also considers the consequences of non-radiological emergencies.

Section C: Scope

This document describes actions to be taken in the event of a radiological accident at CRANE that may impact the health and safety of the general public or station employees. It also serves to limit the damage to facilities and property and provide for the restoration of such facilities in the event of an emergency. If such an accident were to occur, the Emergency Response Organization (ERO) would be put in place and maintained until such time when the plant is returned to a stable condition and the threat to the general public or station personnel no longer exists. This plan describes the functions and operation of the ERO, including assignments of authority and responsibility. It does not, nor is it intended to, provide guidance for actual plant equipment manipulations. These instructions are contained in site-specific normal and emergency operating procedures as required by Technical Specifications and other regulatory guidance. The Emergency Plan provides for: identification and evaluation of emergency situations, protective measures, communications, coordination and notification of governmental authorities, document review and control, emergency preparedness assessment, and training of all emergency personnel. An emergency recovery phase is also described in this Emergency Plan.

Section D: Planning Basis

The Emergency Plan, in conjunction with the Station Annex and implementing and administrative procedures, documents the methods by which the CRANE Emergency Preparedness Program meets the planning standards set forth in 10 CFR 50.47(b) and the requirements of 10 CFR 50 Appendix E. Development of the Emergency Plan was based on NUREG-0654/FEMA-REP-1, Rev. 1.

Acceptable alternate methods, which deviate from NUREG-0654, Rev. 1, are allowed under Regulatory Guide 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors." However, deviations will be documented in the Station Annex and evaluated as continuing to meet the Planning Standards of 10 CFR 50.47(b) and Appendix E to 10 CFR 50 under the 10 CFR 50.54(q) process to ensure the continued effectiveness of the Emergency Plan and Station Annex.

Other applicable regulations, publications, and guidance were used (see Appendix 1, "References") along with site-specific documents to ensure consistency in the planning effort.

Section E: Contiguous-Jurisdiction Governmental Emergency Planning

The Emergency Plan recognizes the state, in cooperation with the local EPZ communities, as the overall authority responsible for protective action directives in order to protect the health and safety of the general public.

Section F: Integrated Emergency Planning

State and local (county level) emergency response plans were utilized in the development of this plan to ensure a consistent and integrated response to a classified event.

Section G: Funding and Technical Assistance

Constellation Nuclear is dedicated to providing the level of support necessary, as dictated by federal regulation, to ensure appropriate integration of the state, county, and utility radiological emergency programs.

Section H: Emergency Response Organization

Constellation Nuclear acknowledges its primary responsibility for planning and implementing emergency measures within the site boundary and for overall plant accident assessment. These emergency measures include corrective actions, protective measures, and aid for personnel onsite. To accomplish these responsibilities, advance arrangements have been made with offsite organizations for special emergency assistance such as ambulance, medical, hospital, fire, and police services.

Section I: Federal Response

Provisions are made within the Emergency Plan for the integration of appropriate elements of the federal assistance activities. Arrangements have been made to accommodate a federal response organization presence at the Constellation Nuclear emergency response facilities as well as support communications between utility and federal emergency facilities.

Section J: Form and Content of Plan

As required by federal regulations, the Emergency Plan is governed by and contained (or referenced) in the Station UFSAR. The Emergency Plan is administratively maintained as a separate document. The Emergency Plan has been formatted similar to NUREG-0654/FEMA-REP-1, Rev. 1. The use of this format lends itself to uncomplicated comparison with the criteria set forth in NUREG-0654/FEMA-REP-1.

Appendix 2, "Procedure Cross-Reference to NUREG-0654", provides a cross-reference between the NUREG-0654 evaluation criteria and the Emergency Plan implementing procedures and applicable administrative documents.

Required Content of the Station Annex

Information that is in the plan need not be restated in the Annex. The Annex shall address what means, methods, and resources are used to satisfy the requirements and responsibilities set forth in the Emergency Plan.

Annex Format and Specific Content: As a minimum, the Station Annex shall address the areas described as follows:

1. Section 1: Introduction

   The station and surrounding area are described by the inclusion of maps, drawings and/or diagrams. A summary statement describes the Annex interface with the Emergency Plan.

2. Section 2: Organizational Control of Emergencies

   The agencies with which the station has independent agreements for support during an emergency are provided. Station specific differences from the Emergency Plan, such as on-shift staffing or ERO augmentation, shall be outlined. The justification for differences shall be provided as required under 50.54(q) documentation.

3. Section 3: Classification of Emergencies

   The Classification levels are described in this Section. Note that the Site Specific EALs are located in Addendum 3 to the Annex and are included for all emergency classes for the purpose of event classification.

4. Section 4: Emergency Measures

   Maps indicating the location of Assembly Areas, site evacuation routes, and centers for the monitoring of evacuated nonessential personnel are included. Roadway/traffic control measures of roads under control of the station are addressed.

5. Section 5: Emergency Facilities and Equipment

   - Descriptions of the station Control Room, Technical Support Center, and Operational Support Center are provided.
   - A description of the specific equipment is provided.
   - A description of the capability and resources available to categorize accidents.

Section A: Assignment of Responsibility

This section describes the primary responsibilities and organizational control of Constellation, federal, state, county, and other emergency response organizations within the Plume Exposure Pathway and the Ingestion Pathway Emergency Planning Zones (EPZs). Various supporting organizations are also described as well as staffing for initial and continuous response.

1. Concept of Operations

The relationships and the concept of operations for the organizations and agencies who are a part of the overall ERO are as follows:

a. Identified below are federal, state, and county organizations that are involved in a response to an emergency at Crane Clean Energy Center.

1) Federal Agencies: The National Response Framework (NRF), Nuclear/Radiological Incident Annex outlines the statutory and regulatory responsibilities. The primary federal response for supporting an emergency at a Constellation station include:

a) Nuclear Regulatory Commission (NRC): The NRC is responsible for licensing and regulating nuclear facilities and materials and for conducting research in support of the licensing and regulatory process. These responsibilities include protecting the public health and safety, protecting the environment, protecting and safeguarding materials and plants in the interest of national security and assuring conformity with antitrust laws.

The NRC Regional Office has the responsibility for auditing of nuclear power stations. It is responsible for ensuring that such activities are conducted in accordance with the terms and conditions of such NRC licenses and that as a result of such operations, there is no undue risk to the health and safety of the public.

The NRC Office of Nuclear Reactor Regulation, established by the Energy Reorganization Act of 1974, as amended, performs licensing functions associated with the construction and operation of nuclear reactors and with the receipt, possession, ownership, and use of special nuclear and byproduct materials used at reactor facilities.

With regard to emergency preparedness, the NRC shall:

- Assess licensee emergency plans for adequacy;
- Review the Federal Emergency Management Agency findings and determinations on the adequacy and capability of implementation of state and local plans; and
- Make decisions with regard to the overall state of emergency preparedness and issuance of operating licenses.

The NRC shall respond to incidents at licensed facilities or vehicular accidents involving licensed materials, including radionuclides, in transit. The NRC shall act as the lead Federal agency with regard to technical matters during a nuclear incident including radiological assistance. The NRC shall be prepared to recommend appropriate protective actions for the public and technical actions to the licensee. FEMA shall act as the lead Federal agency for offsite, non-technical concerns.

During an incident, the Chairman of the Commission is the senior NRC authority for all aspects of a response. The Chairman shall transfer control of emergency response activities to the Director of Site Operations when deemed appropriate by the Chairman.

All NRC Regions as well as Headquarters are prepared to respond to potential emergencies. All Regions and Headquarters have developed plans and procedures for responding to radiological incidents involving NRC licensees. Headquarters has developed the NRC Incident Response Plans and Implementing Procedures. Each NRC Region has developed Regional Supplements that detail how the Region will fulfill all of the responsibilities assigned in the NRC Incident Response Plan. All NRC organizations are responsible for maintaining an effective state of preparedness through periodic training, drills and exercises.

Each Region and Headquarters have established and maintain an Incident Response Center designed to centralize and coordinate the emergency response function. Adequate communications are established to link the licensee, Headquarters and the Region. The NRC has established lines of communications with local government, state government, other Federal agencies, Congress and the White House. Public information will be disseminated in a timely manner and periodically.

Each Region is prepared to send a team of qualified specialists to the scene expediently. All of the necessary supplies and equipment needed for emergency response will be provided and maintained by the NRC.

The NRC Incident Response Plan objectives are to provide for protection of the public health and safety, property, and the environment, from the effects of radiological incidents that may occur at licensed facilities or which involve licensed materials, including radio-nuclides in transit.

The objectives of the agency plan set forth the organizational and management concepts and responsibilities needed to assure that NRC has an effective emergency response program.

The plan is intended to ensure NRC preparedness:

- To receive and evaluate notification information of incidents, accidents and unusual events and determine the extent of NRC response necessary to meet NRC responsibilities for mitigating the consequences of these events;

- To determine the cause of incidents, accidents, and unusual events in order to ensure that appropriate corrective actions are taken by the licensee to minimize the consequences of these events;

- To provide onsite expertise in a timely manner, to evaluate the nature and extent of the incident, ascertain plant status (for reactors and fuel facilities), monitor licensee activities, determine compliance, make recommendations, and, if necessary, issue orders relative to the event;

- To inform the public and others of plant status and technical details concerning the incident;

- To recommend adequate protective actions to the responsible local and/or state agencies;

- To provide technical assistance;

- To ensure the plant is returned to a safe condition; and

- To return the NRC Headquarters and Regional office to normal operations.

b) Federal Emergency Management Agency (FEMA): Per the National Response Framework (NRF), FEMA is responsible for the overall coordination of a multi-agency Federal response to a significant radiological incident. The primary role of FEMA is to support the state by coordinating the delivery of Federal non-technical assistance. FEMA coordinates state requests for Federal assistance, identifying which Federal agency can best address specific needs. If deemed necessary by FEMA, it will establish a Federal Response Center from which it will manage its assistance activities.

c) Federal Radiological Preparedness Coordinating Committee (FRPCC): The FRPCC consists of the Federal Emergency Management Agency, which chairs the Committee, the Nuclear Regulatory Commission, the Environmental Protection Agency, the Department of Health and Human Services, the Department of Energy, the Department of Transportation, the Department of Defense, the Department of Agriculture, the Department of Commerce, and where appropriate and on an ad hoc basis, other Federal departments and agencies. The FRPCC shall assist FEMA in providing policy direction for the program of Federal assistance to state and local governments in their radiological emergency planning and preparedness activities.

d) U.S. Department of Energy (DOE): The Department of Energy (DOE) has extensive radiological monitoring equipment and personnel resources that it can assemble and dispatch to the scene of a radiological incident. The Department of Energy (DOE) local operations office can assist Constellation Nuclear following a radiological incident as outlined in the Federal Radiological Monitoring and Assessment Plan (FRMAP). If Constellation Nuclear, the NRC or the affected state(s) deem that assistance from DOE is necessary or desirable, the affected state(s) would notify the appropriate DOE operations office.

e) Environmental Protection Agency (EPA): Assists with field radiological monitoring/sampling and non-plant related recovery and reentry guidance.

f) The U.S. Coast Guard (USCG): The USCG patrols and ensures the safety of navigable waterways in the United States. The USCG is promptly notified of any oil or hazardous substance discharges into rivers or lakes or radioactive contamination of rivers or lakes under its jurisdiction at levels requiring assistance to effect protective actions. The USCG is contacted by the appropriate state agencies in the event of an incident at an applicable nuclear power plant. The USCG is responsible for officially closing the waterways to all commercial traffic [Refer to the appropriate State Plan].

g) U.S. Army Corps of Engineers: The U.S. Army Corps of Engineers control barge and boat traffic at locks and dams on navigable waterways in the United States. The Corps of Engineers will be contacted by the appropriate state agencies in the event of an incident at an applicable nuclear power plant. The Corps will be responsible for closing their locks and dams to all waterway traffic leading to the affected area, allowing only traffic leaving the area [Refer to the State Plan].

h) Federal Bureau of Investigation (FBI): Support from the FBI is available through its statutory responsibility based in Public Law and the US code, and through a memorandum of understanding for cooperation with the NRC. Notification to the FBI of emergencies in which they would have an interest will be through provisions of the Nuclear Station's Security Plan, or by the NRC.

i) National Weather Service (NWS): Provides meteorological information during emergency situations, if required. Data available will include existing and forecasted wind directions, wind speed, and ambient air temperature.

2) State Agencies

a) The Commonwealth of Pennsylvania: The Commonwealth organizations having prime responsibility in matters of radiation hazards are the Pennsylvania Emergency Management Agency and the Bureau of Radiation Protection (BRP) of the Pennsylvania Department of Environmental Protection.

- Pennsylvania Emergency Management Agency: Responsibilities of PEMA are outlined in The Nuclear/Radiological Plan (formerly Annex E)of the Commonwealth of Pennsylvania Emergency Operations Plan. PEMA is the primary State agency to interface with FEMA. Any BRP requests for non-technical assistance from FEMA are coordinated through PEMA.

- Department of Environmental Protection, Bureau Of Radiation Protection (DEP/BRP): Responsibilities of DEP/BRP are outlined in the Nuclear/Radiological Plan (formerly Annex E).

- Pennsylvania State Police: Responsibilities of the State Police are set forth in the Nuclear/Radiological Plan (formerly Annex E).

3) County Government Agencies

Constellation and the surrounding communities that comprise the Plume Exposure Pathway EPZs have developed integrated emergency response programs that call upon the resources of their community. The community organizations are responsible for implementing and coordinating the community response to an emergency.

The County Emergency Operations Centers (EOCs) serve as the primary coordinating center for local government response within the county's jurisdiction and for coordination between counties.

b. During an event classified as an Alert, Site Area Emergency, or General Emergency, the Constellation Nuclear ERO replaces the normal plant organization. The ERO consists of three major response sub-organizations:

1) The Station Organization, directed by the Station Emergency Director, provides for:

- Control and operation of the plant.

- Mitigation of the emergency condition.

- Protection of station personnel.

- Emergency event classification.

- Notification of the appropriate individuals and Federal agencies prior to EOF taking Command and Control.

- Emergency support for operations, engineering, maintenance, firefighting, material acquisition, security, and first aid.

2) The Corporate Organization, directed by the Corporate Emergency Director, provides for:

- Emergency notifications to state and local agencies.
- Offsite radiological accident assessment and Protective Action Recommendations to offsite authorities.
- The primary interface between Constellation Nuclear and outside organizations responsible for the protection of the public.

3) The Public Information Organization, directed by the Corporate Spokesperson, coordinates with public information officers from other organizations to provide information to the public through the news media.

c. Interrelationships between major Constellation Nuclear organizations and sub-organizations in the total response effort are illustrated in a block diagram in Figures A-1 and A-2. For a more detailed diagram of the Constellation Nuclear ERO, see Figures CRANE B-1a to CRANE B-1d.

d. The Corporate Emergency Director is a senior Constellation employee with overall responsibility for coordinating emergency response actions in support of the affected Constellation Nuclear station, Emergency Public Information Organization, and affected state and local agencies.

e. Procedures for training and maintenance of the emergency organization are in place to ensure 24-hour per day staffing for emergency response, including established communication links.

2. State and County Functions and Responsibilities

The state and counties have emergency response plans that specify the responsibilities and functions for the major agencies, departments, and key individuals of their emergency response organizations. This information is located in their respective plans.

3. Agreements in Planning Effort

Written agreements establishing the concept of operations developed between Constellation and other support organizations having an emergency response role within the EPZs have been developed. These agreements identify the emergency measures to be provided, the mutually accepted criteria for implementation, and the arrangements for exchange of information. Agreement letters are not necessary with Federal Agencies who are legally required to respond based on Federal law; however, agreements are necessary if the agency was expected to provide assistance not required by law. Letters of Agreement with private contractors and others who provide services in support of the station shall be obtained by the station and are maintained on file at the station. Constellation Corporate Emergency Preparedness maintains Letters of Agreement with organizations that provide support to multiple stations. A contract/purchase order with a private contractor is considered acceptable in lieu of a Letter of Agreement for the specified duration of the contract.

4. Continuous Coverage

Constellation maintains 24-hour emergency response capability at CRANE. The normal on-shift complement provides the initial response to an emergency. This group is trained to handle emergency situations (e.g. initiate implementation of the Emergency Plan, make initial accident assessment, emergency classification, notifications, communications, protective action recommendations) until the augmented ERO arrives. The ERO is composed of a broad spectrum of personnel with specialties in operations, maintenance, engineering, radiochemistry, health physics, material control, fire protection, security, and emergency planning and are available and trained to augment on-shift personnel in an emergency. Procedures for training and maintenance of the emergency organization are in place to provide the capability of continuous (24-hour) operations.

The Corporate Emergency Director, located in the EOF, has the authority and responsibility for assuring continuity of resources (technical, administrative, and material) in the event of the activation of the ERO.

Figure A-1: Constellation Emergency Response Organization Interrelationships

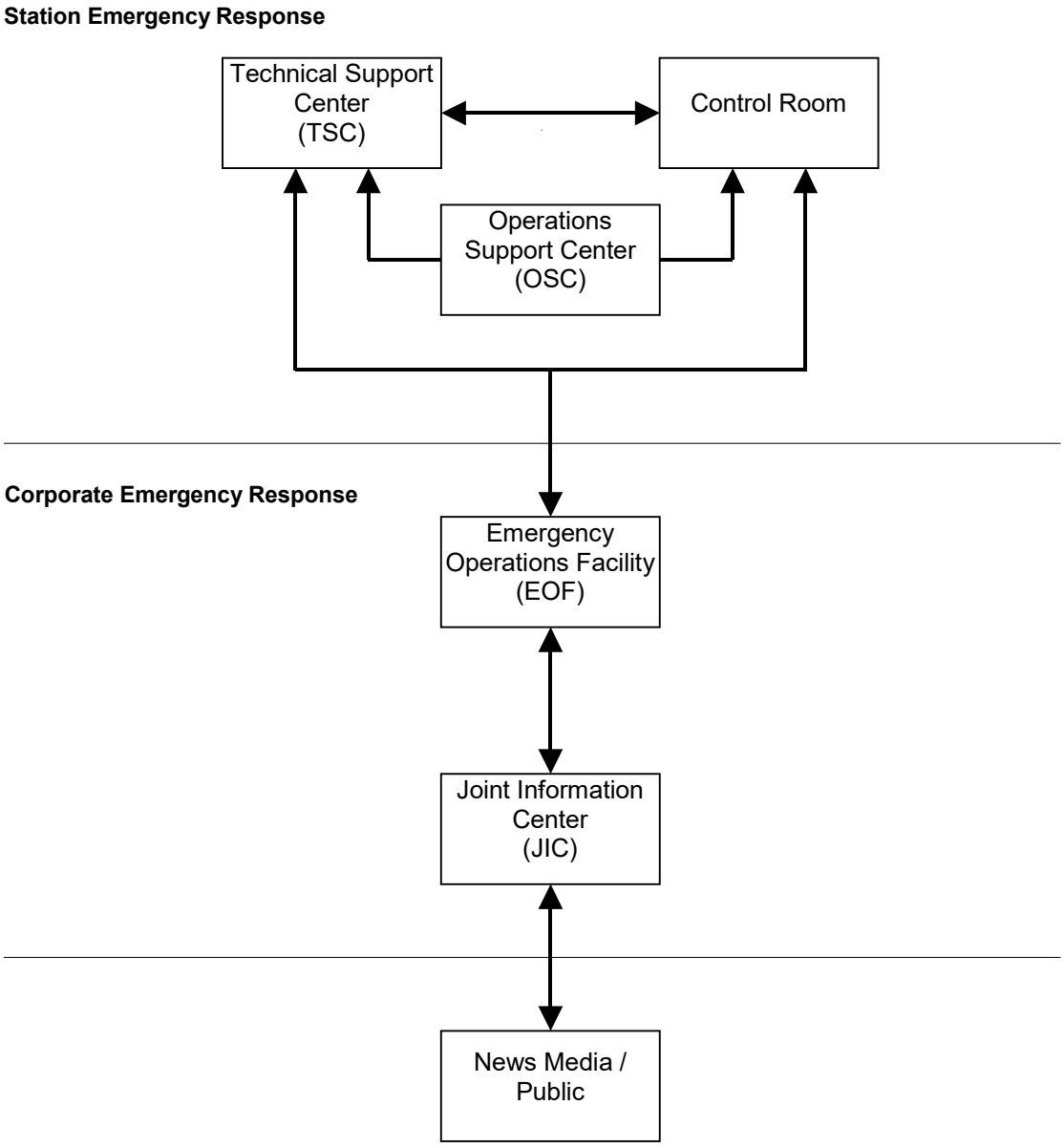
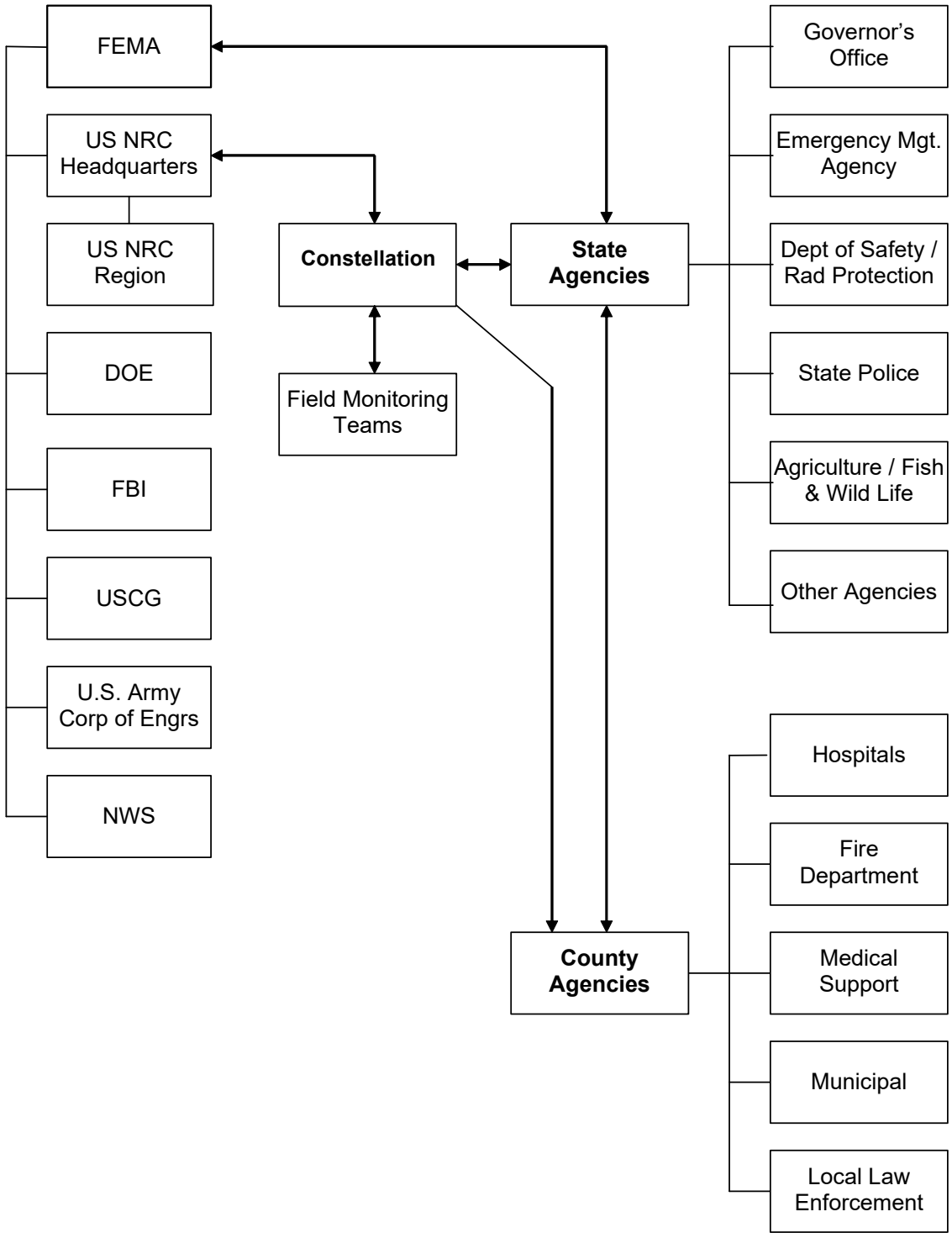


Figure A-2: Agency Response Organization Interrelationships



Section B: Constellation Nuclear Emergency Response Organization

This section describes the Constellation Nuclear ERO, its key positions, and associated responsibilities. It outlines the staffing requirements which provide initial emergency response actions and provisions for timely augmentation of on-shift personnel when required. It also describes interfaces among Constellation Nuclear emergency response personnel and specifies the offsite support available to respond to CRANE.

1. On-Shift Emergency Response Organization Assignments

The normal plant personnel complement is established with the Station Plant Manager having overall authority for station operations. The Station Plant Manager directs the site organization in the management of the various departments while the Shift Manager retains the responsibility for actual operation of plant systems. Emergency Preparedness must consider the capabilities of the normal plant organization, the Station and Corporate Emergency Response Organizations of Constellation Nuclear, and the non-Constellation Nuclear Emergency Response agencies. The initial phases of an emergency situation at a nuclear station will most likely involve a relatively small number of individuals. These individuals must be capable of (1) determining that an emergency exists; (2) providing initial classification and assessment; and (3) promptly notifying other groups and individuals in the emergency organization. The subsequent phases of the emergency situation may require an increasing augmentation of the emergency organization.

CRANE has personnel on shift at all times that can provide an initial response to an emergency event. ERO staffing tables contained within this Emergency Plan outline the plant on-shift emergency organization and its relation to the normal staff complement. Members of the on-shift organization are trained on their responsibilities and duties in the event of an emergency and are capable of performing all response actions in an Unusual Event or the initial actions of higher classifications.

On Shift Personnel: CRANE has the capability at all times to perform detection, mitigation, classification, and notification functions required in the early phases of an emergency. Shift augmentation and further ERO involvement will be determined by the extent and magnitude of the event.

Shift Manager: While acting as Shift Emergency Director, will take immediate action during an emergency and will activate the Station ERO, as appropriate. In the Shift Manager’s absence or incapacitation, the line of succession is defined by CRANE procedures.

Shift Technical Advisor (STA): During normal plant operations, the Senior Reactor Operators report to the Shift Manager and directly supervise the licensed Reactor Operators and all activities in the Control Room. During an abnormal condition, the Shift Manager assumes direct supervision of personnel and all activities in the Control Room while a qualified individual steps back and assumes an overview role as an STA with the specific responsibility of monitoring the maintenance of core cooling and containment integrity. An individual assigned the duty as the STA shall be available to the Control Room at all times.

Radiation Protection: The Station Radiation Protection personnel are responsible for the handling and monitoring of radioactive materials. Included in this organization are Health Physicists, Radiation Protection Supervisors, and Technicians.

Security: The Station Security personnel are responsible for the physical security of the site. Included in this organization are Security Supervisors and Security Guards.

2. Authority Over the Emergency Response Organization

The Emergency Director in Command and Control is the designated Constellation Nuclear individual who has overall authority and responsibility, management ability, and technical knowledge for coordinating all emergency response activities at the nuclear power station.

- Control Room: Shift Emergency Director (Shift Manager)
- TSC: Station Emergency Director
- EOF: Corporate Emergency Director

3. Criteria for Assuming Command and Control (Succession)

Emergency personnel assume responsibility for their positions upon receiving notification to activate. The responsibility for initial assessment of and response to an emergency rests with the Shift Manager. The Shift Manager is the Shift Emergency Director and has the Station and Corporate Emergency Director's responsibilities and authority until relieved. The Corporate Emergency Director, once having relieved the Shift Manager of the Emergency Director responsibilities, is responsible for continued assessment of the severity of the emergency and for the necessary functions as described in the Emergency Plan, the Station Annex, and the emergency implementing procedures.

The Shift Emergency Director is relieved of Command and Control as soon as possible after the declaration of an Alert (or higher classification if Alert not declared). Following the Command and Control turnover, the Corporate Emergency Director shall have overall Command and Control of the Emergency Response. Note that the Station Emergency Director takes responsibility for onsite Non-Delegable Responsibilities including Classification and Emergency Exposure Control. The Corporate Emergency Director takes responsibility for offsite Non-Delegable Responsibilities including Protective Action Recommendations and State/local Notifications. Command and Control does not transfer until the following criteria have been met:

- Adequate staff levels are present in support of the non-delegable responsibilities.
- The staff has been fully briefed as to the status of the event and the currently proposed plan of action.
- A turnover between the Emergency Director relinquishing Command and Control and the Emergency Director assuming Command and Control has been made.

Although the CRANE ERO fulfills all regulatory requirements for emergency response, it may be altered by the Emergency Director. This type of alteration will be based upon identified needs within the ERO, event dependent criteria, and identified needs of the company as a whole.

4. Non-Delegable Responsibilities

Non-delegable responsibilities include the following functions:

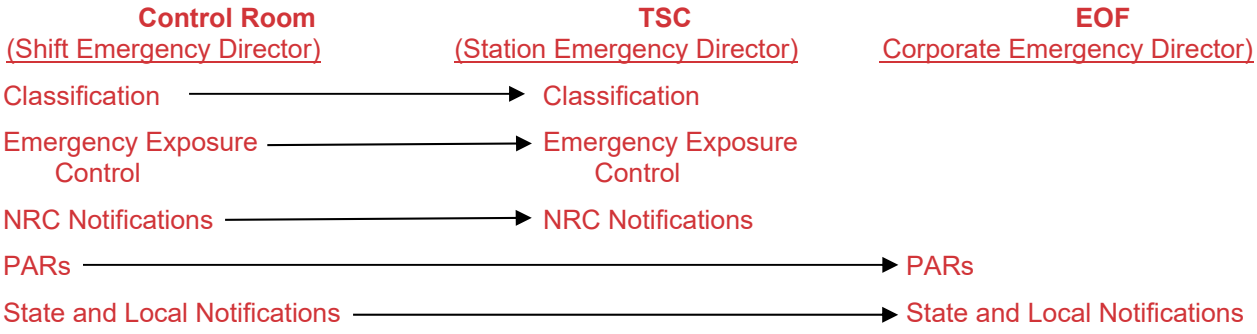
- Event classification.
- Protective Action Recommendations (PARs) for the general public.
- Notification of offsite authorities (approval of state/local and NRC notifications).
- Authorization of emergency exposure controls in excess of 5 Rem TEDE and the issuance of potassium iodide (KI), for Constellation Nuclear emergency workers per EPA-400.

The Shift Manager is responsible for the initial classification of an event and assumes the position as Shift Emergency Director. In this capacity, the Shift Manager has responsibility for performing the non-delegable responsibilities until relieved.

The Shift Emergency Director is relieved of Command and Control as soon as possible after the declaration of an Alert (or higher classification if Alert not declared). Command and Control is transferred to the Station Emergency Director but may be transferred directly to the Corporate Emergency Director.

When the Station Emergency Director assumes overall authority and responsibility for Classification and Emergency Exposure Control and NRC Communications. The Corporate Emergency Director (EOF) will assume the non-delegable responsibilities for PAR determination and notifications to State and Local authorities.

Transition of "Non-Delegable" Responsibilities



5. Emergency Response Organization Positional Responsibilities

The Emergency Plan designates two types of augmented ERO responders.

Those designated as Minimum Staff are those key ERO needed to relieve the on-shift staff of key EP functions/tasks required in response to the Emergency and are those required to activate their respective Emergency Response Facility (ERF). Specifically, these are the ERO that are the absolute minimum needed to implement the emergency plan (i.e., if any position or function is not staffed then the emergency plan may not be effectively implemented). These positions in most cases are required to respond to their respective ERF within 60 minutes of the declaration of an Alert or higher classification. See Appendix 5, Table 5-1 for the list of On-shift and Minimum Staff positions.

The positions which are considered Full Augmented staff (i.e., non-minimum staff) are those positions which provide support for the minimum staff in their response to the Emergency. The Full Augmentation positions consist mostly of liaisons, coordinators and additional communicators which help facilitate communication and the emergency response effort over time but are not directly needed to implement the functions/tasks identified in the Emergency Plan.

ERO staffing tables contained within this Emergency Plan outline ERO positions required to meet minimum staffing of the on-shift complement at an Alert or higher classification, and the major tasks assigned to each position. The full augmentation staffing levels described in Emergency Preparedness Implementing Procedures (EPIPs). For extended events (ones which last for more than 24 hours), actual staffing will be established by the Emergency Director based on the event and personnel availability. However, additional staffing or reduced staffing will only occur after discussion concerning the impact on plant operations and emergency response.

In addition to maintaining adequate documentation of the event, responsibilities for each position are as follows:

a. Station Emergency Response Organization: The Station ERO is the onsite group that is activated during an emergency. It functions under the Station Emergency Director, who is responsible for organizing and coordinating the emergency efforts at and within the immediate vicinity of the station (including carrying out all onsite emergency efforts and the initial offsite environs monitoring efforts necessary to assess plant releases).

   The Station ERO consists of station personnel who are involved with emergency response efforts necessary to control the plant during an incident. This organization operates out of the Control Room, the Technical Support Center (TSC) and the Operations Support Center (OSC). Collectively, members of the Station ERO provide for the following activities during an emergency:

   - Plant systems operations
   - Radiological survey and monitoring (including Environs Monitoring)
   - Firefighting
   - Rescue operations and First Aid

- Decontamination
- Security of plant and access control
- Repair and damage control
- Personnel protection including Assembly, Accountability and Evacuation
- Communications

1) Shift Manager (Shift Emergency Director) Control Room

A Shift Manager is on duty 24 hours a day and is the Shift Emergency Director in a declared emergency until relieved of this function. While serving in this capacity the Shift Manager is responsible for:

- Activating the ERO (as deemed appropriate or as procedurally required).

- Performing those duties outlined in Section B.5.a.2 for the Station Emergency Director. The on-duty Shift Manager directs the activities of the operating crew and is responsible for the safe operation of the plant in compliance with the station NRC operating license and the station operating procedures. The Shift Manager, after relinquishing Command and Control, functionally reports to the Operations Manager in the TSC.

  The Shift Manager's responsibilities, when not in Command and Control, are described below:

  - The authority and responsibility to shut down the reactor when determined that the safety of the reactor is in jeopardy or when operating parameters exceed any of the reactor protection circuit set-points and automatic shutdown does not occur.

  - To ensure a review has been completed to determine the circumstance, cause, and limits under which operations can safely proceed before the reactor is returned to power following a trip or an unscheduled or unexplained power reduction.

  - The responsibility to be present at the plant and to provide direction for returning the reactor to power following a trip or an unscheduled or unexplained power reduction.

  - The responsibility to adhere to the station Technical Specifications and to review routine operating data to assure safe operation.

  - The responsibility to identify applicable EALs and emergency classifications; and

- The responsibility to adhere to plant operating procedures and the requirements for their use. During an emergency, operations personnel may depart from approved procedures where necessary to prevent injury to personnel, including the public, or damage to the facility consistent with the requirements of 10 CFR 50.54(x) and (y).

- Supervise the activities of the Control Room Crew.

2) Station Emergency Director TSC

The Station Emergency Director reports to the Corporate Emergency Director and supervises and directs the Station ERO. The Station Emergency Director's responsibilities include organizing and coordinating the onsite emergency efforts. Additionally, the Station Emergency Director has the requisite authority, plant operating experience and qualifications to implement in-plant recovery operations.

a) Station Emergency Director Responsibilities while in Command and Control:

- Activate the facility.

- Conduct personnel assembly/accountability and evacuation of non-essential personnel at Site Area Emergency, General Emergency or as conditions warrant.

- If the emergency involves a hazardous substance and/or oil discharges, ensure that appropriate notifications and responses have been made.

- Determine if the OSC is to remain activated at the Alert Classification.

- Event classification.

- Emergency exposure controls.

- Protective actions for all onsite personnel.

- Supervision of the Station ERO.

- Inform the Corporate Emergency Director and onsite NRC as to the status of the plant.

- Assist the Corporate Emergency Director in the acquisition of information for the state/local notifications, NRC notifications and offsite agency updates.

- Provide information and recommendations to the Corporate Emergency Director.

- Implement plans, procedures and schedules to meet emergency response objectives as directed by the Corporate Emergency Director.
- Request from the Corporate ERO any additional material, personnel resources or equipment needed to implement response plans and operations.

3) ENS Communicators CR/TSC

Responsibilities assigned to all the ENS Communicators include:

- Establish communications with appropriate parties as directed.
- Transmit information that has been reviewed and/or approved by the responsible Manager or Coordinator.
- Document time, date and information being transmitted or received on appropriate forms.
- Record and relay inquiries and the responses to those inquiries.
- Assist appropriate Managers and Coordinators in maintaining proper records and logs of emergency related activities.
- Gather, record, and post appropriate information.
- Notify the NRC of changes in event classification, , and assist in completing the NRC Event Notification Worksheet and responding to NRC inquiries.
- Provide real time updates of significant changes to plant and system status and responses to NRC inquiries.
- Maintain continuous communications with the NRC, if requested, via the NRC ENS phone or commercial telephone line.

4) Operations Manager TSC

The Operations Manager reports to the Station Emergency Director. Major functions include determining the extent of station emergencies, initiating corrective actions, and implementing protective actions for onsite personnel. In the event that the Station Emergency Director becomes incapacitated and can no longer fulfill the designated responsibilities, the Operations Manager will normally assume the responsibilities until relieved by another qualified Station Emergency Director. Responsibilities include:

- Coordinate TSC efforts in determining the nature and extent of emergencies pertaining to equipment and plant facilities in support of Control Room actions.

- Initiate immediate corrective actions to limit or contain the emergency invoking the provisions of 10 CFR 50.54(x) if appropriate.
- Recommend equipment operations checks and miscellaneous actions to the Control Room in support of restoration and accident mitigation.
- Approve emergency special procedures, and implement as required under the provisions of 10 CFR 50.54(x).
- Assist in determining the priority assigned to OSC activities.
- Organize and direct medical response efforts for injured personnel.
- Ensure adequate staffing of the Control Room and TSC subordinates.
- Ensure the Shift Manager is informed of OSC staffing utilization and activities.
- Identify steps or procedures that the Operations staff should be utilizing to properly respond to the emergency condition.
- Assist the Station Emergency Director in evaluating changes in event classification.
- Supervise the activities of the ENS Communicator in the TSC.
- Act as the TSC liaison with the appropriate NRC Site Team Representative.

5) Technical Support Staff TSC

The TSC Technical Support Staff consists of the following minimum staff engineering positions:

– Electrical Engineer
– Mechanical Engineer
– Core/Thermal Hydraulic Engineer - serves as Core Damage Assessment Methodology (CDAM) Evaluator, as applicable.

In addition, station Engineering support will be augmented on an as needed basis to support accident assessment and mitigation activities.

6) Radiation Protection Manager (RPM) TSC

The Radiation Protection Manager reports to the Station Emergency Director The TSC RPM directs a staff in determining the extent and nature of radiological or hazardous material problems onsite. Responsibilities include:

- Accumulate, tabulate, and evaluate data on plant conditions such as meteorological and radiological monitoring readings, and other pertinent data.
- Act as the TSC liaison with the appropriate NRC Site Team representative.
- Ensure use of protective clothing, respiratory protection, and access control within the plant as deemed appropriate to control personnel exposures.
- Ensure that appropriate bioassay procedures have been implemented for onsite personnel when a radioactivity incident has occurred.
- Ensure that personnel are decontaminated, if necessary.
- Authorize personnel exposures below 5 Rem TEDE (EPA-400 lower limit).
- Assist the Station Emergency Director in determining if exposures in excess of the 5 Rem TEDE (EPA-400 lower limit) are necessary.
- Advise the Station Emergency Director of situations when the use of KI should be considered.
- Advise the Station Emergency Director and EOF Radiation Protection Manager of changes in radiological release status.
- Assist the Operations Manager in planning rescue operations and provide monitoring services as required, including the transfer of injured and/or contaminated personnel.
- Coordinate with the Security Coordinator to determine the routes to be used for evacuation of non-essential personnel.
- Assure additional radiation protection personnel and/or equipment is arranged for, as necessary.

7) Security Coordinator TSC

The Security Coordinator reports to the Station Emergency Director and maintains plant security and personnel accountability at the nuclear station. Responsibilities include:

- Maintain plant security and account for all personnel within the protected area.

- Assist the Station Emergency Director in evaluating changes in security related threats and event classifications.
- Identify any non-routine security procedures and/or contingencies that are in effect or that require a response.
- Expedite ingress and egress of emergency response personnel.
- Coordinate with the Radiation Protection Manager in controlling ingress and egress to and from the Protected Area if radiological concerns are present.
- Provide for access control to the Control Room, TSC and OSC, as appropriate.
- Expedite entry into the Protected Area, as necessary, for the NRC Site Team.
- Act as the TSC liaison with the appropriate NRC Site Team representative.
- Assist the Radiation Protection Manager in determining personnel evacuation routes as necessary.
- Coordinate the evacuation of station non-essential personnel with the appropriate Local Law Enforcement Agencies (LLEAs).

8) Operations Support Center Director OSC

The OSC Director reports to the Emergency Director and supervises the activities of OSC personnel. Responsibilities include:

- Assign tasks to designated Leads as available:
  - I&C Maintenance
  - Mechanical Maintenance
  - Electrical Maintenance
  - Radiation Protection
- Coordinate with the OSC Operations Lead in the dispatch of Operations personnel to support Control Room and OSC Team activities.
- Notify the Control Room and TSC prior to dispatch of any OSC teams into the plant.
- Maintain OSC resources including personnel, material, and equipment.

- Maintain accountability for all individuals dispatched from the OSC.
- Conduct periodic briefings on the overall plant status, emergency response activities, and station priorities.
- Assemble and dispatch the Field Monitoring Teams as required.

9) OSC Leads OSC

OSC Leads report to the OSC Director and are assigned from the following station departments:

- Mechanical Maintenance
- Electrical
- Instrument and Control
- Radiation Protection

The OSC Lead assigned to an OSC team is responsible at all times for the safety of team personnel and to keep the OSC Director apprised of team status. Specifically, the OSC Leads are responsible for the managing and supervising OSC team personnel, including:

- Conduct of adequate pre-dispatch briefings.
- Ensuring adequate protective equipment and measures have been identified.
- Tracking of OSC team activities while dispatched.
- Debriefing of team personnel upon return to the OSC.

b. Corporate Emergency Response Organization

1) Corporate Emergency Director EOF

a) The ongoing responsibilities include:

- Coordinate all Constellation Nuclear activities involved with the emergency response.
- Ensure off-site agency updates are periodically communicated as required/requested.
- Coordinate Constellation Nuclear press releases with the Nuclear Duty Officer and Constellation Communications and Public Affairs.
- Request assistance from non-Constellation Nuclear emergency response organizations, as necessary.

- Direct and coordinate the activation of the EOF.

b) Following assumption of Command and Control, the additional responsibilities assigned to the Corporate Emergency Director include:

- Assume overall Command and Control of emergency response activities and the non-delegable responsibilities for PAR determination and the notification of offsite authorities.

- Ensure that Federal, state and local authorities and industry support agencies remain cognizant of the status of the emergency situation. If requested, dispatch informed individuals to offsite governmental Emergency Operation Centers (EOCs).

- Approve the technical content of Constellation Nuclear press releases prior to their being released to the media.

2) Radiation Protection Manager EOF

The Radiation Protection Manager directs the activities of the EOF Radiation Protection staff. Specific responsibilities include:

- Recommend changes in event classification and PARs based upon effluent releases or dose projections.
- Assist the Corporate Emergency Director in the evaluation of the significance of an emergency with respect to the public.
- Notify the Corporate Emergency Director of meteorological changes that may impact identification of downwind areas.
- Advise the Corporate Emergency Director of protective actions taken by the station for plant personnel.
- Assist the TSC in the planning and coordination of activities associated with the evacuation of non-essential personnel.
- Advise the Corporate Emergency Director on the need for emergency exposures or for issuance of KI to the Field Monitoring Teams or Constellation personnel required to enter the plume.
- Determine the need for and contact Occupational Health/Industrial Safety Services personnel for assistance.
- Monitor plant radiological conditions and advise the TSC Radiation Protection Manager of any adverse trends or potential release pathways that may impact existing event classification.
- Assist in the completion and review of the state/local notification form.
- Maintain cognizance of environmental sampling activities.
- Ensure state authorities are provided information pertaining to Constellation Field Monitoring Team activities and sample results.
- Assist the affected station in the following areas:
  - Planning and coordination of activities associated with the evacuation of non-essential personnel.
  - Acquisition of additional instrumentation, dosimetry, protective equipment and radiological support personnel.
- Assist and interface with the EOF Technical Support Group and the station in the development of plans for plant surveys, sampling, shielding, and special tools in support of waste systems processing and design modification activities.

- Upon request, provide in-plant health physics data to Emergency Public Information personnel.
- Coordinate Field Monitoring Team Activities.
- Determine needs of the Dose Assessment Coordinator and the Environmental Coordinator for updates on Field Monitoring Team data and ensure distribution of new data to them in accordance with those needs.
- Promptly report new environmental or Field Monitoring Team exposure data to the Dose Assessment Coordinator.

3) Dose Assessment Coordinator EOF

The Dose Assessment Coordinator reports to the EOF Radiation Protection Manager. Responsibilities include:

- Interpret radiological data and provide PARs based upon dose projections to the EOF Radiation Protection Manager.
- Advise the EOF Radiation Protection Manager of changes in event classification based on effluent releases or dose projections.
- Initiate evaluation of the need for administering KI to Constellation nuclear workers.
- Remain cognizant of forecast and meteorological data and ensure the status is updated periodically.
- Notify the EOF Radiation Protection Manager of meteorological changes that may impact identification of downwind areas.
- Upon request, provide release and dose assessment data to Emergency Public Information personnel.
- Perform dose projections using the Dose Assessment computer models
- Monitor meteorological and plant effluent conditions.
- Evaluate the need for administering KI to Constellation nuclear workers.

4) Computer Specialist EOF

The Computer Specialist reports to the Emergency Director. Responsibilities include:

- Assist any personnel in logging in, initializing or using a desired computer program.

- Investigate and repair problems encountered with communications equipment and computer equipment/applications.

5) State/Local Communicator EOF

The State/Local Communicator reports to the Corporate Emergency Director. Responsibilities include:

- Communicate and receive information via the Nuclear Accident Reporting System (NARS) circuit or commercial telephone line with appropriate state and county agencies.

c. Public Information Emergency Response Organization

1) Corporate Spokesperson JIC

The Corporate Spokesperson reports to the Corporate Emergency Director and is responsible for directing the Constellation Emergency Public Information Organization and providing news information to the media. Responsibilities include:

- Maintain command and control of the Joint Information Center.
- Coordinate with Federal, state and local agencies, as well as with other organizations involved in the emergency response, to maintain factual consistency of information to be conveyed to the news media/public.
- Conduct periodic briefings with the news media.
- Interface with the Public Information Director.
- Coordinate and direct responses to media inquiries.
- Ensure that the composition and timeliness of Constellation News Releases are adequate.
- Provide for timely exchange of information between other spokespersons.

2) JIC Director JIC

The JIC Director reports the Corporate Spokesperson to ensure the operability of and to supervise the activities in the JIC. Responsibilities include:

- Maintain cognizance of conditions of the plant and environment, and the actions of Constellation Nuclear and governmental support personnel.

- Coordinate with Federal, state and local agencies, as well as with other organizations involved in the emergency response, to maintain factual consistency of information to be conveyed to the news media/public.
- Participate, as needed, in rumor control activities.
- Ensure that adequate information flow between the EOF and the JIC is coordinated through the Public Information Director.
- Authorize admittance of non-Constellation Nuclear officials to the JIC.
- Until the JIC is fully staffed, work with Corporate Communications to compose draft news releases.
- Provide the drafted news releases to the Corporate Emergency Director for technical review prior to Public Information Director approval.
- Until the JIC is fully staffed, work with Corporate Communications to ensure that rumors are reviewed, documented and responded to by Constellation Nuclear personnel as deemed appropriate.
- Until the JIC is fully staffed, work with Corporate Communications to document and respond to rumors as quickly as possible, through the Constellation Communications and Public Affairs.
- Until the JIC is fully staffed, work with Corporate Communications to ensure that the media is being monitored and that Constellation Nuclear personnel review the information detailed or contained in media releases.

3) Public Information Director (PID) JIC

When the Emergency Public Information Organization is activated, the Public Information Director reports to the Corporate Spokesperson and is responsible for all emergency event related information intended to be conveyed from Constellation Nuclear to the news media/public. The Public Information Director may perform this function at remote locations. Responsibilities include:

- Provide the Corporate Emergency Director with an overview of the public and media impacts resulting from the Constellation Nuclear and governmental activities.
- Participate with the Corporate Emergency Director regarding information to be released to the public.

- Authorize the issuance of news releases.
- Interface with the Corporate Spokesperson at the JIC.
- Act as a liaison between the ERO and Constellation Nuclear's corporate executives.
- Maintain cognizance of conditions of the plant and environment, and the actions of Constellation Nuclear and governmental support personnel.
- Coordinate information flow between the EOF and the JIC.
- Review and access media coverage of the emergency event.

6. Crane Clean Energy Center Emergency Response Organization Block Diagram

ERO staffing tables contained within the Emergency Plan in Appendix 5, list the key positions of the ERO. Figures CRANE B-1a through CRANE B-1d illustrate the overall emergency response organization. Section B.5 discusses specific responsibilities and the interrelationships for key positions.

7. Constellation Corporate Emergency Response Organization

The Corporate ERO consists of the EOF Organization and the Emergency Public Information Organization. Personnel staffing these corporate organizations are covered in detail in Section B.5 of this plan.

The Corporate Emergency Response Organization is staffed by Constellation personnel, and operates out of the Emergency Operations Facility (EOF) and the Joint Information Center (JIC). The Corporate ERO is supported by News Media Spokespersons, environmental assessment staff and monitoring teams that provide long-term support to the affected station. Additionally, the Corporate ERO has long term liaison responsibilities with federal, state, and local authorities. These positions are further described in the EPIPs.

The Emergency News Center (ENC) function is responsible for the collection and analysis of event information and status, and development of Company news statements. This information is then communicated to the JIC Spokespersons. The ENC function may be located at either the EOF or the JIC.

The EOF is activated at an Alert. The EOF Organization is responsible for evaluating, coordinating and directing the overall company activities involved in the emergency response. Within the EOF, the Corporate Emergency Director shall assume Command and Control from the Shift Emergency Director when classification escalates to an Alert or higher, unless the EOF capabilities are limited such that the overall control and responsibility for PARs and offsite notifications cannot be assumed. The EOF may also function in a supporting role to the station when the Station Emergency Director maintains Command and Control. The JIC is activated within 90 minutes of an Alert or higher. Some JIC functions may continue to be performed by the Constellation Communications organization until transferred to the JIC.

8. Industry/Private Support Organizations

Constellation Nuclear retains contractors to provide supporting services to nuclear generating stations. A contract/purchase order with a private contractor is acceptable in lieu of an agreement letter for the specified duration of the contract. Among services currently provided are the following:

a. Institute of Nuclear Power Operations (INPO): Experience has shown that a utility may need resources beyond in-house capabilities for the recovery from a nuclear plant emergency. One of the roles of the Institute of Nuclear Power Operations (INPO) is to assist affected utilities by quickly applying the resources of the nuclear industry to meet the needs of an emergency. INPO has an emergency response plan that enables it to provide the following emergency support functions:

- Assistance to the affected utility in locating sources of emergency personnel, equipment and operational analysis.
- INPO, Electric Power Research Institute (EPRI) and Nuclear Energy Institute (NEI) maintain a coordination agreement on emergency information with their member utilities.
- INPO provides the "Nuclear Network", or its replacement, electronic communications system to its members, participants, NEI, and EPRI to coordinate the flow of media and technical information about the emergency.
- Constellation Nuclear may obtain utility industry information and assistance from any party to this agreement through the coordination of INPO.

To support these functions, INPO maintains the following emergency support capabilities:

- A dedicated emergency call number.
- Designated INPO representative(s) who can be quickly dispatched to the utility emergency response organization to coordinate INPO support activities and information flow.

- The 24-hour per day operation of an Emergency Response Center at INPO headquarters.

Constellation Nuclear will notify INPO (via the designated emergency call number) for all situations involving an Alert, Site Area Emergency, or General Emergency declaration per the Constellation Nuclear Reportability Manual.

INPO has coordinated the preparation of a Voluntary Assistance Agreement for Transportation Accidents. Constellation Nuclear has signed this agreement which establishes the rights and responsibilities of electric utilities in requesting or providing assistance for response to a nuclear materials Transportation Accident.

b. American Nuclear Insurers (ANI): In early 1982, ANI issued Bulletin #5B (1981) "Accident Notification Procedures for Liability Insurers" which provides revised criteria for the notification of the Pools in the event of a nuclear emergency at one of the liability insured nuclear power reactor sites. This revision brings the ANI/MAELU (Mutual Atomic Energy Liability Underwriters) notification criteria into alignment with the standard emergency classification system adopted by the nuclear industry. This document also identifies a suitable channel for follow-up communication by ANI after initial notification.

- ANI/MAELU Emergency Assistance: In the event of an extraordinary nuclear occurrence (as defined in the Price-Anderson Law) ANI and MAELU (the insurance pools) have plans prepared to provide prompt emergency funding to affected members of the public.

- ANI/MAELU Emergency Assistance (Claims Handling Procedures): The pools' emergency assistance arrangements contemplate the mobilization and dispatch of emergency claims teams to directly dispense emergency assistance funds to affected members of the public.

  The pools should be notified in the event of a nuclear emergency requiring notification of state or Federal governmental agencies, or if the insured believes that offsite persons may be affected and financial assistance of a nature discussed may be required. In these instances, ANI expects notification as soon as possible after the initiation of the emergency. Constellation notification to the pools in the event of an Alert, Site Area Emergency, or General Emergency will be in accordance with the Constellation Nuclear Reportability Manual.

  Even if it appears to be remote that offsite persons will be affected, the pools should be notified in order that response plans can be initiated to the point of alerting teams of adjusters to stand by. Response activity can be discontinued if it proves less severe and does not require pool response.

  All nuclear occurrences of an emergency or non-emergency nature that fall under the nuclear liability policy should be reported formally in writing to ANI by the Constellation Nuclear Insurance Administrator.

- Emergency Notification and Follow-up Procedures: Pre-established lines of communication exist between each utility and ANI in order to exchange all required information during a developing emergency situation.

  ANI Bulletin 11-01, "Revised Emergency Notification Procedures for ANI Policyholders", has four specific instances which require notification to ANI. They generally include 1) Notification of A Facility Nuclear Incident, 2) Notification of a Transportation Incident Involving Radioactive Materials, 3) Notification of a Drill or Test of the ANI Emergency Number, and 4) Continued Incident Reporting.

  ANI maintains 24-hour coverage of an emergency notification number. ANI's emergency notification call center is fully automated with no hold times for reporting a nuclear incident, a transportation event, a facility drill, or a test of the ANI emergency contact. The ANI emergency response contact number has not changed and continues to be: (877) 680-2644. The contact number is monitored 24 hours a day, 7 days a week, 365 days a year. Emergency response procedures and records must include this number.

  In addition to ANI emergency response telephone contact, the insured must include ANI on copies of all e-mail data and/or written facsimile emergency notifications that are required and sent to State and Federal authorities. Email data should be delivered to ANI.ER@amnucins.com. The ANI facsimile number is: (860)-659-0002

  In order that follow-up information is available to the Insurance Pool Constellation Nuclear has established the Corporate Emergency Director or their designee as a Point of Contact that ANI personnel may use to update themselves regarding the status of the emergency.

NOTE: For the below listed support services, the specific contractors may change but the functions are maintained.

c. Environmental Monitoring Services:

Environmental Inc.: Environmental Inc. provides emergency Radiological Environmental Monitoring Program (REMP) services. These services include:

- Sample collection
- Handling, packaging and storage of test samples
- Sample shipment
- Chain of Custody

The Environmental Inc. Midwest Laboratory in Northbrook, Illinois analyzes environmental samples for their radioactivity content and reports results to Constellation Nuclear. The REMP sample collection activities at certain Mid-Atlantic and Northeast stations have been subcontracted to Constellation Industrial Services (also referred to as Fort Smallwood) while others are performed by station personnel.

d. Teledyne Brown Engineering: Teledyne Brown Engineering provides bioassay analysis and radiochemical analysis services.

e. Department Of Energy (DOE) Radiation Emergency Assistance Center/Training Site (REAC/TS): DOE REAC/TS provides services of medical and health physics support. REAC/TS advises on the health physics aspects of situations requiring medical assistance.

f. Murray and Trettel, Inc.: Murray and Trettel, Inc. provide meteorological monitoring services, including weather forecasts. Murray and Trettel maintain all Constellation Nuclear station meteorological facilities. Murray and Trettel have computer capability to poll remotely the meteorological facilities to ascertain local conditions and to detect instrument failure.

g. Landauer, Inc.: Landauer provides extremity dosimetry services. In an emergency Landauer would provide additional dosimetry to the affected nuclear station and EOF, if needed.

h. Manufacturer Design and Engineering Support: Under established contracts, the following will provide available engineering expertise, specialized equipment and other services identified as needed and deemed appropriate to assist in an emergency situation:

- General Electric (GE) Nuclear Energy
- Westinghouse Electric Company
- Framatome Inc.

9. Supplemental Emergency Assistance to the ERO

Agreements are maintained with outside support agencies who do not take part in the organizational control of the emergency that provide assistance when called on during an emergency or during the recovery phase. These agreements identify the emergency measures to be provided, the mutually accepted criteria for implementation, and the arrangements for exchange of information. These support agencies (named in the Station Annex) provide services of:

a. Law enforcement;

b. Fire protection;

c. Ambulance services;

d. Medical and hospital support

Support groups providing transportation and treatment of injured station personnel are described in Section L of this plan.

Figure CRANE B-1a: Constellation Overall ERO Command Structure

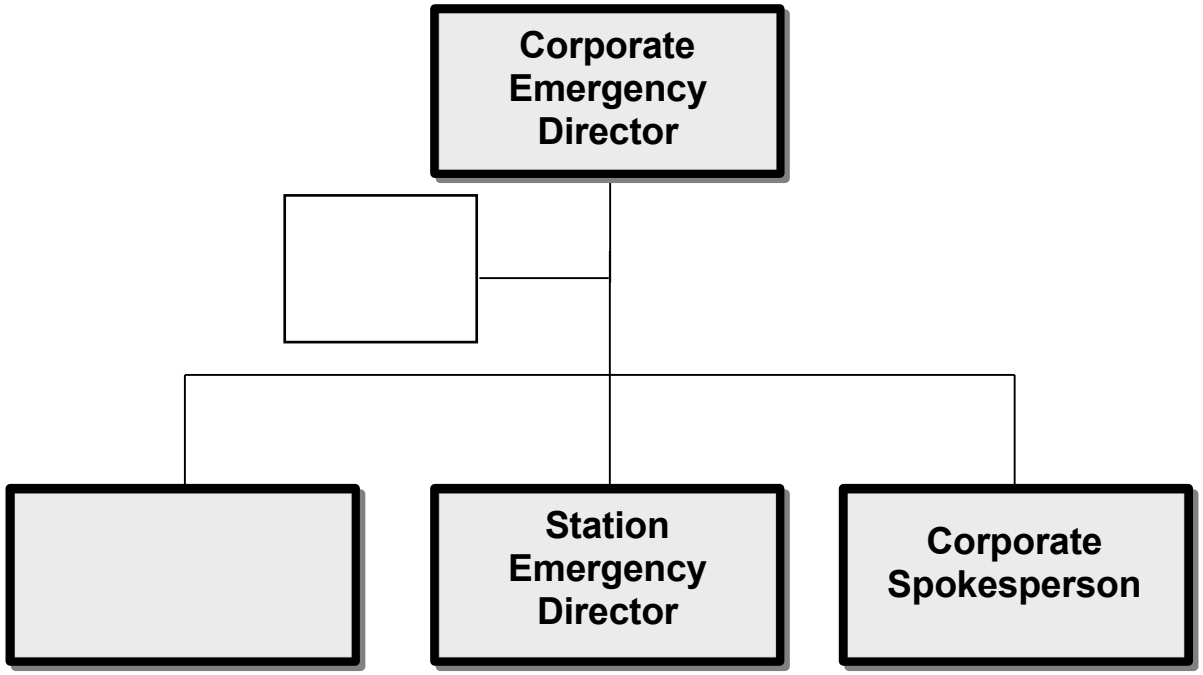
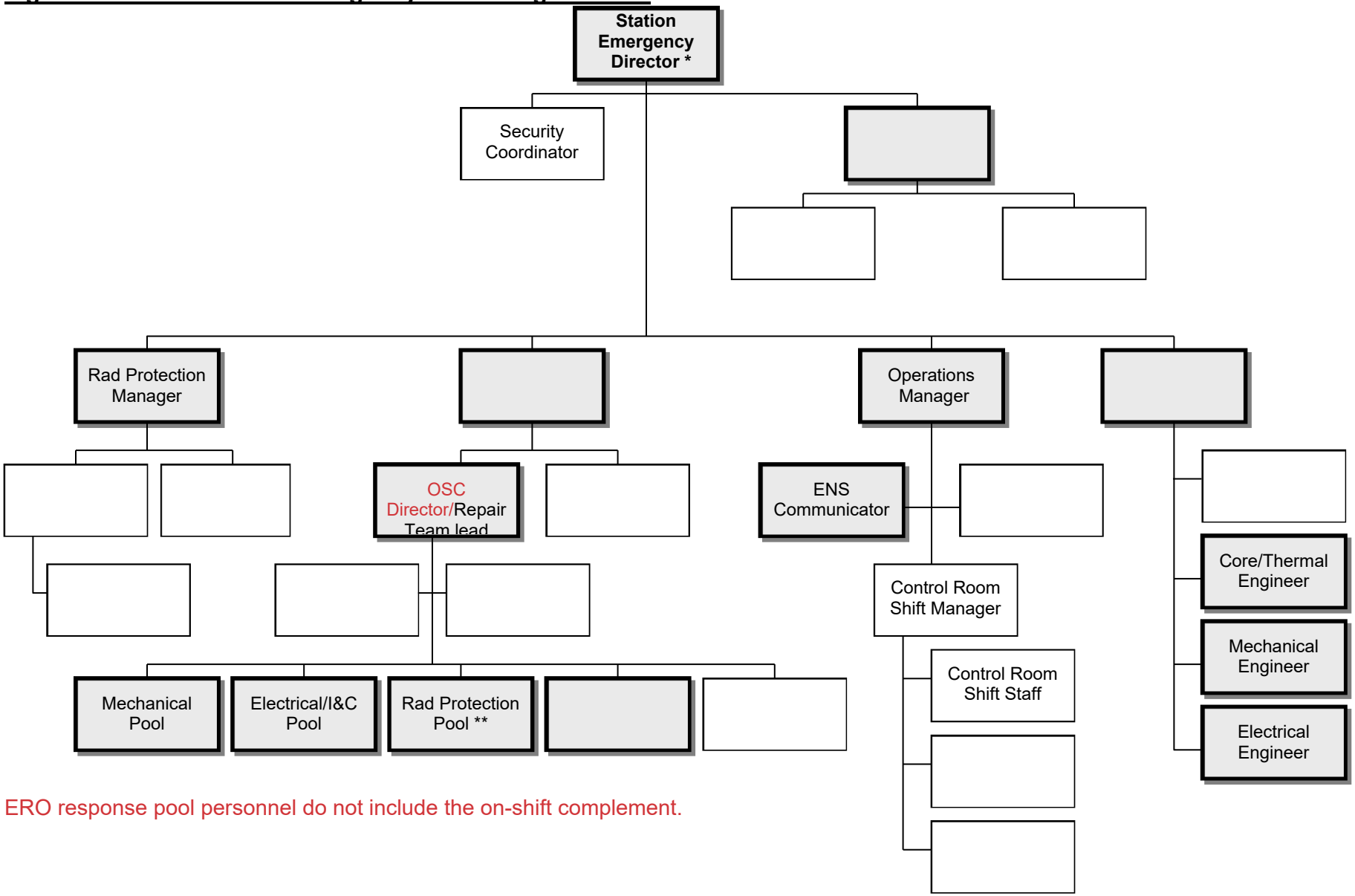

Corporate Emergency Director
Station Emergency Director
Corporate Spokesperson

Figure CRANE B-1b: Emergency Onsite Organization



ERO response pool personnel do not include the on-shift complement.

Figure CRANE B-1c: Emergency Offsite Organization

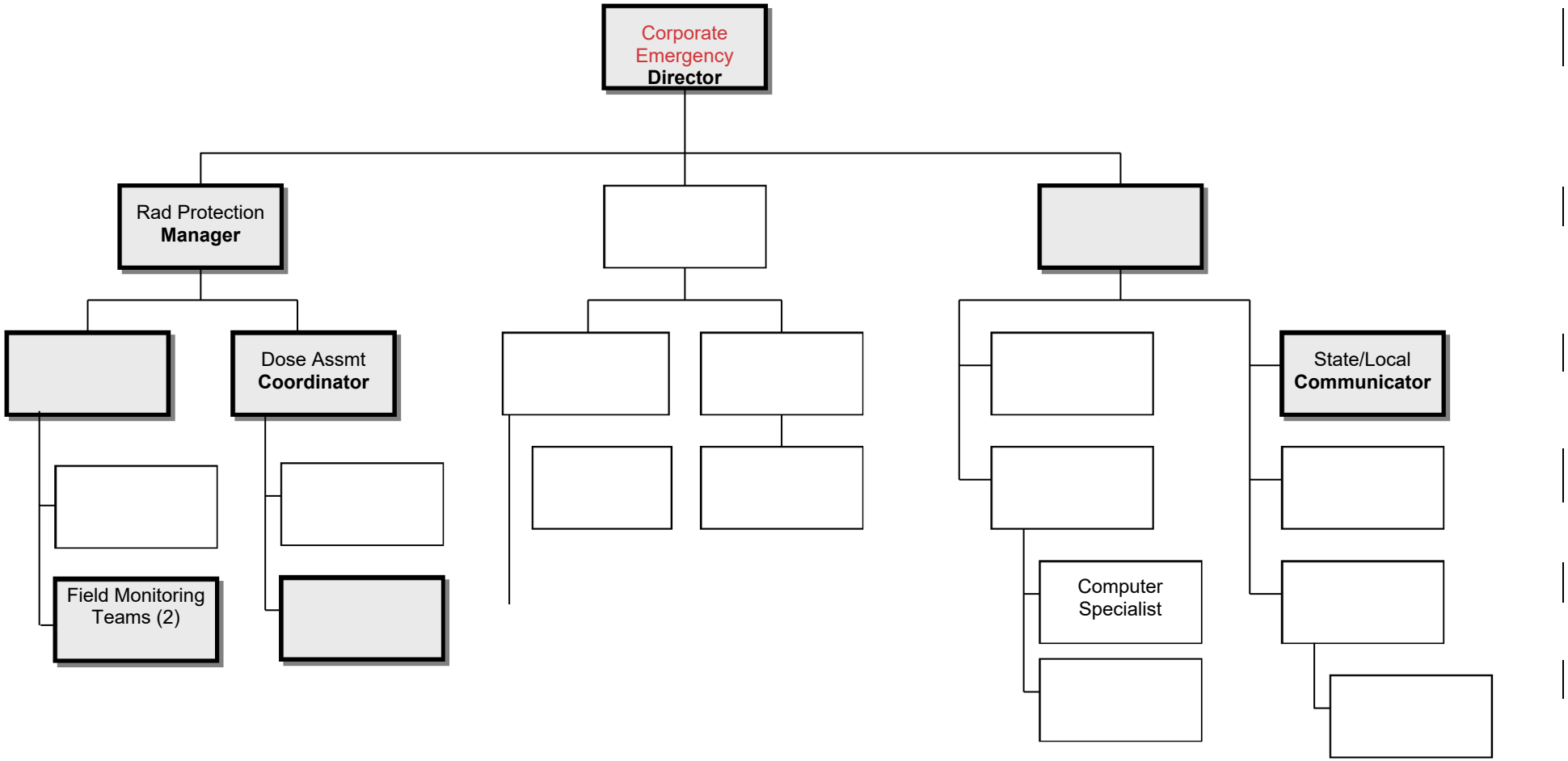
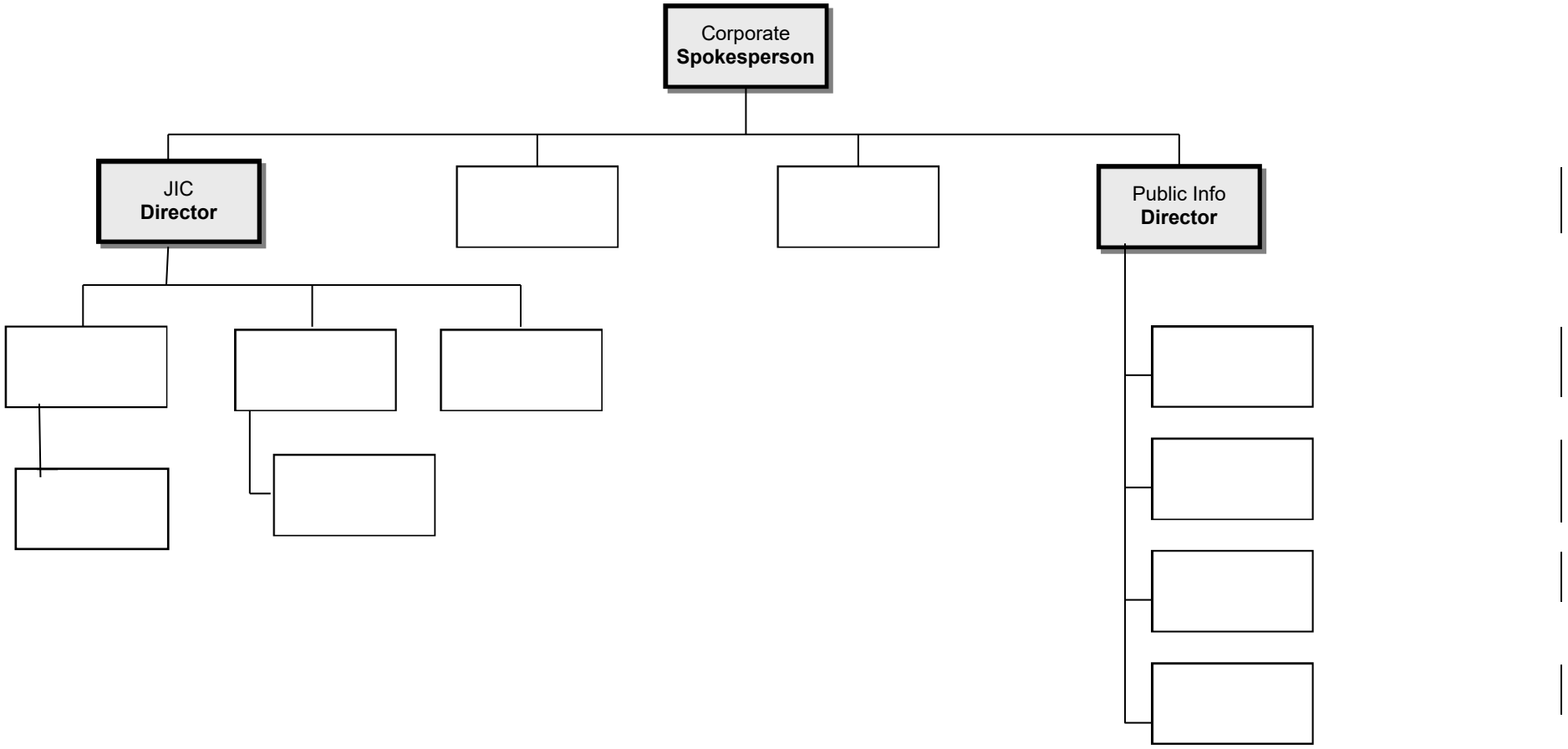


Figure CRANE B-1d: Emergency Public Information Organization



Section C: Emergency Response Support and Resources

This section describes the provisions for requesting and effectively utilizing support resources and for accommodating offsite officials at the Constellation Nuclear emergency response facilities.

1. Federal Response Support and Resources

Assistance is available from federal agencies through the National Response Framework (NRF). The lead federal agency who provides direct assistance to Constellation during an emergency is the Nuclear Regulatory Commission (NRC). Other federal agencies, such as the Federal Emergency Management Agency (FEMA) and the Department of Energy (DOE), provide assistance to the state through implementation of the NRF.

a. Sections A and B of this plan identify the specific individuals by title who are authorized to request federal assistance.

b. Federal agencies that may provide assistance in direct support of Constellation Nuclear in the event of an accident are identified in Section A of this plan. If needed, federal resources are made available to Constellation Nuclear in an expeditious and timely manner.

c. Each emergency response facility has the equipment and communications capability necessary for a continuous high level of response, interaction, and communication among key personnel during emergency conditions. The emergency facilities are able to accommodate federal representatives with working areas provided for their use. Accommodations for the expected NRC site response team assume the following approximate numbers for each facility:

	Initial Activation (minimum)	Full Activation
EOF	9	16
TSC	3	5
CR	1	1
JIC	1	10

The Constellation Emergency Response Organization will provide senior management support for site response teams and communications over a Management Counterpart Link to federal response headquarters.

2. Liaisons

a. The NRC, FEMA, and the state may dispatch representatives to the EOF where accommodations have been provided.

b. At the Alert level and above, Constellation Nuclear personnel may be assigned as liaisons to the requesting state and/or county Emergency Operations Center (EOC). These representatives act as technical liaisons to interpret emergency action levels and protective action recommendations made by Constellation.

3. Radiological Laboratories

Support of the radiation monitoring and analysis effort is provided by an onsite laboratory. The onsite laboratory is the central point for receipt and analysis of all onsite samples and includes equipment for chemical analyses and for the analysis of radioactivity. Additional facilities for counting and analyzing samples can be provided by the other Constellation Nuclear generating stations, state, federal or contracted laboratory services. These laboratories can act as backup facilities in the event that the plant's counting room and laboratory become unusable or the offsite radiological monitoring and environmental sampling operation exceeds the capacity or capability of the station laboratory during an emergency. Additional outside analytical assistance may be requested from contracted vendors or state and federal agencies. The equipment and analytical capabilities for Crane laboratories are listed in the Station Annex. The state, federal and contract laboratories maintain independent evaluation and certification processes and have the capability of quantitative analysis of terrestrial, marine and air samples.

4. Other Assistance

Any unaffected Constellation Nuclear Generating station is available to provide certain types of assistance and support, including engineering, design, consultation, whole body counting, and dosimetry evaluation and equipment. Additional facilities, organizations, and individuals, as listed in the Emergency Response Facilities (ERF) Telephone Directory, are available and may be used in support of emergency response. In addition, American Nuclear Insurers (ANI) provides insurance to cover Constellation legal liability up to the limits imposed by the Price-Anderson Act, for bodily injury and/or property damage caused by the nuclear energy hazard resulting from an incident at the plant. Written agreements which describe the level of assistance and resources provided to Constellation Nuclear by external sources are included in Appendix 3 as applicable.

Section D: Emergency Classification System

This section describes the classification and emergency action level scheme used to determine the minimum response to an abnormal event. This scheme is based on plant systems, effluent parameters, and operating procedures. The initial response of federal, state, and county agencies is dependent upon information provided by the ERO. Constellation works closely with the state and county agencies to ensure consistency in classification schemes and procedural interfaces.

1. Emergency Classification System

The Emergency Plan provides for classification of emergencies into five (5) categories or conditions, covering the postulated spectrum of emergency situations. The first four (4) categories: Notification of Unusual Event (referred to as Unusual Event), Alert, Site Area Emergency, and General Emergency, are characterized by Emergency Action Levels (EALs) or event initiating conditions and address emergencies of increasing severity. The fifth, the Recovery classification, is unique in that it may be viewed as a phase of the emergency requiring specific criteria to be met and/or considered prior to its declaration. Recovery is that period when the emergency phase is over and activities are in progress to return the situation to a normal state (acceptable condition).

a. Unusual Event - Events are in process 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.

   This is the least severe of the four (4) levels. The purpose of this classification is to bring response personnel and offsite agencies to a state of readiness in the event the situation degrades and to provide systematic handling of information and decision making. The Shift Manager, as Shift Emergency Director will classify an Unusual Event.

   Required actions at this classification include:

   - Notifications to station management and the NDO.
   - Notification, within 15 minutes, of the state and local communities.
   - At the discretion of the Emergency Director, station management or the Nuclear Duty Officer (NDO), full or selective staffing of the TSC, OSC, and EOF may be initiated.
   - Notification of the NRC immediately after notification of the appropriate State and local agencies and not later than 60 minutes of classification.
   - Assessment of the situation and response as necessary, which may include escalating to a higher classification if conditions warrant.

- When the event is terminated, close-out is performed over communication links to offsite authorities participating in the response (i.e., NRC, state, county), followed by formal transmission of a state/local notification form within 24 hours.

b. Alert - Events are in process or have occurred which indicate 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 EPA Protective Action Guideline exposure levels.

The purpose of this classification is to ensure that emergency response personnel are readily available and to provide offsite authorities with current status information. An Alert will be classified as the initiating event or as escalation from an Unusual Event. In either case, the classification will most likely be made by the Shift Manager (Shift Emergency Director) prior to the transfer of Command and Control.

Required actions at this classification include:

- Notifications to station management and the NDO.
- Notification, within 15 minutes, of the state and local communities. The EOF will assume state update responsibilities.
- Activation of the TSC, OSC, EOF, and the JIC organizations.
- Transfer of Command and Control.
- Notification of the NRC immediately after notification of the appropriate State and local agencies and not later than 60 minutes of classification.
- Notification of ANI.
- Assessment of the situation and response as necessary, which may include escalating to a higher classification if conditions warrant.
- On-site and off-site Field Monitoring Teams are sent to staging areas or dispatched to monitor for releases of radiation to the environment.
- Keeping offsite authorities informed of plant status by providing periodic updates to include meteorological and radiological data.
- When the event is terminated, notification is performed over communication links followed by an Initial Incident Report to offsite authorities participating in the response (i.e., NRC, state, county) within 8 hours.

c. Site Area Emergency - Events are in process 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 Protective Action Guideline exposure levels beyond the site boundary.

The purpose of this classification, in addition to those of the Alert level, is to ensure that all emergency response centers are staffed and provisions are made for information updates to the public through offsite authorities and the news media. The classification will most likely be made by the Station Emergency Director following activation of the TSC.

Required actions at this classification, in addition to those listed under the Alert level, include:

- If not previously performed, Assembly/Accountability shall be performed and Site Evacuation of non-essential personnel shall be initiated.
- Keeping offsite authorities informed of plant status by providing periodic updates to include meteorological data and projected or actual doses for any releases that have occurred.

d. General Emergency - Event(s) are in process or have occurred which involve actual or imminent substantial fuel degradation or melting or HOSTILE ACTION that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area.

The purpose of this classification, in addition to those of the Site Area Emergency level, is to initiate predetermined protective actions for the public and provide continuous assessment of information from monitoring groups. The classification will most likely be made by the Station Emergency Director following activation of the TSC.

Required actions at this classification, in addition to those listed under the Alert and Site Area Emergency, include:

- A Protective Action Recommendation will be determined.
- Assessment of the situation and response as necessary.

e. Recovery: That period when the emergency phase is over and activities are being taken to return the situation to a normal state (acceptable condition). The plant is under control and no potential for further degradation to the plant or the environment is believed to exist.

   Recovery will be classified by the Station Emergency Director after obtaining authorization from the Corporate Emergency Director.

   Required actions at this classification include:

   - The affected state(s) and the NRC should be consulted prior to entry into Recovery.
   - Notifications will be made to station management, the NDO, state(s) and NRC.
   - A Recovery organization will be established to manage repairs to return the Unit to an acceptable condition, and support environmental monitoring activities as requested in coordination with Federal and state efforts.
   - ANI is notified of Recovery classification.

f. Classification Downgrading: Constellation Nuclear policy is that emergency classifications shall not be downgraded to a lower classification. Once declared, the event shall remain in effect until no Classification is warranted or until such time as conditions warrant classification to Recovery.

g. Guidance for Termination of an Emergency: The purpose of terminating an emergency is to provide an orderly turnover of plant control from the Emergency Response Organizations to the normal plant organization. Termination of the emergency is authorized by the Emergency Director in Command and Control. The considerations provided in the Recovery/Termination Checklist in the emergency implementing procedures must be performed prior to exiting the emergency event. Consultation with governmental agencies and other parties should be conducted prior to termination of an event classified as Site Area or General Emergency. Notifications shall be transmitted to appropriate agencies to terminate an event.

h. Station Nuclear Security Plan: The station has a Security Plan that complies with the requirements of 10 CFR 73. The interface between the Emergency Plan and the Security Plan is one of parallel operation. The plans are compatible. The Emergency Plan response measures, once initiated, are executed in parallel with measures taken in accordance with the Security Plan.

Threats made to Crane Clean Energy Center are evaluated in accordance with established threat assessment procedures and the Security Plan. The Security Plan, Appendix C, Contingency Events, identifies situations that could be initiating conditions for EAL classifications. Contingency events include bomb threats, attack threats, civil disturbances, protected area intrusions, loss of guard/post contact, vital area intrusions, bomb devices discovered, loss of guard force, hostages, extortion, fire/explosions, internal disturbances, security communications failure, and obvious attempts of tampering. The Security Plan provides guidance for decisions and actions to be taken for each security contingency event. As guidance, the Security Plan allows for differing responses depending upon the assessment of the actual situation within each contingency event classification.

The assessment of any security contingency event and the decision to initiate, or not to implement the Emergency Plan, will be the responsibility of the Shift or Station Emergency Director. All identified security contingency events have the potential of being assessed as initiating conditions for a radiological emergency declaration.

Determination of a credible security threat may require the staffing of emergency response facilities based on the classification of an Unusual Event per the Emergency Action Levels (EALs).

2. Emergency Action Level Technical Bases

Addendum 3 to the Station Annex includes Site Specific Emergency Action Levels (EALs) consistent with the general class descriptions and provided in NEI guidance documentation in accordance with Regulatory Guide 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors." Where possible, these EALs will be related to plant instrumentation readings.

Emergency classifications are characterized by Emergency Action Levels (EALs). The Threshold Values are referenced whenever an Initiating Condition is reached. An Initiating Condition is one of a predetermined subset of unit conditions where either the potential exists for a radiological emergency, or such an emergency has occurred. Defined in this manner, an Initiating Condition is an emergency condition, which sets it apart from the broad class of conditions that may or may not have the potential to escalate into a radiological emergency. Initiating Conditions are arranged in one of the Recognition Categories.

EALs are for unplanned events. A planned evolution involves preplanning to address the limitations imposed by the condition, the performance of required surveillance testing, and the implementation of specific controls prior to knowingly entering the condition. Planned evolutions to test, manipulate, repair, perform maintenance or modifications to systems and equipment that result in an EAL Threshold Value being met or exceeded are not subject to classification and activation requirements as long as the evolution proceeds as planned. However, these conditions may be subject to the reporting requirements of 10 CFR 50.72.

An emergency is classified after assessing abnormal plant conditions and comparing them to EAL Threshold Values for the appropriate Initiating Conditions. Matrix tables organized by recognition categories are used to facilitate the comparison.

All recognition categories should be reviewed for applicability prior to classification. The initiating conditions are coded with a letter and/or number designator. All initiating conditions, which describe the severity of a common condition (series), have the same initial designator.

3. Timely Classification of Events

Classification of an emergency condition occurs within 15 minutes after the availability of indications from plant instrumentation, plant alarms, computer displays, or incoming verbal reports that an EAL has been exceeded and, is then promptly made upon identification of the appropriate EAL. The 15-minute period encompasses all assessment, classification, and declaration actions associated with making an emergency declaration from the first availability of a plant indication or receipt of a report up to and including the declaration of the emergency.

Validation or confirmation of plant indications or reports of the condition are to be accomplished within the 15-minute period as part of the assessment. Since this validation or confirmation is being performed to determine the validity of an alarm, indication, or report, the 15-minute period starts with the availability of the alarm, indication, or report to any qualified EAL assessor, and not the completion of the validation or confirmation, because the former is the time that the information was first available.

A qualified EAL assessor means any member of the plant staff who, by training and experience, is qualified to assess the indications or reports for validity and to compare the same to the EALs. A qualified EAL assessor may be, but need not be, a licensed operator or member of the ERO. Qualified EAL assessors may be in the MCR or in another facility where emergency declarations are performed. A qualified EAL assessor does not include personnel such as chemists, radiation protection technicians, craft personnel, security personnel, and others whose positions require they report, rather than assess, abnormal conditions to the MCR.

The 15-minute criterion ends as soon it is determined that an EAL has been exceeded and upon identification of the appropriate Emergency Classification Level (ECL) and when the Emergency Director makes the emergency declaration. The emergency condition should be declared as soon as possible following the identification of the appropriate ECL. As used here, “promptly” means the next available opportunity unimpeded by activities not related to the emergency declaration, unless such activities are necessary for protecting health and safety.

The 15-minute criterion is not to be construed as a grace period in which attempts to restore plant conditions are taken to avoid declaring an EAL that has already been exceeded. This statement does not preclude taking actions to correct or mitigate an off-normal condition, but once an EAL has been recognized as being exceeded, the emergency declaration shall be made promptly without waiting for the 15-minute period to elapse. The 15-minute criterion shall not prevent the implementation of response actions deemed necessary to protect public health and safety provided that any delay in the declaration would not deny the State and local authorities the opportunity to implement measures necessary to protect the public health and safety.

For EAL thresholds that specify duration of the condition, the emergency declaration process runs concurrently with the specified threshold duration. Once the condition has existed for the duration specified in the EAL or it is determined that the duration time will likely be exceeded, no further assessment is necessary—the EAL has been exceeded.

4. Offsite Classification Systems

Constellation Nuclear works with the state to ensure consistency between classification schemes. The content of the EALs is reviewed with the state and county authorities on an annual basis.

5. Offsite Emergency Procedures

Constellation Nuclear works with the state and county authorities to ensure that procedures are in place that provide for emergency actions to be taken which are consistent with the protective actions recommended by Constellation accounting for local offsite conditions that exist at the time of the emergency.

Section E: Notification Methods and Procedures

This section describes the notification of state and county response organizations and Constellation emergency response personnel. It outlines the content of initial and follow-up messages to response organizations within the Plume Exposure Pathway Emergency Planning Zone (EPZ).

1. Bases for Emergency Response Organization Notification

Constellation Nuclear, in cooperation with state and county authorities, has established mutually agreeable methods and procedures for notification of offsite response organizations consistent with the emergency classification and action level scheme. Notifications to offsite agencies include a means of verification or authentication such as the use of dedicated communications networks, verification code words, or providing call back verification phone numbers.

Notification for Transportation Accidents: A Transportation Accident is defined in 49 CFR 171.15 and 49 CFR 171.16. If a Transportation Accident involving material in the custody of an Constellation facility occurs, Constellation Nuclear will notify the appropriate internal and offsite agencies in accordance with the Constellation Nuclear Reportability Manual.

2. Notification and Mobilization of Emergency Response Personnel

Emergency implementing procedures are established for notification and mobilization of emergency response personnel as follows:

a. Onsite: When an emergency is declared, reclassified, or terminated an announcement is made (over the plant public address system or by other means) that includes the emergency classification declared and response actions to be taken by site personnel.

   At the Unusual Event classification, select ERO augmentation personnel are notified and requested to remain available to respond. At an Alert classification or higher ERO augmentation personnel are notified for activation of the TSC, OSC, EOF, and JIC using the ERO Notification System.

b. Offsite: Notifications are promptly made to offsite emergency response organizations as follows:

   1) State/Local Agencies: A notification shall be made within fifteen (15) minutes of:

      - The initial emergency classification.
      - Classification escalation.
      - The issuance of or change to a Protective Action Recommendation (PAR) for the general public.

- Changes in radiological release status, occurring outside of an event classification or PAR notification, based on an agreement with the state(s).

The emergency warning points are simultaneously notified using the Nuclear Accident Reporting System (NARS), or a commercial telephone line as backup.

A notification will also be initiated to cognizant state/local government agencies as soon as possible but within one hour of the termination of an event classification, or entry into Recovery Phase.

2) Nuclear Regulatory Commission (NRC): An event will be reported to the NRC Operations Center immediately after notification of the appropriate state or local agencies but not later than one (1) hour after the time of initial classification, escalation, termination or entry into the Recovery Phase. The NRC is notified by a dedicated telephone system called the Emergency Notification System (ENS). If the ENS is inoperative, the required notification is made via commercial telephone service, other dedicated telephone service, or any other method that shall ensure that a report is made as soon as practical. An NRC Event Notification Worksheet should be utilized to transmit initial information to the NRC. If a continuous communication is requested and established, a log is used in lieu of the ENS Worksheet.

   Specific requirements for the notifications to the NRC for classified emergency events are detailed in 10 CFR 50.72 with guidance provided in the Constellation Reportability Manual.

Mobilization of federal, state, and county response organizations is performed in accordance with their applicable emergency plan and procedures. At a minimum, mobilization of federal response organizations and activation of state and county EOCs is expected to occur at the declaration of a Site Area Emergency.

The state and county authorities are responsible for the process of notification of the general public.

c. Support Organizations: When an emergency is initially classified, escalated or terminated, notifications are promptly made to the following support organizations:

- Medical, rescue, and firefighting support services are notified for assistance as the situation dictates.

- The American Nuclear Insurers (ANI) are notified at an Alert or higher classification with requests for assistance as necessary.

- Vendor and contractor support services are notified for assistance as the situation dictates.

3. Initial Notification Messages

Constellation Nuclear, in conjunction with state and county authorities, has established the contents of the initial notification message form transmitted during a classified emergency. The contents of the form include, as a minimum:

- Designation ("This is a Drill" or "Actual Event").
- Identity of site.
- Event classification.
- EAL number (as agreed upon with state authorities).
- Non-technical event description (as agreed upon with state authorities).
- Date and time of declaration (or entry into Recovery or Termination).
- Whether a release is taking place (Note: "Release" means a radiological release attributable to the emergency event.)
- Wind direction and speed.
- Whether offsite protective measures may be necessary.
- Potentially affected Subareas (or Sectors as applicable) when a General Emergency is declared.

Notification approval, transmittal date and time, and offsite agencies contacted are recorded either on the notification form or in an event logbook.

4. Follow-up Messages

For all emergency classifications, update messages to state authorities will be provided at the time of the notification on a prearranged frequency. The facility in Command and Control is responsible for ensuring that the updates are completed. State updates contain the prearranged information plus any additional information requested at the time of the notification.

Follow-up notifications are provided to the NRC Operations Center as soon as possible, but not later than one (l) hour after significant new information is available involving:

a. The results of evaluations or assessments of plant conditions.

b. The effectiveness of response or protective measures taken.

c. Information related to plant behavior that is not understood.

If requested by the NRC, an open, continuous communications channel will be maintained with the NRC Operations Center over the Emergency Notification System (ENS) and/or Health Physics Network (HPN) Circuits.

5. State and County Information Dissemination

The state and county emergency response plans describe procedures for state and county officials to make a public notification decision promptly (within about 15 minutes) on being informed by the plant of an emergency. The system for disseminating information to the public includes notification by pre-scripted messages through appropriate broadcast media such as the Emergency Alert System (EAS).

6. Notification of the Public

The capability exists for the prompt notification of the general public within the Plume Exposure Pathway Emergency Planning Zone (EPZ) for CRANE.

The Alert and Notification System (ANS) for Crane relies on the Integrated Public Alert Warning System (IPAWS)-WEA (Wireless Emergency Alerts) and IPAWS-EAS (Emergency Alert System) as the primary means of alerting and notifying the public, respectively, and an independent electronic Mass Notification System (MNS) as the backup means.

The use of IPAWS, WEA, and EAS strengthens the ability to alert populations, including residents, visitors, commuters, and individuals with access and functional needs. Counties also apply a whole community approach by identifying and addressing the communication needs of diverse populations and community groups, including individuals with limited access to technology, to help ensure emergency information reaches all segments of the public.

The Integrated Public Alert Warning System (IPAWS) is operated by local governmental agencies and maintained by FEMA. A more specific description of the various prompt public notification systems is presented in the FEMA ANS Design Report for Crane.

7. Messages to the Public

The respective States have developed EAS messages for the public consistent with the classification scheme. These draft messages are included as part of the States' Emergency Plan and contain instructions with regard to specific protective actions to be taken by occupants and visitors of affected areas. Messages may include instructions such as: take shelter and go indoors, close windows and doors, turn off ventilation systems; directions given for evacuation; directions to stay tuned to specific stations for further information, ad-hoc respiratory protection, (e.g. handkerchief over mouth, etc.). Constellation will provide support for the content of these messages when requested. The States control the distribution of radioprotective drugs to the general public.

Section F: Emergency Communications

This section describes the provisions utilized for prompt communications among principal emergency response organizations, communications with the ERO and communications with the general public.

1. Communications/Notifications

Constellation Nuclear has extensive and reliable communication systems installed at CRANE and Corporate Headquarters. Examples of the communications network include systems such as normal and dedicated telephone lines on landlines, and fiber-optic voice channels, cell phones, satellite phones, mobile radio units, handi-talkies and computer peripherals. This network provides:

- Voice communication through normal telephone, dedicated lines , conference call capability, speaker phones, and operator assistance where required.

- Communications between selected Constellation vehicles and appropriate fixed locations, as well as with state mobile units and fixed locations.

- Facsimile, network, and modem transmission.

Figure F-1 depicts the initial notification paths and the organizational titles from the Constellation Nuclear Emergency Response Facilities (ERFs) to federal, state and local emergency response organizations, and industry support agencies. The Constellation primary and alternate methods of communication, and the NRC communications network, are illustrated on Figures F-2 and F-3.

a. Constellation Nuclear maintains the capability to make initial notifications to the designated offsite agencies on a 24-hour per day basis. The offsite notification system, referred to as the Nuclear Accident Reporting System (NARS) provides communications to state and county warning points and Emergency Operations Centers from the CR, TSC, and EOF. Backup methods include facsimile and commercial telephone lines. state and county warning points are continuously staffed. The Emergency Offsite Notification System (EONS) supports the notification of State/local agencies.

b-d. Constellation Nuclear has established several dedicated communication systems that ensure reliable and timely exchange of information necessary to provide effective Command and Control over any emergency response; (1) between Constellation and state and local agencies within the EPZs, (2) with federal emergency response organizations, (3) between the plant, the EOF, and the state and county EOCs, and (4) between Emergency Response Facilities and Field Monitoring Teams. A general description of the systems is as follows:

1) Nuclear Accident Reporting System (NARS): The NARS is a dedicated communications system that has been installed for the purpose of notifying state and local authorities of declared nuclear emergencies. This system links together the station Control Rooms, the EOF, TSCs and state and local authorities as appropriate. The specific design, operation, and responsibility for maintenance of the NARS systems vary between Constellation Nuclear regions.

2) Operations Status Line: A vendor-hosted conference bridge called the Operations Status Line that enables communication between the Control Room, the TSC, OSC and the EOF to monitor the activities throughout the Emergency Response Facilities (see Figure F-2). The Operations Status line consists of a Voice Over Internet Protocol (VoIP) system.

3) Director's Hotline: A vendor-hosted conference bridge called the Director's Hotline that enables direct Emergency Director communication between the Control Room, TSC, and the EOF (see Figure F-2).

4) Local Commercial Telephone System: This system provides standard commercial telephone service through the public infrastructure, consisting of central offices and the wire line.

5) Emergency Response Data System (ERDS): ERDS will continuously supply the NRC with selected plant data points on a near real time basis. The selected data points are transmitted automatically to the NRC at approximately 1-minute intervals.

6) Field Monitoring Team (FMT) Communications: A separate communications system has been installed to allow coordinated environmental monitoring and assessment during an emergency. This system consists of the necessary hardware to allow communication via Satellite phones, TSC, EOF, and mobile units in Constellation Nuclear vehicles. Commercial cell phones are available as back up to the primary field team communications system.

7) Electronic Offsite Notification System (EONS): EONS is a system of software and hardware components that supports off-site State & Local notifications via an electronic transfer of data between Constellation Emergency Response Facilities and offsite agencies.

In addition, station communication links exist to ensure appropriate information transfer capabilities during an emergency. The station may also utilize its Public Address System, station radios and notification devices to augment its emergency communications.

e. ERO Notification System: Constellation Nuclear utilizes an automated ERO Notification System to rapidly notify members of the ERO. The system consists of a network of physical infrastructure capable of initiating and receiving contact via multiple notification devices. When activated, the system contacts the notification devices (e.g., through commercial and cellular phone, email, text message) belonging to members of the ERO. The System includes redundant activation methods via the internet as well as redundant, geographically separated call centers and data centers, with redundant power sources. Implementing procedures specify the course of action to be taken if the primary ERO Notification System activation path fails to respond. The ERO Notification System provides primary and back-up notification functions.

f. NRC Communications (ENS and HPN)
Communications with the NRC Operations Center will be performed via the ENS and HPN circuits or commercial telephone line. Information is normally communicated from an approved NRC Event Notification Worksheet prior to establishing an open ENS and/or HPN line.

Installation and use of these NRC telephones is under the direction of the NRC (see Figure F-3).

Emergency Notification System (ENS): Dedicated telephone equipment is in place between the Control Room and the NRC, with an extension of that line in the TSC. A separate line is available in the EOF with the capability of being patched with the station through the NRC. This line is used for NRC event notifications and status updates.

Health Physics Network (HPN): There also exists a separate dedicated telephone between the NRC, the TSC, and EOF for conveying health physics information to the NRC as requested or as an open line.

2. Medical Communications

Communications are established with the primary and backup medical hospitals and transportation services via commercial telephone that is accessed by station personnel.

3. Communications Testing

Communications equipment is checked in accordance with Section H.10. Communications drills between Constellation Nuclear and state and county government facilities are conducted in accordance with Section N.2.a. In addition, minimum ANS testing is performed in accordance with the site-specific ANS Design Report.

Figure F-1: Constellation Notification Scheme (For Full Augmentation)

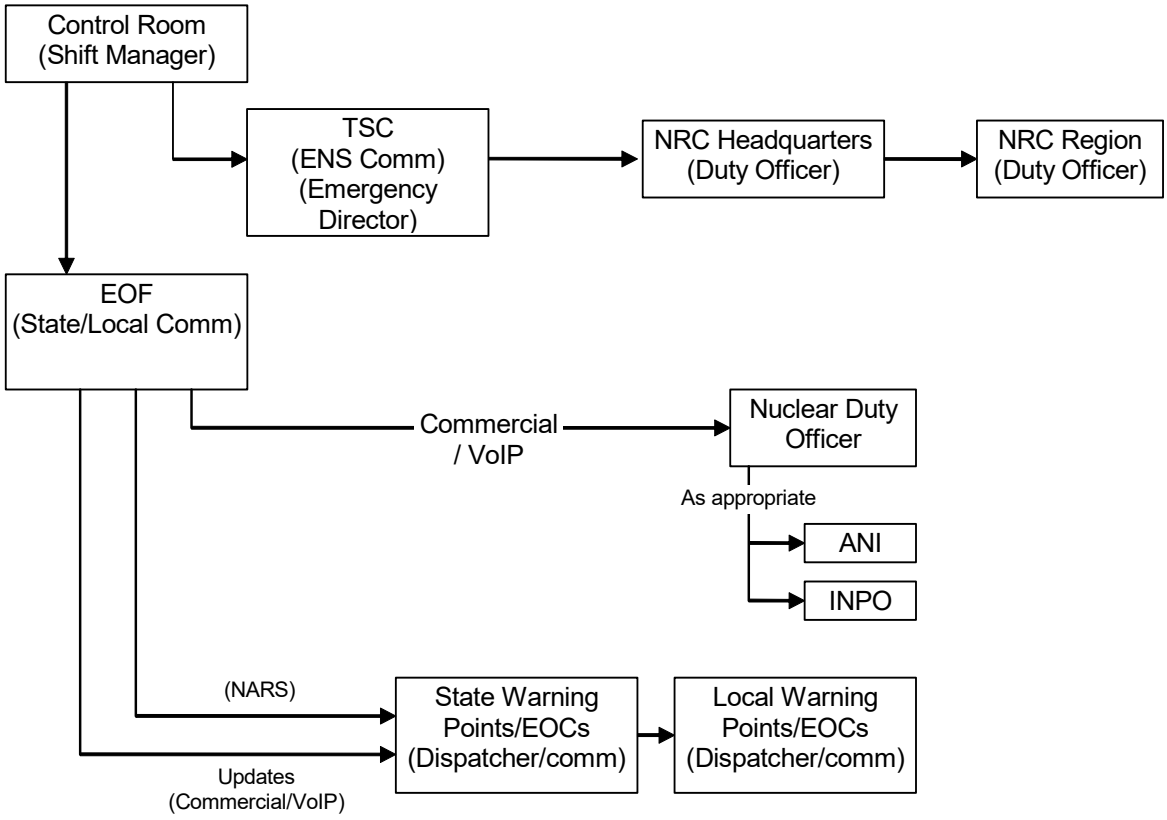
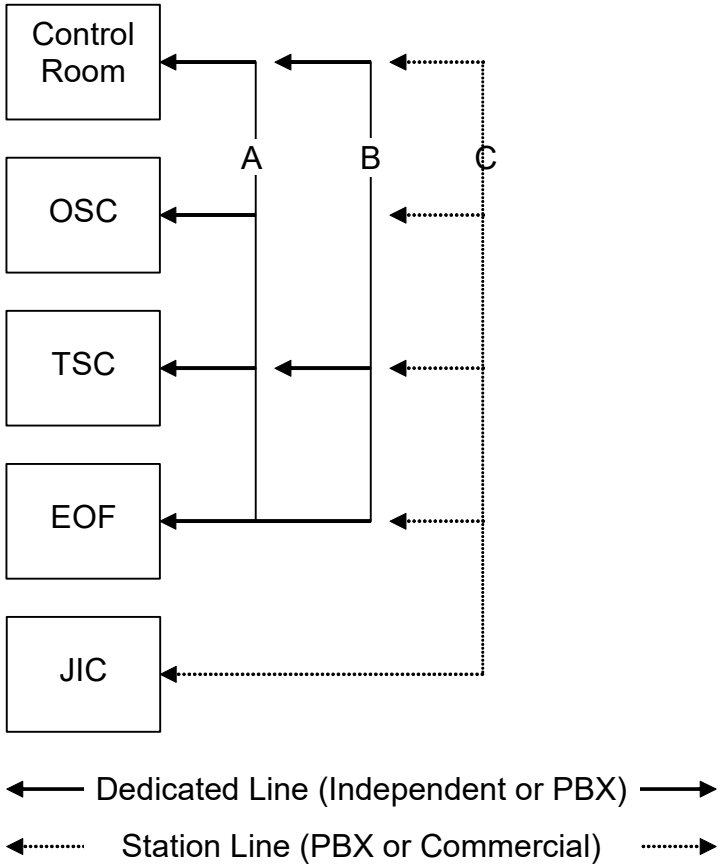


Figure F-2: ERF Communications Matrix

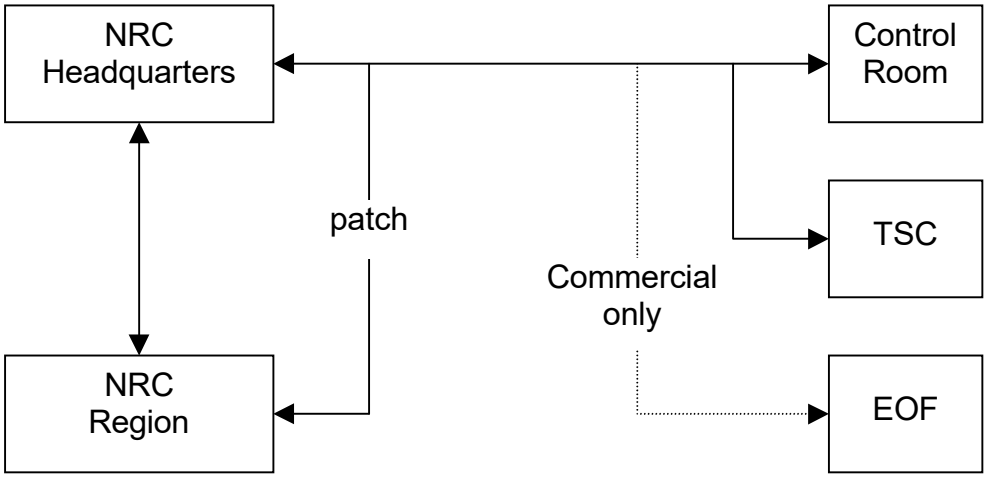


A = Operational Status Line between the OSC, TSC, EOF, and Control Room.

B = Directors Hotline line between the Control Room, TSC and EOF.

E = Station telephone line.

Figure F-3: NRC Communications for Nuclear Response



NOTE: ENS circuits may use the Federally maintained system, company tie lines or PBX as dedicated primary communications systems and have commercial backups.

Section G: Public Education and Information

This section describes the Constellation Nuclear public education and information program. It outlines the methods for distributing public information materials on an annual basis and describes how the public is informed in the event of an emergency.

1. Public Information Publication

The state has overall responsibility for maintaining a continuing disaster preparedness public education program. The emergency public information publication for the Constellation Nuclear generating stations is updated annually, in coordination with state and county agencies, to address how the general public is notified and what their actions should be in an emergency. Constellation distributes the publication, or internet links to the publication on an annual basis by mail to all residents within the ten-mile plume exposure EPZs and to appropriate locations where a transient population may obtain a copy. The public information publication includes the following information:

a. Educational information on radiation.

b. A description of the times that require public notification (what to do if a take-shelter or evacuate recommendation is given).

c. A map of major evacuation routes.

d. A list of communities likely to serve as host shelter areas and instructions on how to obtain additional information, especially for the disabled or their caretakers and those without transportation.

2. Public Education Materials

Public information publications instruct the public to follow the IPAWS-WEA messages which will provide information and instructions related to the emergency.

3. Media Accommodations

a. The Constellation Communications and Public Affairs Department is notified when an Unusual Event or higher Emergency condition exists. They will handle public and media inquiries in the early stages of the event (until the JIC is activated) by distributing background information, news releases, and providing information to corporate management.

1) The Emergency Public Information Organization: The Emergency Public Information Organization is part of the Corporate ERO. It may be activated at any time at the discretion of the Nuclear Duty Officer. However, when there is a procedural requirement to activate the EOF, the Emergency Public Information Organization shall also be activated.

The primary purpose of the Emergency Public Information Organization is to disseminate information from Constellation Nuclear's ERO about the emergency events to the public, via the news media. However, the authority for issuance of news releases for the classification of an Unusual Event or prior to ERO activation will always reside with the Constellation Communications and Public Affairs Department. Upon activation, the Emergency Public Information Organization has the responsibility and authority for issuance of news releases to the public.

The Emergency Public Information Organization is comprised of senior managers from Constellation Nuclear who will function as spokespersons, and other Constellation Nuclear individuals including personnel from the Governmental Affairs and Human Relations areas. Constellation Nuclear's spokespersons disseminate information to the news media/public concerning the emergency events out of a Joint Information Center (JIC).

2) The Joint Information Center (JIC): The JIC is the facility in which media personnel gather to receive information related to the emergency event. The JIC is the location where approved news releases will be provided to the media for dissemination to the public. News releases are coordinated between the EOF and JIC personnel and state and/or Federal representatives in the JIC. Constellation public information personnel operate from the EOF and the JIC, which is under the direction of the Corporate Spokesperson and functions as the single point contact to interface with Federal, state, and local authorities who are responsible for disseminating information to the public.

   Each station has a designated JIC. Each JIC is equipped with appropriate seating, lighting and visual aids to allow for public announcements and briefings to be given to the news media. Additionally, JICs are equipped with commercial telephone lines for making outgoing calls. The Emergency Public Information Organization functions from the JIC and EOF in preparing and releasing utility information about the emergency event. The JIC is activated at the declaration of an Alert or higher classification. Some JIC personnel may perform functions remotely from alternate locations while remaining in contact with personnel in the JIC facility (e.g., media monitoring, rumor control, news writers, issuance of press releases). The JIC Director and Corporate Spokesperson will ensure communication and coordination of these functions with the EOF and JIC staff. Functions of the JIC include:

   - Serving as the primary location for accumulating accurate and current information regarding the emergency conditions and writing news releases.

   - Providing work space and phones for public information personnel from the state, counties, NRC, FEMA, and industry-related organizations.

   - Providing telephones for use by the news media personnel.

- Providing responses to media inquiries through telephones that the media can call for information about an emergency.

b. The news media is not permitted into the EOF during an emergency.

4. Coordination of Public Information

a. The JIC is staffed by Constellation and government public information representatives who will be the source of public information during an emergency at the station. The Corporate Spokesperson is the primary spokesperson for Constellation Nuclear. The Corporate Spokesperson has direct access to all necessary information (see Section B.5).

b. The JIC is staffed by federal, state, county, and utility personnel to assure timely, periodic exchange and coordination of information. Representatives coordinate information prior to conducting news briefings.

c. Rumors or misinformation are identified during an emergency by the JIC Staff. They respond to public and news media calls and monitor media reports.

d. The JIC for the MA Region Stations is co-located with the EOF at 175 North Caln Road, Coatesville, Pennsylvania.

5. Media Orientation

Emergency Preparedness, in conjunction with Constellation Communications and Public Affairs Department, offers training (at least annually) to acquaint news media with the Emergency Plan, information concerning radiation, and points of contact for release of public information in an emergency. Training is provided for those media agencies that accept the training offer.

Section H: Emergency Facilities and Equipment

Onsite and offsite facilities are available for emergency assessment, communications, first aid and medical care, and damage control. Of particular importance are the Emergency Response Facilities (ERFs); the Control Room (CR), the Technical Support Center (TSC), the Operations Support Center (OSC), the Emergency Operations Facility (EOF), and the Joint Information Center (JIC).

This section describes the emergency facilities and equipment used by the Emergency Response Organization and outlines the requirements which aid in timely and accurate response actions. It also describes the surveillance programs used to monitor and ensure that these facilities and equipment are maintained in a high degree of constant readiness.

1. Control Room, Technical Support Center, and Operations Support Center

Crane has established a TSC and an on-site OSC, which are activated upon declaration of an Alert or higher classification. Until they become operational, required functions of these facilities are performed in the Control Room.

Under certain adverse conditions for Security-Based Events, personnel may be assembled in an "ERO Alternative Facility" prior to being dispatched to one of the facility ERFs.

a. Station Control Room: The Control Room is the centralized onsite location from which the Nuclear Station's plant systems necessary to support the spent fuel pool are operated. The Control Room is equipped with instrumentation to supply detailed information on the plant systems. The Control Room is continuously staffed with qualified operators. The Control Room is the first onsite facility to become involved with the response to emergency events. Control Room personnel must evaluate and effect control over the emergency and initiate activities necessary for coping with the emergency until such time that support centers can be activated. These activities shall include:

- Plant control.
- Initial direction of all plant related operations.
- Accident recognition, classification, mitigation and initial corrective actions.
- Alerting of onsite personnel.
- Notification of appropriate individuals.
- Activation of emergency response facilities and ERO notification.
- Notification of offsite agencies.
- Continuous evaluation of the magnitude and potential consequences of an incident.

- Initial dose projections.
- Recommendations for immediate protective actions for the public.

As other ERFs become activated, they will supply support to the Control Room, although overall Command and Control of the emergency will transfer to the SED (TSC) or the CED (EOF). Throughout all emergencies, the Control Room maintains its emergency activation status until its normal operational status may be resumed.

b. Technical Support Center (TSC): CRANE has established a TSC for use during emergency situations by station management, technical, and engineering support personnel. The TSC is activated for all emergencies classified as Alert or higher. Activation for other events is optional. When activated the TSC functions include:

- Support for the Control Room's emergency response efforts.
- Support the SED with assigned Command & Control functions.
- Continued evaluation of event classification.
- Assessment of the plant status and potential offsite impact.
- Coordination of emergency response actions.
- Notification of appropriate corporate and station management.
- Notification and update of the NRC via Emergency Notification System (ENS).

The TSC is the onsite location utilized to support the Control Room for assessment of plant status and potential offsite impact, and for implementation of emergency actions. TSC provides technical data and information to the EOF.

Figure CRANE B-1b illustrates the staffing and organization of the TSC.

The TSC provides reliable voice communications to the Control Room, the OSC, the EOF, the NRC, and state and local Emergency Operations Centers. In addition, it provides facsimile transmissions capability (see Section F.1).

The TSC is sized to accommodate a minimum of 25 spaces and supporting equipment. This includes provisions for five NRC representatives. Adequate space is also available for the appropriate state representative(s).

Personnel in the TSC shall be protected from radiological hazards, including direct radiation and airborne contaminants under accident conditions with similar radiological habitability as Control Room personnel. To ensure adequate radiological protection, permanent radiation monitoring systems have been installed in the TSC and/or periodic radiation surveys are conducted. These systems indicate radiation dose rates and airborne radioactivity inside the TSC while in use. In addition, protective breathing apparatus (full-face air purifying respirators) and KI are available for use as required.

The TSC has access to a complete set of as-built drawings and other records, including general arrangement diagrams, P&IDs, and the electrical schematics. The TSC has the capability to record and display vital plant data, in real time, to be used by knowledgeable individuals responsible for engineering and management support of operations, and for implementation of emergency procedures.

c. Operations Support Center (OSC): CRANE has established an OSC. The OSC is the onsite location to where station support personnel report during an emergency and from which they will be dispatched for assignments or duties in support of emergency operations. The OSC shall be activated whenever the TSC is activated, but need not remain activated at the Alert level if its use is judged unnecessary by the Station Emergency Director. At the Site Area and General Emergency levels, the OSC or an alternate OSC shall be activated at all times. The OSC is not activated for a HOSTILE ACTION when the Alternative Facility is implemented. Activation for other events is optional. Station disciplines that may be called in to support the OSC include, but are not limited to:

- Operating personnel not assigned to the Control Room,
- Radiation Protection Personnel,
- Chemistry Personnel,
- Maintenance Personnel (mechanical, electrical and I&C).

Figure CRANE B-1b illustrates the staffing and organization for the OSC.

Each OSC is equipped with communication links to the Control Room, the TSC and the EOF (see Section F). A limited inventory of supplies will be kept for the OSC. This inventory will include respirators, protective clothing, flashlights and portable survey instruments.

2. Emergency Operations Facility (EOF)

The EOF is the location where the Corporate Emergency Director will direct a staff in evaluating and coordinating the overall company activities involved with an emergency. Activation of the EOF is mandatory within 60 minutes of declaration of an Alert or higher classification. The EOF provides for:

- Management of overall emergency response.

- Coordination of radiological and environmental assessments.
- Determination of recommended public protective actions.
- Management of recovery operations.
- Coordination of emergency response activities with federal, state, and local agencies.

The common MA Region EOF is located west of Philadelphia, in Coatesville PA. This facility supports Limerick, Peach Bottom, Calvert Cliffs and Crane energy centers. The EOF in the MA region is capable of responding to events occurring simultaneously at more than one nuclear power reactor site since the emergency operations facility serves more than one site.

The facility is designed with the following considerations:

- The location provides optimum functional and availability characteristics for carrying out overall strategic direction of Constellation Nuclear onsite and support operations, determination of public protective actions to be recommended to offsite officials, and coordination with Federal, state and local organizations.
- It is well engineered for the design life of the plant and is of sufficient size to accommodate about 50 people.
- It is equipped with reliable voice communications capabilities to the TSC, the OSC, the Control Room, NRC, and state and local emergency operations centers. In addition, the EOF has facsimile transmission capability.
- Equipment is provided to gather, store, and display data needed in the EOF to analyze and exchange information on plant conditions with the Station. The EOF technical data system receives, stores, processes, and displays information sufficient to perform assessments of the actual and potential onsite and offsite environmental consequences of an emergency condition.
- The EOF has ready access to plant records, procedures, and emergency plans needed for effective overall management of Constellation Nuclear emergency response resources.

3. Emergency Operations Centers

EOCs operated by the state and local communities have been established to perform direction and control of emergency response functions.

The Pennsylvania state EOC is capable of continuous (24-hour) operations for a protracted period. The center contains sufficient communications (radio, telephone and teletype) equipment, maps, emergency plans, and status boards to provide the necessary interfaces with other federal, state, county, and Constellation emergency facilities.

The county EOCs serve as Command and Control headquarters for local emergency response activities as well as a center for the coordination of communications to field units and to the state EOC. The EOC has the equipment necessary, (such as facsimile machines, telecommunications equipment, radio gear, photocopiers, wall maps, etc.) to carry out their emergency responsibilities.

4. Activation

NOTE: NUREG-0654 Criterion II.B.5 states that the "licensee must be able to augment on-shift capabilities within a short period after declaration of an emergency". It further defines that short period as 30 and 60 minutes. The time frames for rapid augmentation of a nuclear power plant staff in the event of an emergency are not rigid inviolate requirements but rather goals. It is Constellation Nuclear's intent to expend its best efforts to meet the augmentation criteria goals regarding staffing Emergency Response Facilities with sufficiently skilled individuals capable of handling an emergency. Both the NRC and Constellation Nuclear realize that due to diversity of normal residential patterns for the stations' staff, possible adverse weather conditions, road congestion and site access restrictions, these time frames might be exceeded.

Constellation Nuclear has put into place plans and procedures to ensure timely activation of its emergency response facilities. The Shift Manager (as Shift Emergency Director) will initiate a call-out in accordance with the implementing procedures. The ERO augmentation process identifies individuals who are capable of fulfilling the specific response functions that are listed in ERO staffing tables contained within this Emergency Plan.

Although the response time will vary due to factors such as weather and traffic conditions, a goal of 60 minutes for minimum staffing, following the declaration of an Alert or higher emergency classification, has been established for the ERO personnel responding to the station emergency facilities and the EOF. Additionally, plans have been developed to ensure timely functional activation and staffing of the JIC within 90 minutes of when the classification of Alert or higher is declared.

It is the goal of the organization to be capable of activating the applicable Emergency Response Facility upon achieving minimum staffing. The facility can be declared activated when the following conditions are met:

a. Minimum staffing has been achieved.

b. The facility is functional.

The Director in charge may elect to activate their facility without meeting minimum staffing; if it has been determined that sufficient personnel are available to fully respond to the specific event (this would not constitute a successful minimum staff response).

5. Monitoring Equipment Onsite

CRANE is equipped with instrumentation for seismic monitoring, radiation monitoring, fire protection and meteorological monitoring. Instrumentation for the detection or analysis of emergency conditions is maintained in accordance with station Technical Specifications, if applicable, or commitments made to the NRC. Descriptions of the equipment will appear in the Station Annex. This equipment includes but is not limited to the following:

a. Geophysical Monitors

1) Meteorological Instrumentation: A permanent meteorological monitoring station is located near each station for display and recording of wind speed, wind direction, and ambient and differential temperature for use in making offsite dose projections. Meteorological information is presented in the CR, TSC, and EOF by means of the plant computer system.

With regard to Constellation Nuclear's meteorological monitoring program, there has been a quality assurance program adopted from 10 CFR 50, Appendix B. However, since the meteorological facilities are not composed of structures, systems, and components that prevent or mitigate the consequences of postulated accidents and are not "safety related," not all aspects of 10 CFR 50, Appendix B, apply. Those aspects of quality assurance germane to supplying good meteorological information for a nuclear power station were adopted into the meteorological quality assurance program. The meteorological program is also subject to the requirements of the Restoration Quality Assurance Program.

The National Weather Service (NWS), or regional weather forecast providers, may be contacted during severe weather periods. These providers analyze national and local weather in order to provide localized weather forecasts for the system or for the station area as appropriate.

2) Seismic Monitoring: The seismic monitoring system measures and records the acceleration (earthquake ground motion) of the structure. Earthquakes produce low frequency accelerations which, when detected by the remote sensing devices, are permanently recorded as information which defines the response spectrum. The system remains in a standby condition until an earthquake causes the remote unit(s) to activate the recording circuits and tape transports. It also provides signals for immediate remote indication that specific preset response accelerations have been exceeded.

3) Hydrological Monitors: The design basis flood, probable maximum precipitation, and other improbable, conceivable extremes in hydrologic natural phenomena are well below any design limits for the station as detailed in the UFSAR.

b. Radiological Monitors and Sampling

1) The Radiation Monitoring System (RMS): In-plant radiological measurements provide information that may help determine the nature, extent and source of emergency conditions. The RMS is available to give early warning of a possible emergency and provides for a continuing evaluation of the situation in the Control Room. Radiation monitoring instruments are located at selected areas within the facility to detect, measure, and record radiation levels. In the event the radiation level should increase above a preset level, an alarm is initiated in the Control Room. Certain radiation monitoring instruments also alarm locally in selected areas of the facility. The RMS is divided into 3 subsystems:

   a) Area Radiation Monitors (ARMs) are used for the direct measurement of in-plant exposure rates. The ARM readings allow in-plant exposure rate determinations to be made remotely without requiring local hand-held meter surveys. This information may be used, initially, to aid in the determination of plant area accessibility. In addition to permanent monitors, portable Continuous Air Monitors (CAMs) measure airborne particulate and airborne iodine activities at various locations within the operating areas.

   b) Process Radiation Monitors (PRMs) are used for the measurement of radioactive noble gas, iodine, and particulate concentrations in plant effluent and other gaseous and fluid streams.

   c) The accident, or high range, radiation monitoring system monitors radiation levels at various locations within the operating area. These are high range instruments used to track radiation levels under accident or post-accident conditions.

   The RMS provides the necessary activity or radiation levels required for determining source terms in dose projection procedures. Key RMS data is linked to the plant computer, which allows information to be passed to the TSC and EOF. The isotopic mix, including isotopes such as those in Table 3 of NUREG-0654, is based upon a default accident mix. Refer to the UFSAR for further detail on the RMS capabilities and design.

2) Liquid and Gaseous Sampling Systems: The process sampling system consists of the normal sampling system and additional sampling panels located throughout the plant. Sampling systems are installed or can be modified to permit sampling even under severe accident conditions.

   The sampling systems use a number of manual sampling techniques to enable sampling operations over a wide range of plant conditions. It is capable of providing information relative to post-accident plant conditions to allow operator actions to be taken to mitigate and control the course of an accident. Refer to the UFSAR for further detail on sampling capabilities.

3) Portable Radiation Monitoring Equipment: Portable radiation survey instruments are available for a wide variety uses such as area, sample, and personnel surveys and continued accident assessment. Instruments are stored throughout the plant and in the emergency facilities.

c. Process Monitors: The Control Room and applicable redundant backup locations are equipped with extensive plant process monitors for use in both normal and emergency conditions. These indications include but are not limited to liquid levels, flow rates, status or lineup of equipment components. This instrumentation provides the basis for initiation of corrective actions.

1) Plant Monitoring/Information System: A plant monitoring/information system provides the data acquisition and database capability for performing plant monitoring and functions. The system is designed to scan, convert to engineering units, make reasonability and alarm limit checks, apply required transformations, store for recall and analysis, and display the reading of transformed data from plant instrumentation. The system scans flows, pressures, temperatures, fluid levels, radiation levels, equipment, and valve status at required frequencies. Scanned variables are quality tagged. The system provides for short and mid-term storage of data for on-line retrieval and fast recall, and long term storage to appropriate media.

2) Safety Parameter Display (SPDS) & Plant Parameter Display (PPDS) Systems: SPDS and PPDS provide a display of plant parameters from which the safety status of operation may be assessed in the Control Room, TSC and EOF. The primary function of the SPDS and PPDS is to help operating personnel in the Control Room make quick assessments of plant safety status. SPDS and/or PPDS displays in the TSC and EOF promote the exchange of information between these facilities and the Control Room and assists the emergency organization in the decision making process.

d. Fire Detection System: The Fire Detection System is designed to quickly detect visible or invisible smoke (or other products of combustion) and/or heat in designated areas of the plant. The fire alarm communication systems and subsystems are located at strategic points throughout the plant to warn personnel of a nuclear incident or other emergency conditions. Existing plant alarm systems are sufficiently audible to alert personnel in the event of a fire or need for assembly. These alarm communication systems consist of warning sirens and lights (in high noise areas) and the PA system. Refer to the Fire Hazards Analysis for further description of the station’s fire protection system.

6. Monitoring Equipment Offsite

Constellation has made provisions to acquire data from and have access to the following offsite sources of monitoring and analysis equipment:

a. Geophysical Monitors: In the event that the onsite meteorological tower or monitoring instrumentation becomes inoperative and the contracted weather provider cannot be contacted, meteorological data may be obtained directly from the National Weather Service or the internet.

A considerable array of seismometers are located in the region. A central point of contact to obtain information about a seismic event is the National Earthquake Information Service in Golden, Colorado.

Constellation Nuclear Corporate Offices can coordinate hydrology and seismology expertise in the event onsite information becomes unavailable.

b. Radiological Environmental Monitors and Sampling: Constellation Nuclear has contracted with a company to conduct an extensive offsite environmental monitoring program to provide data on measurable levels of radiation and radioactive materials in the environs. The program (described fully in the Offsite Dose Calculation Manual), includes:

- Fixed continuous air samplers.
- Routine sampling of river water; milk and fish.
- A fixed dosimeter monitoring network.

The dosimeter program consists of the following elements:

- A near-site ring of dosimeters covering the 16 meteorological sectors.
- A 16-sector ring of dosimeters placed in a zone within about 5 miles from the plant.
- Dosimeters placed at each of the normal fixed air sampler locations (typically about 8-15 air samplers per nuclear station).

c. Laboratory Facilities: External facilities for counting and analyzing samples can be provided by the other Constellation Nuclear stations, state, federal or contracted laboratories. These laboratories can act as backup facilities in the event that the affected station's counting room and laboratory become unusable or the offsite radiological monitoring and environmental sampling operation exceeds the capacity or capability of the station laboratory during an emergency. It is estimated that these laboratories will be able to respond within several hours from initial notification.

Outside analytical assistance may be requested from state and federal agencies, or through contracted vendors. The state maintains a mobile radiological laboratory that provides the primary means of analyzing off-site environmental samples. The NRC mobile laboratory may be made available for Site Area and General Emergencies. The DOE, through the Radiological Assistance Program (RAP) has access to any national laboratory with a Bell Lab contract (e.g., Brookhaven, Oak Ridge, Lawrence Livermore, etc.).

A general description of the laboratory capabilities is provided in Section C.3.

7. Offsite Monitoring Equipment Storage

CRANE maintains a sufficient supply of emergency equipment (such as portable survey, counting, and air sampling instrumentation and other radiological monitoring equipment and supplies) that may be used for environmental monitoring. These supplies meet the initial requirements of two environmental Field Monitoring Teams. During subsequent phases of an emergency, additional equipment is available from other Constellation Nuclear generating stations, vendors and offsite response organizations.

8. Meteorological Monitoring

The station has installed and maintains a meteorological tower equipped with instrumentation for continuous reading of the wind speed, wind direction, air temperature and delta air temperature. Additional capabilities are available to obtain representative current meteorological information from other sources, such as the National Weather Service. A full description of the onsite meteorological capabilities is given in Section H.5.a of this Plan.

9. OSC Capabilities

The OSC provides area for coordinating and planning of OSC activities and the staging of personnel. Further space is available in adjacent offices and locker rooms to accommodate additional personnel as may be required. Alternate locations are available. The onsite storeroom maintains a supply of parts and equipment for normal plant maintenance. These parts, supplies and equipment are available for damage control use as necessary.

Sufficient radiation protection equipment (i.e., protective clothing, respiratory protection gear, KI, and other health physics equipment and supplies) is stored and maintained near the OSC (as well as the other emergency response facilities). Damage Control Team equipment is available near the OSC as well as in the maintenance shops. This equipment includes items such as, portable lighting, and additional portable communications equipment. The OSC is stocked with an assortment of first aid and medical treatment equipment and supplies. The OSC maintains reliable voice communications with the CR, TSC, and EOF. For a complete description of communications equipment, refer to Section F. When an emergency condition exists at one station, additional supplies can be obtained from other unaffected stations and Constellation resources upon request.

10. Facility and Equipment Readiness

Emergency facilities and equipment are inspected and inventoried in accordance with emergency preparedness procedures. These procedures provide information on location and availability of emergency equipment and supplies. An inventory of all emergency equipment and supplies is performed on a quarterly basis and after each use in an emergency or drill. During this inventory, radiation monitoring equipment is checked to verify that required calibration period and location are in accordance with the inventory lists. Inspections include an operational check of instruments and equipment. Equipment, supplies, and parts which have a shelf-life are identified, checked, and replaced as necessary. Sufficient reserves of instruments and equipment are maintained to replace those which are removed from emergency kits or lockers for calibration or repair. The station is responsible for maintaining a supply of KI at the site.

11. General Use Emergency Equipment

Inventory procedures identify the equipment that makes up kits used in an emergency situation available within each emergency facility.

12. Collection Point for Field Samples

The onsite chemistry lab has been designated as the central point for the receipt of radiological field monitoring samples. Sampling and analysis equipment is available for quantitative activity determination of marine and air samples, and qualitative activity determination of terrestrial samples. Sufficient field monitoring equipment is maintained at the station for initial sampling. Instrumentation and equipment utilized for sample activity determination are routinely calibrated to ensure timely availability. Additional facilities as described in C.3 and H.6.c are available for sample and analysis of environmental samples.

Refer to the Station Annex for further description of contracted environmental sampling and analysis support for the site.

Section I: Accident Assessment

To effectively coordinate and direct all facets of the response to an emergency situation, diligent accident assessment efforts are required throughout the emergency. All four emergency classifications have similar assessment methods, however, each classification requires a greater magnitude of assessment effort dependent upon the plant symptoms and/or initiating event(s).

1. Plant Parameters and Corresponding Emergency Classification

Plant system and effluent parameter values are utilized in the determination of accident severity and subsequent emergency classification. Environmental and meteorological events are also determining factors in emergency classification. An emergency condition can be the result of just one parameter or condition change, or the combination of several. The specific symptoms, parameter values or events for each level of emergency classification are detailed in the emergency implementing procedures. Specific plant system and effluent parameters that characterize a classifiable event (EALs) are presented in Addendum 3 to each Station Annex.

In order to adequately assess the emergency condition, each emergency facility has the necessary equipment and instrumentation installed to make available essential plant information on a continuous basis. Evaluation of plant conditions is accomplished through the monitoring of plant parameters both from indication in the Control Room and within the plant. Some of the more important plant parameters to be monitored in the Control Room are assembled into a single display location, which is entitled the "Safety Parameter Display System" (SPDS). The SPDS monitors such parameters as: safety system status and effluent monitor readings. The instrumentation and equipment capabilities available for each emergency facility are described in Section H.

2. Onsite Accident Assessment Capabilities

The resources available to provide initial and continuing information for accident assessment throughout the course of an event include plant parameter display systems, liquid and gaseous sampling system, Area and Process Radiation Monitoring Systems, and Accident Radiation Monitoring Systems. Descriptions of these systems are given in Section H.5.b.

3. Source Term Determination

Source term (or fuel damage) estimations serve several roles within the Constellation Emergency Preparedness Program. For planning purposes, fuel damage considerations are used as the bases for several of the Emergency Action Level (EAL) Initiating Conditions and as the threshold for the declaration of a General Emergency (the definition of a General Emergency specifies conditions which involve ‘substantial’ fuel degradation or melting as one of the bases for classification).

From an implementation perspective, fuel damage estimations provide a means of realistically differentiating between no damage, clad failure, and fuel melt to:

- Evaluate the status of the fuel clad and how their status relates to the risks and possible consequences of the accident.

- Provide input on fuel configuration (coolable or uncoolable) for prioritization of mitigating activities.
- Determine the potential quality (type) and/or quantity (%) of source term available for release in support of projected offsite doses and protective action recommendations.
- Provide information that quantifies the severity of an accident in terms that can be readily understood and visualized.
- Support the determination of radiological protective actions that should be considered for long term recovery activities.

The assessment methodologies utilized by CRANE are intended to provide a rapid best estimate of fuel damage which, when evaluated together, help to develop an overall picture of the extent of fuel damage.

* Containment Radiation Monitors: An indirect method used to determine the amount of core damage. Applicable to Loss of Coolant Accident (LOCA) scenarios. Based upon an end-of-life source term and static nuclide ratio assumptions yielding a limited accuracy. Valid any time following an accident.

  * Core Temperatures: Methods such as Core Exit Thermocouple (CET), Peak Core Temperatures and Hot Leg Temperatures provide indirect methods used to indicate the type and/or amount of core damage. Applicable for all types of accidents. Valid any time following an accident.

  * Core Uncovery: Methods such as Core Uncovery Time, RVLIS Level and Source Range Monitor count rate provide indirect methods used to indicate the type of core damage (clad failure or fuel melt). Applicable for all types of accidents. Provides a relatively accurate estimate of the state of the core early in the event. Valid any time following an accident.

  * Containment Hydrogen Concentration: An indirect method used to establish the type of core damage. Applicable to LOCA type accidents where all the hydrogen generated by the metal-water reaction is released into containment. Valid any time following an accident.

  * Sample Analysis - Isotopic Ratio Comparison: A direct method used to establish the type of core damage. Compares expected isotopic ratios with a sample to determine a general core state. Applicable under all types of accidents. Valid any time following an accident.

  * Sample Analysis - Presence of Abnormal Isotopes: A direct method used to provide a go/no go indication of fuel melt by the presence of unusually high concentrations of the less volatile fission products. Applicable under all types of accidents. Valid any time following an accident.

  * Sample Analysis - Concentration Evaluation: A direct method that yields the most accurate numerical estimations of the amount of core damage. Applicable for all types of accidents. Requires the sampled system(s) be in a steady state that usually prevents its use until the plant is in a stable condition.

4. Effluent Monitor Data and Dose Projection

Dose assessment or projection represents the calculation of an accumulated dose at some time in the future if current or projected conditions continue. During an accident, the Plant Parameter Display System and personal computers will provide the ERO with the timely information required to make decisions. Radiological and meteorological instrumentation readings are used to project dose rates at predetermined distances from the station, and to determine the integrated dose received. Dose assessment methods used by Constellation personnel to project offsite doses include:

A. Monitored Release Points - This method utilizes the plant's effluent radiation monitors and system flow rates. Effluent release points are used to directly calculate a release rate. The point of the release determines the way the source term is affected and is adjusted by the dose assessment process.

B. Containment Leakage/Failure - This method uses a variety of containment failures or leak rates in conjunction with available source term estimations to develop a release rate to the environment. A direct vent of containment can be modeled as a failure to isolate.

C. Release Point Samples - This method uses a sample at the release point and an estimated flow rate to develop a release rate at the point of release.

D. Field Monitoring Team Data - This method uses a field survey or sample and the atmospheric model to back calculate a release rate and ratio concentrations of radioactive material at various points up and downwind of plume centerline.

The computer applications used to provide dose calculations are evaluated against the EPA-400 plume exposure Protective Action Guides (PAGs) applicable for the early phase of an accident. These evaluations place an emphasis on determining the necessity for offsite protective action recommendations. Dose assessment actions will be performed in the following sequence:

First: Onset of a release to 1 hour post-accident: Shift personnel will rely on a simplified computerized dose model to assist them in developing offsite dose projections using real time data from effluent monitors and site meteorology.

Second: 1 hour post-accident to event termination: Estimates of off-site doses based on more sophisticated techniques are provided. Dedicated ERO personnel will analyze the offsite consequences of a release using more complex computerized dose modeling. These additional methods are able to analyze more offsite conditions than the simplified quick method, as well account for more specific source term considerations.

5. Meteorological Information

Local meteorological data is available from an onsite meteorological tower. The data available includes wind speed, wind direction, temperature, and delta temperature. These data are used by the utility, state, and NRC to provide near real-time predictions of the atmospheric effluent transport and diffusion. Meteorological data from the tower is available in the CR, TSC, and EOF. A full description of the onsite meteorological capabilities is given in Section H.5.a.

6. Unmonitored Release

Dose projections can be made during a release through use of actual sample data in situations where effluent monitors are either off-scale or inoperative or the release occurs by an unmonitored flow path. In the absence of effluent sample data, a dose projection can be performed simply by specifying the accident category as a default. The selection of a default accident category defines the mix, the total curies, and the release pathway(s). The total number of curies from a default mix for each isotope is used to provide an upper bound for release concentration, and hence, an upper bound for the dose rate and dose to the public.

7. Field Monitoring

In addition to the capabilities and resources described in Section H.6.b and H.7, CRANE maintains the ability to take offsite air samples and to directly measure gamma dose rates the event of an airborne or liquid release. The capability to take offsite soil, water, and vegetation samples is also provided by either the Field Teams or a contracted vendor.

The environmental monitoring equipment, as described in Section H, contain portable survey, counting, and air sampling instrumentation and other radiological monitoring equipment and supplies to be used by the Field Monitoring Teams. Samples are taken at predetermined locations as well as those specified both during and after a release. Environmental measurements are used as an aid in the determination and assessment of protective and recovery actions for the general public.

8. Field Monitoring Teams

Field Monitoring Teams are dispatched by CRANE to perform a variety of functions during conditions that may involve significant releases of radioactive materials from the plant. Radiological survey and sample data is used to define affected area boundaries, verify or modify dose projections and protective action recommendations, and assess the actual magnitude, extent, and significance of a liquid or gaseous release.

In addition to contamination and dose rate measurements, the change out of dosimeters and air sampler cartridges can be performed. Other actions may include soil, water and vegetation sampling.

The initial environmental surveys involve simple-to-perform measurements to quickly confirm or modify the dose projections based on plant parameters. Subsequent environmental monitoring efforts will be aimed at further defining the offsite consequences including instituting an expanded program to enable prompt assessments of any subsequent releases from the plant.

The expertise necessary to conduct limited offsite environmental survey and sampling exists onsite 24 hours a day. A minimum of two offsite Field Monitoring Teams are notified and activated at an Alert or higher classification. Teams are composed of two individuals are assembled at the station to test and inventory dedicated survey and sampling equipment. Teams are then dispatched in company or personal vehicles into the surrounding area when a release is or is expected to occur. Radiological survey and sample data is transmitted to the emergency facilities. Vendor/contractor support can be used to perform collection, shipment and analysis of environmental sample media as described in Section B.8.c.

9. Iodine Monitoring

Field monitoring equipment has the capability to detect and measure airborne radioiodine concentrations as low as 1×10^{-7} $\mu Ci/cm^3$ in the presence of noble gases. Interference from the presence of noble gas and background radiation will be minimized by ensuring that monitoring teams move to areas of low background prior to analyzing the sample cartridge. The collected air sample is measured by hand held survey meter as an initial check of the projection derived from plant data to determine if significant quantities of elemental iodine have actually been released (the chemical form that would pose a health hazard).

10. Dose Estimates

Specific procedures exist for the correlation of air activity levels to dose rate for key isotopes. Provisions have been established for estimating integrated dose from the projected and actual dose rates and for the comparison of these estimates with the protective action guides.

11. State Monitoring Capabilities

The states have the ability to dispatch their own field monitoring teams to track the airborne radioactive plume. The states also have the ability and resources to coordinate with federal and utility monitoring teams to compare sample results.

Section J: Protective Response

Protective response consists of emergency actions, taken during or after an emergency situation, which are intended to minimize or eliminate hazards to the health and safety of the public and/or station personnel. A range of protective actions has been developed for emergency workers and the general public in the Plume Exposure Pathway EPZ. Additionally, guidelines have been established to aid in choosing protective actions during an emergency that are consistent with federal guidance. CRANE is responsible for onsite actions, while the responsibility for offsite actions rests with the state, county, and other offsite response agencies.

1. Notification of Onsite Personnel

For all emergency classifications, all personnel within the Protected Area are notified within 15 minutes of the initial classification or escalation of an emergency by recognizable alarms and/or verbal announcements over the plant Public Address (PA) System. Announcements include the emergency classification and response actions to be taken by personnel onsite (such as ERO, non-ERO, contractor personnel, and visitors). Provisions are made to alert personnel in high noise areas and outbuildings within the Protected Area as applicable.

CRANE has identified locations where people might be expected to be present outside the Protected Area but within the Owner Controlled Area. Accountability of persons within the Owner Controlled Area but outside the Protected Area is not required. However, provisions are established for notification of personnel within the Owner Controlled Area any time a Site Evacuation has been initiated, or as otherwise deemed appropriate.

2. Evacuation Locations

If a Site Evacuation is required, nonessential personnel are directed to either assemble within designated Assembly Areas or to immediately evacuate the site. Personnel will be directed to either proceed to their homes or to reassemble at designated offsite locations. Visitors to the station will assemble with and follow the instructions of their escorts. Nonessential personnel within the Protected Area will normally exit through the security building. Personal transportation (if available) will normally be used and established evacuation routes will be followed. Personnel without transportation will be identified and provided transportation as necessary.

3. Radiological Monitoring of Evacuees

Personnel evacuating the site will be monitored for contamination by the portal monitors as they exit the Protected Area, with portable friskers in Assembly Areas, or sent to offsite monitoring locations on an as needed basis.

4. Evacuation

Evacuation is the primary protective action anticipated for onsite personnel not having immediate emergency response assignments. CRANE has identified locations that serve as Assembly Areas and offsite locations for non-essential personnel when they are not instructed to proceed home. The specific locations of these areas are shown in the Station Annex. Implementing procedures describe equipment, supplies and general operation of these facilities. The Station Emergency Director will designate personnel within the Site Boundary as essential or nonessential. Evacuation of non-essential personnel is usually conducted immediately after accountability if a Site Area Emergency or General Emergency has been declared and conditions permit. Evacuation shall commence in accordance with station procedures as directed by the Station Emergency Director or his/her designee, unless one of the following conditions exist:

a. Severe weather conditions threaten safe transport.

b. A significant radiological hazard would be encountered.

c. There is a security threat occurring, which would have an adverse impact on the personnel while leaving the site.

d. A condition similar to the above in magnitude, which in the opinion of the Station Emergency Director would adversely affect the site personnel.

Security forces will be dispatched, when available, to access road(s) to control entry to site facilities. Unauthorized and non-ERO personnel will be denied entry.

The initiation of a site evacuation will be reported to the appropriate state/local agency.

Constellation has established the implementation of alternate onsite protective actions for security-based events that are more appropriate than the actions for radiological emergencies. These alternate protective actions could include taking immediate cover, immediate protected area evacuation, immediate owner controlled area evacuation, and dispatch of the ERO to their alternate reporting center.

5. Accountability

The purpose of Accountability is to determine the locations of all personnel inside the Protected Area and to muster emergency personnel at prearranged locations. When Accountability of onsite personnel is determined to be necessary by the Station Emergency Director, all personnel within the protected area shall be accounted for and the names of missing individuals (if any) are determined within thirty (30) minutes of a Site Area Emergency or higher classification.

Accountability is usually performed in conjunction with Assembly, and is required to be initiated whenever a Site Area Emergency or higher classification is declared. The movement of personnel for the purposes of Accountability may be delayed if their health and safety could be in jeopardy, such as severe weather or for security concerns.

If it is determined that the prearranged Assembly Area is unfit for personnel, the Station Emergency Director may designate an alternative Assembly Area and direct personnel using appropriate communication systems that are available.

Once established, Accountability within the Protected Area is maintained throughout the course of the event. Should missing personnel be identified, search and rescue operations are initiated.

6. Provisions for Onsite Personnel

CRANE maintains an inventory of respiratory protection equipment, anti-contamination clothing, and KI that is made available to emergency workers remaining onsite should conditions warrant. During the course of an emergency, protective actions are considered to minimize radiological exposures or contamination problems associated with all onsite personnel. For those who must work within the restricted area of the affected site, measures that are considered are:

a. Use of Respirators: On-shift and emergency response personnel use respiratory protection in any environment involving exposure to high level gaseous activity or oxygen deficient atmosphere, or where air quality is in doubt. In the presence of airborne particulates, emergency response personnel may be directed by health physics personnel to use full-face filter type respirators. The criteria for issuance of respiratory protection are described in Radiation Protection procedures.

b. Use of Protective Clothing: Anti-contamination clothing, located in the TSC, OSC and station dress out areas is available for use by onsite personnel. The criteria for issuance of protective clothing are described in Radiation Protection procedures.

c. Use of Potassium Iodide (KI): The use of KI may be recommended when a projected dose of 50 Rem Committed Dose Equivalent (CDE) is exceeded for an emergency worker's thyroid. The basis of the 50 Rem is specified in EPA 400-R-92-001, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents." CRANE is responsible for maintaining a supply of KI onsite. The Station Emergency Director has the responsibility for approval of issuing KI to Constellation Nuclear emergency workers.

7. Mechanism for Implementing Protective Action Recommendations

Plant conditions, projected dose and dose rates, and/or field monitoring data are evaluated to develop PARs for the purpose of preventing or minimizing exposure to the general public. PARs are provided to the offsite agencies responsible for implementing protective actions for the general public within the 10-mile EPZ. PARs are approved by the Emergency Director in Command and Control.

In an emergency that requires immediate protective actions be taken prior to activation of the offsite emergency facilities, PARs are provided directly to the state and county 24 hour warning points by the Emergency Director.

8. Evacuation Time Estimates (ETEs)

The evacuation time estimates (ETE) were developed in accordance with NUREG/CR-7002, Criteria for Development of Evacuation Time Estimate Studies. Section IV of Appendix E to 10CFR50 requires that an analysis of the time required to evacuate be provided for various sectors and distances within the plume exposure pathway EPZ for transient and permanent residents which includes special facilities schools, nursing homes, hospitals, and recreational areas The evacuation time estimate (ETE) is a calculation of the time to evacuate the plume exposure pathway emergency planning zone (EPZ), which is an area with a radius of about 10 miles around the station.

The ETE study uses population data from the decennial census. The evacuation times are based on a detailed consideration of the EPZ roadway network and population distribution. The ETE Study is contained in an addendum to the station Annex and presents evacuation times for daytime and nighttime scenarios under various weather conditions for the evacuation of various areas around the station.

Within 365 days of the availability of each decennial census data from the U.S. Census Bureau, each station shall develop an ETE analysis using this decennial data and submit it under 10CFR50.4 to the NRC. The ETE analysis shall be submitted to the NRC at least 180 days before using it to form protective action recommendations and providing it to State and local governmental authorities for use in developing offsite protective action strategies.

During the years between decennial censuses, EPZ permanent resident population changes are estimated once a year, but no later than 365 days from the date of the previous estimate, using the most recent U.S. Census Bureau annual resident population estimate and State/local government population data, if available. If at any time during the decennial period, the EPZ permanent resident population increases such that it causes the longest ETE value for the 2-mile zone or 5-mile zone, including all affected Emergency Response Planning Areas, or for the entire 10-mile EPZ to increase by 25 percent or 30 minutes, whichever is less, from the currently NRC approved or updated ETE, the ETE analysis will be updated to reflect the impact of that population increase. These estimates are available for NRC inspection during the period between decennial censuses and will be submitted to the NRC with any updated ETE analysis under 10CFR50.4 no later than 365 days after the determination that the criteria for updating the ETE have been met and at least 180 days before using it to form protective action recommendations and providing it to State and local governmental authorities for use in developing offsite protective action strategies.

9. Capability of Implementing Protective Action Recommendations

The responsibility for implementing protective measures based on protective action guides for the offsite population at risk is the responsibility of the state and local governments. Detailed procedures for public protective actions are contained in the state and other local radiological emergency response plans as appropriate.

The state agencies are responsible for evaluation of Constellation Nuclear recommended protective actions and preparing a recommendation to the Governor, or his/her appointed agent. Only when the state acts under the Governor's order does a recommended protective action become a directed protective action.

If the plant conditions are stable and offsite radiological conditions are such that the public health and safety are not endangered, then return to evacuated areas may be discussed with the affected state(s). State authorities are responsible for actually recommending return and transmitting this recommendation.

10. Implementation of Protective Action Recommendations

The utility, state, and county emergency plans used to implement the protective measures for the plume exposure pathway take numerous factors into consideration as stated in NUREG-0654 II.J. Among these considerations are:

a. Most of the public evacuees are expected to travel in their own vehicles, leaving the EPZ via designated evacuation routes. The Station Annex shows the evacuation routes, EPZ Subareas and pre-selected sampling/monitoring points. The state and county plans contain official maps and information on the locations of off-site centers.

b. The population distribution around the station. Population distribution for the plume exposure EPZ is illustrated in the Station Annexes.

c. As indicated in Section E, offsite agencies are notified in the event the Emergency Plan is activated. State and county agencies have the capability to notify all members of the transient and resident population within the Plume Exposure Pathway EPZ.

d. NUREG-0654 II.J.10.d-l items are addressed separately in state and county emergency plans.

e. At a General Emergency classification, Constellation Nuclear will provide the state with recommendations for protective actions for the public. For incidents involving actual, potential, or imminent releases of radioactive material to the atmosphere, EPA 400-R-92-001, the NRC Response Technical Manual (RTM-96) and NUREG-0654, Supp. 3, Revision 1 are used as the basis for the general public PARs.

1) Plant Based PARs

Station specific PAR Flowcharts have been developed to aid Constellation Nuclear personnel providing PARs based on the above. Station specific PAR Flowcharts with Subarea or Sector tables are documented in the Constellation EP Implementing Procedures, including station-specific requirements regarding PAR determination. These flowcharts and tables provide technically based Protective Action Recommendations based on plant conditions and core damage indicators as applicable to the Constellation site and described within the implementing procedures. Possible plant based PARs issued by Constellation Nuclear, in support of NUREG-0654 Supp. 3, at a General Emergency could include as appropriate for the Station:

- Response to a Rapidly Progressing Severe Accident.
- Utilization of the staged evacuation concept as determined by station ETE's.
- Shelter of the general public in response to but not limited to impediments to evacuation, or Hostile Action event.
- Evacuation of the general public.

In addition to the above actions to minimize or prevent potential exposure to radiation, a recommendation of "monitor and prepare**"** will be issued for the remainder of the EPZ.

2) Dose Based PARs

Evacuation is recommended if projected doses reach the minimum EPA PAGs ($\geq$ 1 Rem EPA TEDE[1] or $\geq$ 5 Rem CDE Thyroid).

Many assumptions exist in dose assessment calculations, involving both source term and meteorological factors, which make computer predictions over long distances highly questionable. However, in the event dose assessment results indicate the need to recommend actions beyond the outer EPZ boundaries, which is past 10 miles, Field Monitoring Teams are dispatched to downwind areas to verify the calculated exposure rates prior to issuing PARs outside the EPZ. In the event dose assessment results indicate the need to recommend actions beyond the outer EPZ boundaries (past 10 miles):

- If Field Monitoring Teams have been dispatched from the site, then dose assessment exposure rates will be verified prior to issuing any recommended action.
- If Field Monitoring Teams have not been dispatched from the site, then issuing recommended actions will not be delayed waiting on Field Teams.

[1] EPA TEDE is defined as the sum of the doses from external exposure and inhalation from the plume, and from 4 days of external exposure to deposited materials.

Constellation personnel normally do not have the necessary information to determine whether off site conditions would require sheltering instead of evacuation. External factors (such as road conditions, traffic/traffic control, weather, or offsite emergency response capabilities) are determined by the state.

11. Ingestion Pathway Protective Measures

The responsibility for specifying protective measures to be used for the ingestion pathway rests with the state. These measures include the methods for protecting the public from consumption of contaminated water and foodstuffs.

12. Monitoring of Evacuees

The state and county organizations have the capability to register and monitor evacuees at designated reception centers. This capability includes personnel and equipment capable of monitoring residents and transients evacuating from the plume exposure EPZ and arriving at the reception centers, in accordance with FEMA guidelines.

Section K: Radiological Exposure Control

This section of the plan describes the means for controlling emergency worker radiological exposures during an emergency, as well as the measures that are used by Constellation to provide necessary assistance to persons injured or exposed to radiation and/or radioactive materials. Exposure guidelines in this section are consistent with EPA Emergency Worker and Lifesaving Activity Protective Action Guides described in EPA 400-R-92-001.

1. Emergency Exposure Guidelines

Being licensed by the NRC, all Constellation Nuclear generating stations maintain personnel exposure control programs in accordance with 10 CFR 20 under normal operating conditions. The Station Emergency Director is assigned the non-delegable responsibility for authorizing personnel exposure levels under emergency conditions per EPA-400. In emergency situations, workers may receive exposure under a variety of circumstances in order to assure safety and protection of others and of valuable property. These exposures will be justified if the maximum risks or costs to others that are avoided by their actions outweigh the risks to which the workers are subjected. The Emergency Worker Dose Limits are as follows:

Dose Limit (Rem TEDE)	Activity	Condition
0-5	All	Personnel should be kept within normal 10 CFR 20 limits during bona fide emergencies, except as authorized for activities as indicated below.
5-10	Protecting valuable property	Lower dose not practicable.
10-25	Lifesaving or protection of large populations	Lower dose not practicable.
> 25	Lifesaving or protection of large populations	Only on a voluntary basis to persons fully aware of the risks involved.

Limit dose to the lens of the eye to 3 times the above values and doses to any other organ (including skin and body extremities) to 10 times the above values.

Whenever possible, the concurrence of the Station's Radiation Protection (Department) Manager should be secured before exposing individuals to dose equivalents beyond the EPA-400 lower limit.

2. Emergency Radiation Protection Program

The TSC Radiation Protection Manager is the individual responsible for the implementation of the radiation protection actions during an emergency. Radiation protection guidelines include the following:

- Volunteers over forty-five years of age are considered first for any emergency response action requiring exposure greater than normal limits. Routine dose limits shall not be extended to emergency dose limits for declared pregnant individuals. As in the case of normal occupational exposure, doses received under emergency conditions should be maintained as low as reasonably achievable.

- Persons undertaking any emergency operation in which the dose will exceed 25 Rem TEDE should do so only on a voluntary basis and with full awareness of the risks involved including the numerical levels of dose at which acute effects of radiation will be incurred and numerical estimates of the risk of delayed effects.

- In the context of the emergency limits, exposure of workers that is incurred for the protection of large populations may be considered justified for situations in which the collective dose avoided by the emergency operation is significantly larger than that incurred by the workers involved.

- Exposure accountability is maintained and proper personnel radiological monitoring equipment is provided for all personnel during emergency conditions.

- Access to high radiation areas is only permitted with prior approval of the applicable Radiation Protection Manager. Personnel are not allowed to enter known or potential high radiation areas unless their exposure has been properly evaluated.

- Periodic habitability surveys of emergency facilities are performed during an emergency. If the facility is determined to be uninhabitable, the facility is evacuated in order to prevent or minimize exposure to radiation and radioactive materials. Alternate assembly areas are established, as necessary, to relocate and monitor evacuated personnel.

3. Personnel Monitoring

a. Emergency workers will receive DLR badges and personal self-reading dosimeters capable of measuring expected exposures on a real time basis. The capability exists for the emergency processing of DLRs on a 24-hour per day basis, if necessary.

b. Emergency worker dose records are maintained by the Radiation Protection Managers (as appropriate) in accordance with the emergency and radiological protection procedures. Emergency workers are instructed to read their dosimeters frequently. DLRs may be processed with increased periodicity.

4. Non-Constellation Personnel Exposure Authorization

The responsibility for authorizing non-Constellation emergency workers (i.e. state and local agency emergency workers) to receive exposures in excess of the EPA General Public Protective Action Guides rests with the state and county organizations, except when such emergency workers are onsite. Authorization of exposures in excess of EPA General Public Protective Action Guides, in this latter instance, rests with the Station Emergency Director.

5. Contamination and Decontamination

During an emergency, the Station Emergency Director is responsible for preventing or minimizing personnel exposure to radioactive materials deposited on the ground or other surfaces. Special consideration should be given to setting up contamination control arrangements for personnel entering the OSC after completion of assigned activities.

a. During emergency conditions, normal plant contamination control criteria will be adhered to as much as possible. However, these limits may be modified by the applicable Radiation Protection Manager per existing Radiation Protection procedures, should conditions warrant.

b. Contamination Control Means: Personnel found to be contaminated will normally be attended to at decontamination areas located onsite. Temporary decontamination areas can also be set up inside at various locations. Decontamination showers and supplies are provided onsite with additional personnel decontamination equipment and capabilities. Shower and sink drains in the controlled area are routed to the miscellaneous waste processing system where the liquid is processed and monitored prior to discharge. Potentially contaminated emergency vehicles will be surveyed before they are allowed to leave the plant or offsite assembly area. If the survey area is not suitable for monitoring and decontamination due to radiological or other concerns, vehicles will be surveyed at an alternate location.

6. Contamination Control Measures

Controls are established 24 hours per day to contain the spread of loose surface radioactive contamination.

a. Contaminated areas are isolated as restricted areas with appropriate radiological protection and access control. Personnel leaving contaminated areas are monitored to ensure they and their clothing are not contaminated. If contamination above acceptable levels is found, they will be decontaminated in accordance with plant procedures. If normal decontamination procedures do not reduce personnel contamination to acceptable levels, the case will be referred to a competent medical authority. Supplies, instruments, and equipment that are in contaminated areas or have been brought into contaminated areas will be monitored prior to removal. If found to be contaminated, they will be decontaminated using normal plant decontamination techniques and facilities or may be disposed of as radwaste. Contaminated vehicles will be decontaminated before being released.

b. Measures will be taken to control onsite access to potentially contaminated potable water and food supplies. Under emergency conditions when uncontrolled releases of activity have occurred, eating, drinking, smoking, and chewing are prohibited in all station emergency response facilities until such time as habitability surveys indicate that such activities are permissible.

c. Restricted areas and contaminated items will be returned to normal use when contamination levels have been returned to acceptable levels. Contamination control criteria for returning areas and items to normal use are contained in the plant procedures.

7. Decontamination of Relocated Personnel

Nonessential onsite personnel may be evacuated to an offsite relocation center or assembly area, as discussed in Section J. Radiological controls personnel at that location monitor evacuees and determine the need for decontamination. Existing and temporary facilities to limit contamination and exposure will be utilized and established at the site as necessary during an emergency situation. In the event that decontamination of evacuees locally is not possible, personnel will be sent to designated locations for monitoring and decontamination. Provisions for extra clothing are made and suitable decontaminates are available for the expected type of contaminations, particularly with regards to skin contaminations.

Section L: Medical and Public Health Support

This section describes the arrangements for medical services for contaminated injured individuals sent from the station.

1. Offsite Hospital and Medical Services

Hospital personnel have been trained, and hospitals are equipped to handle contaminated or radiation injured individuals. Specifically, training of medical support personnel at the agreement hospitals will include basic training on the nature of radiological emergencies, diagnosis and treatment, and follow-up medical care. Station personnel are available to assist medical personnel with decontamination radiation exposure and contamination control. Arrangements, by letter of agreement or contract, are maintained by Crane Clean Energy Center with a qualified hospital located in the vicinity of Crane for receiving and treating contaminated or exposed persons with injuries requiring immediate hospital care. Constellation Nuclear shall provide medical consultants to aid in any special care necessary at these facilities.

Arrangements are also maintained with a qualified medical facility well equipped and staffed for dealing with persons having radiation injuries and whenever necessary, such persons will be transferred to this hospital facility for extended specialized treatment. Constellation Nuclear will have available to the staff of this hospital, medical consultants who will provide the direction of the special care necessary for the treatment of persons having radiation injuries.

These agreements are verified annually. Refer to section II.P.4 for details.

2. Onsite First Aid Capability

CRANE maintains onsite first aid supplies and equipment necessary for the treatment of contaminated or injured persons. In general, physicians or nurses are not staffed at CRANE, and as such, medical treatment given to injured persons is of a "first aid" nature. CRANE does have an industrial hygiene advisor. Additionally, the Radiation Protection Technicians at CRANE are experienced in controlling radioactive contamination and decontamination work. Station personnel are also trained and qualified to administer first aid. At least two of these individuals are available on shift at all times. The functions of station personnel in handling onsite injured people are:

1) Afford rescue;

2) Administer first aid including such resuscitative measures as are deemed necessary;

3) Begin decontamination procedures; and

4) Arrange for suitable transportation to a hospital when required.

Primary attention shall be directed to the actual factors involved in the treatment of casualties, such as: control of bleeding, resuscitation including heart and lung, control of bleeding after resuscitation, protection of wounds from bacterial or radioactive contamination and the immobilization of fractures.

Station personnel provide an initial estimate of the magnitude of surface contamination of the injured and preliminary estimates of total body dose to the injured. Primary rapid and simple decontamination of the surface of the body (when possible and advisable) before transportation to a designated hospital may be carry out as directed or performed by Radiation Protection personnel. When more professional care is needed, injured persons are transported to a local clinic or hospital. Contaminated and injured persons are transported to a dedicated specified facility.

3. Medical Service Facilities

Because of the specialized nature of the diagnosis and treatment of radiation injuries, Corporate Emergency Preparedness maintains an agreement with REAC/TS. REAC/TS is a radiological emergency response team of physicians, nurses, health physicists and necessary support personnel on 24-hour call to provide consultative or direct medical or radiological assistance at the REAC/TS facility or at the accident site. Specifically, the team has expertise in and is equipped to conduct: medical and radiological triage; decontamination procedures and therapies for external contamination and internally deposited radionuclides, including chelation therapy; diagnostic and prognostic assessments or radiation-induced injuries; and radiation dose estimates by methods that include cytogenetic analysis, bioassay, and in vivo counting.

In addition to REAC/TS, the Station Annex may identify additional medical consultants, based on agreements with local hospitals, to support personnel training and medical response.

4. Medical Transportation

Arrangements are made by CRANE for prompt ambulance transport of persons with injuries involving radioactivity to designated hospitals. Such service is available on a 24-hour per day basis and is confirmed by letter of agreement. Radiation monitoring services shall be provided by CRANE whenever it becomes necessary to use the ambulance service for the transportation of contaminated persons.

A qualified Radiation Protection person shall accompany the ambulance to the hospital. Additional Radiation Protection personnel may be contacted and dispatched to local hospitals to assist in the monitoring and decontamination of the injured victim and hospital and ambulance facilities and personnel.

Section M: Reentry and Recovery Planning

This section describes the measures to be taken for reentry into the areas of CRANE which have been evacuated as a result of an accident. It also outlines the Constellation Nuclear Recovery Organization and its concepts of operation.

1. Reentry and Recovery

a. Evaluating Reentry Conditions

During an emergency, immediate actions are directed toward limiting the consequences of the accident to afford maximum protection to station personnel and the general public. Once corrective measures have been taken and effective control of the plant has been re-established, a more methodical approach to reentry is taken. This Emergency Plan divides reentry into two separate categories:

- Reentry *during the emergency phase of an accident* is performed to save a life, control a release of radioactive material, prevent further damage to plant equipment or restore plant equipment. If necessary, this category of reentry may be performed using emergency exposure limits. Briefings, rather than written radiation protection procedures, may be used when making these entries.

  All reentry activities conducted during the emergency are authorized by the Station Emergency Director and coordinated by the OSC Director and the Radiation Protection Manager.

- Reentry *during the recovery phase of an accident* is performed using normal exposure limits. Either normal procedures or procedures that consider existing as well as potential conditions inside affected areas are developed specifically for each reentry.

  Reentry activities during the recovery phase are authorized by the Recovery Director and coordinated by the recovery organization managers in charge of personnel making the reentry.

The following items are considered when planning for any reentry:

- Review of available radiation surveillance data to determine plant areas potentially affected by radiation and/or contamination.

- Review of radiation exposure history of personnel required to participate in the accident mitigation or recovery operations.

- Determination of the need for additional personnel and the sources of these additional personnel.

- Review of adequacy of radiation survey instrumentation and equipment (types, ranges number, calibration, etc.).

- Review of non-radiological hazards and required protective measures (e.g., fire, electrical, Hazmat).
- Pre-planning of activities and briefings for the reentry team that include the following:
  - Personnel knowledge requirements.
  - Methods and procedures that will be employed during the entry.
  - Specific tasks to be performed.
  - Anticipated radiation and contamination levels.
  - Radiation survey equipment and types and ranges of dosimetry required.
  - Shielding requirements and availability.
  - Appropriate communications.
  - Protective clothing and equipment requirements.
  - Access control procedures.
  - Decontamination requirements.
  - De-briefing requirements.
  - Respiratory protection.
- A review of security controls to prevent unauthorized or unintentional entry into hazardous areas.

b. Evaluating Entry into Recovery

The Recovery Phase is that period when major repairs are being performed to return the plant to an acceptable condition and the possibility of the emergency condition degrading no longer exists. Once the plant has been stabilized, contained and controlled, the Recovery Phase may be entered. It is the responsibility of the Station Emergency Director to classify Recovery after obtaining authorization from the Corporate Emergency Director.

Establishment of Recovery can be conducted from any emergency classification level. However, it is possible that the lower classifications of Unusual Event and Alert will conclude with the event being terminated. There may be cases where certain EAL initiating conditions remain exceeded, but the station is under control and no further danger of degradation exists. In such a case, it may be appropriate to enter Recovery. Site Area and General Emergencies will require a Recovery Phase to be established prior to event termination. Constellation Nuclear may consult with/notify cognizant governmental agencies prior to declaring Recovery or event termination.

Termination/Recovery considerations are contained in the implementing procedures to provide guidance for evaluating the risk of entering Recovery without alleviating the intent of the Initiating Condition. The purpose of Recovery is to provide the necessary personnel to handle the long-term activities and to return the plant to an acceptable condition.

The following conditions are guidelines for the determination of establishing Recovery (this is not intended to be a complete list and additional criteria may apply, depending on the specifics of the event):

- The risk to the health and safety of the public has been mitigated.
- Plant parameters and equipment status have been established and controlled.
- In-plant radiation levels are stable or decreasing, and acceptable, given the plant conditions.
- The potential for uncontrolled releases of radioactive material to the environment has been eliminated.
- Environmental monitoring has been established.
- The radioactive plume has dissipated and plume tracking is no longer required (the only environmental assessment activities in progress are those necessary to assess the extent of deposition resulting from passage of the plume).
- Constellation Nuclear workers have been protected.
- Any security threat has been neutralized, and/or plant security is under the direction of Constellation Nuclear personnel.
- Adequate plant safety systems are operable.
- The reactor is in a stable shutdown condition and long-term core cooling is available.

- The fuel pool damage has been mitigated, or spent fuel damage has been contained and controlled.
- Primary and/or secondary containment integrity has been established.
- Plant systems and equipment are restored and/or replaced such that plant conditions are stable highly unlikely to degrade further.
- Conditions that initiated the emergency have been contained, controlled, eliminated or stabilized such that the classification is no longer applicable.
- The operability and integrity of radioactive waste systems, decontamination facilities, power supplies, electrical equipment and of plant instrumentation including radiation monitoring equipment.
- Any fire, flood, earthquake or similar emergency condition or threat to security no longer exists.
- All required notifications have been made.
- Discussions have been held with federal, state and county agencies and agreement has been reached to terminate the emergency.
- At an Alert or higher classification, the ERO is in place and emergency facilities are activated.
- Any contaminated injured person has been treated and/or transported to a medical care facility.
- Offsite conditions do not unreasonably limit access of outside support to the station and qualified personnel and support services are available.

It is not necessary that all conditions listed above be met; however, all items must be considered prior to entering the recovery phase. For example, it is possible after a severe accident that some conditions remain that exceed an Emergency Action Level, but entry into the Recovery Phase is appropriate.

2. Recovery Organization

Once plant conditions have been stabilized and the Recovery Phase has been initiated, the Emergency Director may form a Recovery Organization for long-term operations. These types of alterations will be discussed with the NRC prior to implementation.

- For events of a minor nature, (i.e. for Unusual Event classifications) the normal on shift organization is normally adequate to perform necessary recovery actions.

- For events where damage to the plant has been significant, but no offsite releases have occurred and/or protective actions were not performed, (i.e. for Alert classifications) the station Emergency Response Organization, or portions thereof, should be adequate to perform the recovery tasks prior to returning to the normal station organization.

- For events involving major damage to systems required to maintain safe shutdown of the plant and offsite radioactive releases have occurred, (i.e. for Site Area Emergency or General Emergency classifications) the station recovery organization is put in place.

The specific members of the station recovery organization are selected based on the sequence of events that preceded the recovery activities as well as the requirements of the recovery phase. The basic framework of the station recovery organization is as follows:

a. The Recovery Director: The Corporate Emergency Director is initially designated as the Recovery Director. The Recovery Director is charged with the responsibility for directing the activities of the station recovery organization. These responsibilities include:

    - Ensuring that sufficient personnel, equipment, or other resources from Constellation and other organizations are available to support recovery.

    - Directing the development of a recovery plan and procedures.

    - Deactivating any of the plant Emergency Response Organization which was retained to aid in recovery, in the appropriate manner. Depending upon the type of accident and the onsite and offsite effects of the accident, portions of the ERO may remain in place after initiation of the recovery phase.

    - Coordinating the integration of available federal and state assistance into onsite recovery activities.

    - Coordinating the integration of Constellation support with federal, state and county authorities into required offsite recovery activities.

    - Approving information released by the public information organization which pertains to the emergency or the recovery phase of the accident.

    - Determining when the recovery phase is terminated.

b. The Recovery Plant Manager: The Station Manager or a designated alternate will become the Recovery Plant Manager. The Recovery Plant Manager reports to the Recovery Director and is responsible for:

    - Coordinating the development and implementation of the recovery plan and procedures.

- Ensuring that adequate engineering activities to restore the plant, are properly reviewed and approved.
- Directing all onsite activities in support of the station recovery effort.
- Designating other Constellation recovery positions required in support of onsite recovery activities.

c. The Recovery Offsite Manager: A senior Corporate Emergency Preparedness or Regulatory Affairs individual, or a designated alternate, is the Recovery Offsite Manager. The Recovery Offsite Manager reports to the Recovery Director and is responsible for:

- Providing liaison with offsite agencies and coordinating Constellation assistance for offsite recovery activities.
- Coordinating Constellation ingestion exposure pathway EPZ sampling activities and the development of an offsite accident analysis report.
- Developing a radiological release report.
- Designating other Constellation recovery positions required in support of offsite recovery activities.

d. The Company Spokesperson: A senior Constellation management individual is designated as the Company Spokesperson. The Company Spokesperson reports to the Recovery Director and is responsible for:

- Functioning as the official spokesperson to the press for Constellation on all matters relating to the accident or recovery.
- Coordinating non-Constellation public information groups (federal, state, county, etc.).
- Coordinating media monitoring and rumor control.
- Determining what public information portions of the ERO will remain activated.

The remainder of the recovery organization is established and an initial recovery plan developed at the end of the emergency phase or just after entry into the recovery phase. Consideration is given to recovery activity needs and use of the normal station organizations. Individual recovery supervisors may be designated in any or all of the following areas:

- Training
- Radiation Protection
- Chemistry
- Technical/Engineering Support

- Nuclear Oversight
- Operations
- Security
- Maintenance
- Special Offsite Areas (Community Representatives, Environmental Samples, Investigations, etc.)

3. Recovery Phase Notifications

When the decision is made to enter the recovery phase, all members of the Constellation ERO are informed of the change. All Constellation personnel are instructed of the Recovery Organization and their responsibilities to the recovery effort.

4. Total Population Exposure

Total population exposure calculations are performed and periodically updated during the recovery phase of an accident. A method has been developed for estimating the total population exposure resulting from the accident from data collected in cooperation with the state and other federal agencies. Total population exposure is determined through a variety of procedures including:

- Examination of pre-positioned dosimeters.
- Bioassay.
- Estimates based on release rates and meteorology.
- Estimates based on environmental monitoring of food, water, and ambient dose rates.

The state will be the lead agency in the collection and analysis of environmental air, soil, foliage, food, and water samples and for the generation of radiation monitoring reports. Constellation Nuclear environmental sampling activities will be coordinated with state efforts, as requested, and results shared with cognizant agencies.

Section N: Drill and Exercise Program

This section describes the Drill and Exercise Program that Constellation Nuclear has implemented to:

- Verify the adequacy of the Emergency Preparedness Program.
- Develop, maintain, and evaluate the capabilities of the ERO to respond to emergency conditions and safeguard the health and safety of station personnel and the general public.
- Identify deficiencies in the Emergency Plan and the associated procedures, or in the training of response personnel, and ensure that they are promptly corrected.
- Ensure the continued adequacy of emergency facilities, supplies and equipment, including communications networks.

The Exercise Cycle is defined as an eight-year period of time. At each station, the eight-year cycle began in the same year that the first Hostile Action based exercise was performed. During each eight-calendar year exercise cycle, sites shall vary the content of scenarios during exercises to provide the opportunity for the ERO to demonstrate proficiency in the key skills necessary to respond to the following scenario elements:

- hostile action directed at the plant site,
- no radiological release or an unplanned minimal radiological release that does not require public protective actions,
- an initial classification of or rapid escalation to a Site Area Emergency or General Emergency,
- implementation of strategies, procedures, and guidance developed under § 50.155 and integration of offsite resources with onsite response.

Constellation uses drill and exercise scenarios that provide reasonable assurance that anticipatory responses do not result from preconditioning of participants. Such scenarios include a wide spectrum of radiological releases and events, including hostile action

1. Exercises

a. Biennial Exercises

Federally prescribed exercises are conducted at CRANE in order to test the adequacy of timing and content of implementing procedures and methods; to test emergency equipment and communication networks; and to ensure that emergency personnel are familiar with their duties. Exercises involving offsite agency participation, required under Section F.2.c & d to 10 CFR 50 Appendix E, are conducted based on the FEMA Radiological Emergency Preparedness Manual and the state and local emergency response plans.

Partial participation means appropriate offsite authorities shall actively take part in the exercise sufficient to test direction and control functions to include protective action decision making related to Emergency Action Levels and communication capabilities among affected state and local authorities and Constellation Nuclear.

Full participation exercises will include appropriate offsite local and state authorities and Constellation personnel physically and actively taking part in testing the integrated capability to adequately assess and respond to an accident at the plant. Additionally, full participation exercises will include testing the major observable portions of the onsite and offsite emergency plans and mobilization of state, local, and Constellation personnel and other resources in sufficient numbers to verify the capability to respond to the accident scenario.

Where partial or full participation by offsite agencies occurs, the sequence of events simulates an emergency that results in the release of radioactivity to the offsite environs, sufficient in magnitude to warrant a response by offsite authorities.

b. Off-Year Exercises

An Off-Year Exercise is conducted at each station during the calendar year when an NRC Evaluated Exercise is not scheduled. An Off-Year Exercise shall involve a combination of at least two facilities in order to demonstrate at least two of the functions of management and coordination of emergency response, accident assessment, protective action decision-making, or plant system repair and corrective actions. For Off-Year Exercises involving no or limited participation by offsite agencies, emphasis is placed on development and conduct of an exercise that is more mechanistically and operationally realistic. Players will be able, by implementing appropriate procedures and corrective actions, to determine the outcome of the scenario to a greater extent than when core damage and the release of radioactivity are prerequisites for demonstration of all objectives.

Exercises provide an opportunity to evaluate the ability of participating organizations to implement a coordinated response to postulated emergency conditions. Exercises are conducted to ensure that all major elements of the Emergency Plan and preparedness program are demonstrated at least once in each exercise cycle. Each station shall conduct at least one off-hours exercise between 6:00 p.m. and 4:00 a.m. every exercise cycle. Weekends and holidays are also considered off-hours periods. Provisions will be made for qualified personnel from Constellation, federal, state, or local governments to observe and critique each exercise as appropriate.

2. Drills

In addition to the exercises described above, Constellation conducts drills for the purpose of testing, developing, and maintaining the proficiency of emergency responders. Drills are scheduled on the Emergency Preparedness annual events plan, which contains provisions for the following drills:

a. Communication Drills

- Monthly - The capability of the Nuclear Accident Reporting System (NARS) to notify the state and local government warning points and EOCs within the plume exposure pathway EPZ are demonstrated. Also, the capability to notify the NRC Region is demonstrated using the Emergency Notification System (ENS) and the Health Physics Network (HPN) where available.

- Quarterly - The capability to notify the NRC Region, FEMA Region, American Nuclear Insurers (ANI) and federal emergency response organizations as listed in the Emergency Response Facilities (ERF) Telephone Directory are demonstrated from the EOF. Also, computer and critical communications equipment shall be functionally tested.

  Communications between states outside the 10 mile EPZ but within the 50-mile EPZ are tested by the host state.

- Annually - The emergency communications systems outlined in Section F are fully tested. This includes (1) communications between the plant and the state and local EOCs and Field Monitoring Teams, and (2) communications between the CR, the TSC, and the EOF.

Each of these drills includes provisions to ensure that all participants in the test are able to understand the content of the messages.

b. Fire Drills: Fire drills shall be conducted at CRANE in accordance with Station Technical Specifications and/or Station procedures.

c. Medical Emergency Drills: A medical emergency drill, involving a simulated contaminated individual, and containing provisions for participation by local support services organizations (i.e., ambulance and support hospital) are conducted annually. Local support service organizations, which support more than one station, shall only be required to participate once each calendar year. The offsite portions of the medical drill may be performed as part of the required biennial exercise.

d. Radiological Monitoring Drills: Plant environs and radiological monitoring drills (onsite and offsite) are conducted annually. These drills include collection and analysis of all sample media (such as, water, vegetation, soil, and air), and provisions for communications and record keeping.

e. Health Physics Drills: Health Physics Drills involving a response to, and analysis of, simulated airborne and liquid samples and direct radiation measurements within the plant are conducted semi-annually. At least annually, these drills shall include a demonstration of the sampling system capabilities, or the Core Damage Assessment Methodology (CDAM) objectives as applicable.

f. Augmentation Drills: Augmentation drills serve to demonstrate the capability of the process to augment the on-shift staff with a TSC, OSC and EOF in a short period after declaration of an emergency. These drills are conducted using the following methods:

- Quarterly, each station will initiate an unannounced off-hours ERO augmentation drill where no actual travel is required. Each region's Corporate ERO shall also perform an unannounced off-hours ERO augmentation drill that may be conducted independent of, or in conjunction with, a station drill.

- At least once per exercise cycle, an off-hours unannounced activation of the ERO Notification System with actual response to the emergency facilities is conducted by each station. Each region's Corporate ERO need only participate once per cycle.

g. Accountability Drills: Accountability drills are conducted annually. The drill includes identifying the locations of all individuals within the protected area.

3. Conduct of Drills and Exercises

Advance knowledge of the scenario will be kept to a minimum to allow "free-play" decision making and to ensure a realistic participation by those involved. Prior to the drill or exercise, a package will be distributed to the controllers and evaluators that will include the scenario, a list of performance objectives, and a description of the expected responses.

For each emergency preparedness exercise or drill conducted, a scenario package is developed that includes at least the following:

a. The basic objective(s) of the drill or exercise and the 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 scenario to include such things as simulated casualties, offsite fire department assistance, rescue of personnel, use of protective clothing, deployment of radiological monitoring teams, and public information activities.

f. A description of the arrangements for and advance materials to be provided to official observers.

Prior approval by the appropriate station management is obtained for all drills and exercises conducted in support of the Emergency Preparedness Program.

4. Critique and Evaluation

Drill and exercise performance objectives are evaluated against measurable demonstration criteria. As soon as possible following the conclusion of each drill or exercise, a critique is conducted to evaluate the ability of the ERO to implement the Emergency Plan and procedures.

A formal written critique report is prepared by Emergency Preparedness following a drill or exercise involving the evaluation of designated objectives or following the final simulator set with ERO participation. The report will evaluate the ability of the ERO to respond to a simulated emergency situation. The report will also contain corrective actions and recommendations.

Biennially, representatives from the NRC observe and evaluate the licensee's ability to conduct an adequate self-critical critique. For partial and full offsite participation exercises both the NRC and FEMA will observe, evaluate, and critique.

Critique comments identified by participants during a training drill where objectives are not formally being evaluated will be reviewed and dispositioned by Emergency Preparedness, but do not require a formal report.

5. Resolution of Drill and Exercise Findings

The critique and evaluation process is used to identify areas of the Emergency Preparedness Program that require improvement. The Emergency Preparedness Manager is responsible for evaluation of recommendations and comments to determine which items will be incorporated into the program or require corrective actions, and for the scheduling, tracking, and evaluation of the resolution to the items.

Whenever exercises and/or drills indicate deficiencies in the Emergency Plan or corresponding implementing procedures, such documents will be revised as necessary.

Remedial exercises will be required if the emergency plan is not satisfactorily tested during the Biennial Exercise, such that NRC, in consultations with FEMA, cannot find reasonable assurance that adequate protective measures can be taken in the event of a radiological emergency. The extent of State and local participation in remedial exercises must be sufficient to show that appropriate corrective measures have been taken regarding the elements of the plan not properly tested in the previous exercises.

Section O: Emergency Response Training

This section describes the emergency response training that is provided to those who may be called upon in an emergency. It outlines the training provided by Constellation Nuclear to both its employees and offsite support personnel requiring site access.

1. Assurance of Training

The Emergency Plan Training Program assures the training, qualification, and requalification of individuals who may be called on for assistance during an emergency. Specific emergency response task training, prepared for each Emergency Plan position, is described in lesson plans and study guides. The lesson plans, study guides, and written tests are contained in the ERO Training Program. Responsibilities for implementing the training program are contained in plant procedures. Constellation personnel who are assigned an Emergency Plan position will receive retraining at a frequency of once per calendar year not to exceed 18 months between training sessions.

Offsite training is provided to support organizations that may be called upon to provide assistance in the event of an emergency. The following outlines the training received by these organizations:

a. Emergency Preparedness shall annually train, or document an annual written offer to train, those non-Constellation Nuclear organizations referenced in the Station Annex that may provide specialized services during a nuclear plant emergency (e.g., local law enforcement, fire-fighting, medical services, transport of injured, etc.). The training made available is designed to acquaint the participants with the special problems potentially encountered during a nuclear plant emergency, notification procedures and their expected roles. Those organizations that must enter the site shall also receive site-specific emergency response training and be instructed as to the identity (by position and title) of those persons in the onsite organization who will control their support activities.

b. Training of offsite emergency response organizations is described in their respective radiological emergency plans, with support provided by Constellation Nuclear as requested.

2. Functional Training of the ERO

In addition to general and specialized classroom training, members of the CRANE ERO receive periodic performance based emergency response training. Performance based training is provided using one or more of the following methods:

- Familiarization Sessions: A familiarization session is an informal, organized tabletop discussion of predetermined objectives.

- Walk Throughs: Consists of a facility walk through to familiarize plant ERO personnel with procedures, communications equipment, and facility layout. Walk throughs also provide the opportunity to discuss facility activities, responsibilities and procedures with an instructor.

- Drills: A drill is a supervised instruction period aimed at testing, developing and maintaining skills in a particular operation. Drills described in Section N of this plan are a part of training. These drills allow each individual the opportunity to demonstrate the ability to perform their assigned emergency functions. During drills, on-the-spot correction of erroneous performance may be made and a demonstration of the proper performance offered by the Controller.

3. First Aid Response

Selected station personnel are trained in accordance with the Constellation Nuclear approved First Aid Program. First-Aid Teams will likely be augmented with additional personnel such as Fire Brigade Members and other personnel qualified to assist in the rescue.

4. Emergency Response Organization Training Program

CRANE ERO personnel who are responsible for implementing this plan receive specialized training. The training program for emergency response personnel is developed based on the requirements of 10 CFR 50, Appendix E and position specific responsibilities as defined in this document.

On-Shift emergency response personnel perform emergency response activities as an extension of their normal duties and are trained annually as part of their duty specific training. Additional Emergency Preparedness information is provided as part of the Station Nuclear General Employee Training.

New ERO personnel receive an initial overview course that familiarizes them with the Emergency Plan by providing basic information in the following areas as well as specific information as delineated in the sections below:

- Planning Basis
- Emergency Classifications
- Emergency Response Organization and Responsibilities
- Call-out of Emergency Organization
- Emergency Response Facilities
- Communications Protocol/Emergency Public Information
- Offsite Organizations

Emergency response personnel in the following categories receive knowledge and/or performance based training initially and retraining thereafter once per calendar year not to exceed 18 months between training sessions.

a. Directors, Managers and Coordinators within the station and corporate ERO: Personnel identified by the Emergency Response Organization Telephone Directory as Directors, Managers and Coordinators for the station and corporate EROs receive training appropriate to their position in accordance with the approved ERO Training Program. These personnel receive specialized training in the areas of:

   - Notifications
   - Emergency Classifications
   - Protective Action Recommendations
   - Emergency Action Levels
   - Emergency Exposure Control

   Selected Directors, Managers, Coordinators and Shift Emergency Directors receive training in accordance with the approved ERO Training Program. Training in accident assessment sufficient to classify an event and to mitigate the consequences of an event are also covered.

b. Personnel Responsible for Accident Assessment:

   The skills and knowledge required to perform plant stabilization and mitigation are a normal function of operations specific positions, as identified in Section B of this plan. Power changes and planned and unplanned reactor shutdowns are handled on a normal operation basis. Subsequent plant stabilization and restoration is pursued utilizing normal operating procedures. Licensed Operators receive routine classroom and simulator training to ensure proficiency in this area.

   1) Active Senior Licensed Control Room Personnel shall have training conducted in accordance with the approved ERO Training Program such that proficiency is maintained on the topics listed below. These subjects shall be covered as a minimum on an annual basis.

      - Event Classification.
      - Protective Action Recommendations.
      - Radioactive Release Rate Determination.
      - Notification form completion and use of the Nuclear Accident Reporting System (NARS).
      - Federal, state and local notification procedures as appropriate.

- Site specific procedures for activating the onsite and offsite ERO.

To remove peripheral duties from the Operations shift, the following group of positions responsible for accident assessment, corrective actions, protective actions, and related activities receive the training listed below:

2) Core Damage Assessment Personnel: During an emergency when core/cladding damage is suspected, a specialized group of trained individuals perform core damage assessment. At a minimum, personnel responsible for core damage assessment receive classroom and hands-on training in the following areas:

   - Available Instrumentation and Equipment
   - Isotopic Assessment and Interpretation
   - Computerized Core Damage Assessment Methodology (CDAM) and/or proceduralized assessment methods.

c. Radiological Monitoring Teams and Radiological Analysis Personnel

1) Offsite Radiological Monitoring: Offsite radiological monitoring is performed by trained individuals who provide samples and direct readings for dose assessment calculations and dose projection comparisons.

   Personnel identified as members of Field Monitoring Teams receive training in accordance with the approved training program. Field Monitoring Team members receive classroom and hands-on training in the following areas:

   - Equipment and Equipment Checks
   - Communications
   - Plume Tracking Techniques

2) Personnel Monitoring: Personnel monitoring is performed by trained individuals who monitor station personnel and their vehicles for contamination during an emergency. Personnel Monitoring Team members receive classroom and hands-on training in the following areas:

   - Personnel Monitoring Equipment and Techniques
   - Decontamination Techniques for Personnel
   - Decontamination Techniques for Vehicles

3) Dose Assessment: Dose Assessment training includes the skills and knowledge necessary for calculation and interpretation of an offsite release and its impact on the environment under varying meteorological conditions. Individuals responsible for performing dose assessment are trained in the following areas:

- Computerized Dose Assessment
- Protective Action Recommendations
- Field Monitoring Team Interface
- Protective Action Guidelines associated with offsite plume exposure doses
- Basic Meteorology

d. Police, Security, and Fire Fighting Personnel

1) Local Police and Fire Fighting Personnel: The local Police and Fire Departments are invited to receive training as outlined in Part 1.a of this section.

2) Security Personnel: Station security personnel are trained in accordance with training defined by the Nuclear General Employee Training (NGET) and Constellation Nuclear Security Program.

3) Fire Control Teams (fire brigades): Station fire brigades are trained in accordance with training defined by the Constellation Nuclear Fire Protection Program. Fire Brigade personnel are considered the primary members of rescue teams and will receive the appropriate EP training as part of their training program. Training also includes rescue of personnel from hazardous environments.

e. Repair and Damage Control Teams: Operations, Maintenance and Radiation Protection personnel are trained as part of their normal job specific duties to respond to both normal and abnormal plant operations.

Operations personnel are trained to: (1) recognize and to mitigate degrading conditions in the plant, (2) mechanically and electrically isolate damaged or malfunctioning equipment, (3) isolate fluid leaks, and (4) minimize transients.

Maintenance personnel are trained to troubleshoot and repair damaged or malfunctioning electrical, mechanical, or instrumentation systems as appropriate to their job classification.

Radiation Protection personnel are trained to assess the radiological hazards associated with equipment repair and instruct personnel as to the appropriate protective clothing requirements, respiratory protection requirements, stay times, and other protective actions specific to the conditions present.

At least 50% of personnel from those departments, who are potential responders to the OSC as Damage Control Team members, are required to be qualified in the use of respiratory protection equipment. This includes in-plant supervision and craft/technicians for the following departments:

- Operations
- Radiation Protection/Chemistry
- Maintenance (mechanical, electrical and I&C)

f. First Aid and Rescue Personnel: First aid and rescue team members receive training as outlined in Part 3 of this section.

g. Local Support Service Personnel: Local support service personnel providing assistance during an emergency are invited to receive training as outline in Parts 1.a and 1.b of this section.

h. Medical Support Personnel: Offsite medical personnel receive specialized training in the handling of contaminated victims and hospital interface. Offsite ambulance and hospital personnel are offered annual training in accordance with a program provided by Emergency Preparedness.

i. Public Information Personnel: Corporate and station personnel responsible for disseminating emergency public information and responding to media and public information requests receive specialized public information training.

j. Communications Personnel: ERO personnel receive training on communications protocol as a part of the initial Emergency Response Overview Course. Personnel using specialized communications equipment that is not part of their normal daily function receive initial and requalification training on the equipment. Personnel involved in notifications to offsite agencies receive specialized training in the notification process.

5. General, Initial, and Requalification Training Program Maintenance

a. Station Departments and Emergency Preparedness share the responsibility for ensuring that the ERO receives all necessary training and retraining. In order to carry this out, responsibilities are assigned as follows:

Corporate Responsibilities for Corporate ERO Personnel

- Scheduling and conducting initial, retraining, and make-up classes.
- Acting as the sole contact point for ensuring attendance.
- Record keeping for the training courses, including dates of scheduled classes and non-attendance information.
- Verifying that all emergency response personnel training records are current.

- Ensure instructional materials are prepared and reviewed every two years.

Station Responsibilities for Station ERO Personnel

- Station management shall ensure the attendance of onsite personnel for training, including required Emergency Plan courses.
- Each Station shall conduct onsite emergency personnel initial and retraining for station Emergency Response Personnel using approved lesson plans.
- The Station Training Department shall provide those shift personnel included in a continuing training program an annual review of the following items as a minimum:
  - Assembly Areas
  - Emergency Response Facility assignment
  - Potential Hazards (radiological and non-radiological)
  - Anticipated actions including assembly requirements, protective equipment requirements (clothing, masks, SCBA, etc.), the use of KI, emergency exposure limits and accountability requirements.

b. Initial and Requalification ERO Training: The proficiency of emergency response personnel (as defined in 10 CFR 50 Appendix E) is ensured by the following means:

- Assigning persons to emergency duties that are similar to those performed as a part of their regular work assignment or experience.
- Initial training and annual retraining on applicable generic and site-specific portions of the Emergency Plan and the corresponding implementing procedures. Individuals not demonstrating the required level of knowledge in initial or retraining classes receive additional training on the areas requiring improvement. Annual retraining is conducted **once** per calendar year not to exceed 18 months between training sessions.
- Training is required for changes to the Emergency Plan and Station Annexes that are not editorial or minor in nature including changes that impact the resources, capabilities, or methods associated with Planning Standards, Program Elements, or 10CFR50 Appendix E, and modify program requirements or commitments. Training on Emergency Plan changes shall be completed within one hundred twenty (120) days of implementation of the change.

- Participation in exercises and/or drills as developed or authorized by the Emergency Preparedness Department and designed to sharpen those skills that they are expected to use in the event of a nuclear emergency.

All personnel assigned position specific responsibilities in the ERO are documented by inclusion in the Emergency Response Organization Telephone directory listing of positions and personnel.

c. Nuclear General Employee Training (NGET): All personnel with unescorted station access are provided with initial orientation training on the notification and instruction methods used in the event of an emergency. Additionally, all badged individuals also receive initial orientation on the basic principles of radiological safety including the effects of radiation and the theory and use of radiation detection devices. Appropriate actions for escorted individuals shall be the responsibility of the escort. NGET provides initial and annual requalification training on the basic elements of the Emergency Plan for all personnel working at the plant. Specifically, these elements include:

- Station emergency alarms and their meaning
- Assembly areas
- Site and Exclusion Area Evacuation procedures
- Special precautions and limitations during an emergency
- Purpose of the Emergency Plan

Section P: Responsibility for the Maintenance of the Planning Effort

This section describes the responsibilities for development, review and distribution of the Emergency Plan and actions that must be performed to maintain the emergency preparedness program. It also outlines the criteria for insuring that personnel who perform the planning are properly trained.

1. Emergency Preparedness Staff Training

The Emergency Preparedness staff is involved in maintaining an adequate knowledge of state of the art planning techniques and the latest applications of emergency equipment and supplies. At least once each calendar year each member of the Emergency Preparedness staff is involved in one of the following activities:

- Training courses specific or related to emergency preparedness.
- Observation of or participation in drills and/or exercises at other stations.
- Participation in industry review and evaluation programs.
- Participation in regional or national emergency preparedness seminars, committees, workshops or forums.
- Specific training courses in related areas, such as systems, equipment, operations, radiological protection, or Problem Identification & Resolution (PI&R).

2. Authority for the Emergency Preparedness Effort

The Site Vice President is responsible for the safe and reliable operation of the generating station. The issuance and control of this plan and the activities associated with emergency preparedness at CRANE shall be the overall responsibility of the Vice President, Licensing and Regulated. This individual is assigned the responsibility for overall implementation of the Emergency Plan and Station Annexes.

3. Responsibility for Development and Maintenance of the Plan

The Corporate Emergency Preparedness Managers are responsible for the overall radiological emergency preparedness program associated with the operation of the nuclear power stations within their respective responsibility and to administer the program to ensure availability of resources in the event of an emergency. The Corporate Emergency Preparedness Managers report to an EP Functional Area Manager who in turn reports to the Vice President, Licensing and Regulated.

The Emergency Preparedness Managers are assisted by regional corporate and Station Emergency Preparedness staff. Specific responsibilities include the following:

Program Administration

- Develop and maintain the Emergency Plan, Station Annex, implementing procedures and administrative documents.
- Develop and maintain 50.54(q) evaluations for changes to EP documents.
- Coordinate and maintain the EP Activities Schedule.
- Develop and maintain working relationships and coordinate meetings with Federal, state and local agencies.
- Ensure integration of plans between Constellation and offsite agencies.
- Provide an opportunity to discuss Emergency Action Levels and the availability of Nuclear Oversight audit results relating to interface with governmental agencies.
- Coordinate, negotiate and maintain agreements and contracts with offsite agencies and support organizations.
- Obtain Letters of Agreement with medical facilities, and medical consultants specifically skilled in the medical aspects of radiation accidents and other medical consultants as might be necessary for the case of a person involved in a radiation incident.
- Coordinate the development and annual distribution of the station's public information publication.
- Coordinate and administer the Self Evaluation Program to monitor and evaluate the adequacy of the Emergency Preparedness Program.
- Coordinate and support EP Self-Assessments, Audits and Inspections.
- Ensure the documentation and resolution of adverse conditions in the emergency preparedness program discovered through drills, audits, etc. in accordance with the Constellation Nuclear Corrective Action Program.
- Coordinate and develop Operational Experience responses.
- Coordinate, document and review Performance Indicator data and reports.
- Provide oversight of Drill and Exercise Performance (DEP) evaluations during Operator Requalification Training.
- Coordinate and conduct EP Event reviews and reports.

- Maintain adequate documentation/files to support EP activities.
- Develop and manage the EP budget.
- Maintain the Emergency Response Facilities (ERF) Telephone Directory.

Drills and Exercises

- Coordinate and maintain the EP Drill and Exercise Schedule.
- Coordinate and conduct exercises and drills.
- Coordinate NRC, FEMA, state, and local exercise scheduling and development activities.
- Coordinate drill and exercise scenario development activities.
- Develop and publish drill and exercise scenario manuals.
- Coordinate and perform controller and evaluator functions for drills and exercises.
- Coordinate response cells for drills and exercises.
- Develop and issue drill and exercise reports.

Facilities and Equipment

- Provide maintenance of the ERO call-out system.
- Ensure the Emergency Response Facilities are maintained in a constant state of readiness.
- Coordinate and review the EP equipment inventories.
- Coordinate and conduct maintenance and testing of the communications systems.
- Maintain the EP computer applications.

ERO Qualification and Administration

- Develop and maintain ERO Lesson Plans, Examinations, and Qualification Cards.
- Maintain EP NGET training content.
- Coordinate, schedule and conduct ERO qualification and requalification training.
- Oversee the maintenance of ERO training records.

- Maintain and coordinate publishing of the ERO Duty Rosters.
- Provide adequate oversight and support for the training of offsite response personnel.
- Coordinate conduct of Emergency Medical Assistance Program training.
- Coordinate annual training for the media.

The CRANE Plant Manager is responsible for implementation of the Emergency Plan at CRANE. The Plant Manager has the following responsibilities for maintenance of the Emergency Preparedness Program:

- Ensure the adequate staffing and training of station ERO members.
- Schedule and conduct drills and exercises to maintain the state of readiness of the Emergency Preparedness Program.
- Ensure the operational readiness of station facilities and communication systems for use during an emergency.
- Ensure the operational readiness of station emergency equipment and supplies is maintained.
- Ensure the emergency response procedures and the training and retraining of Station Emergency Response personnel are maintained.

4. Emergency Plan and Agreement Revisions

The Emergency Plan, its Annex, and supporting Agreements are reviewed on an annual basis. This review may also include applicable state and local emergency response agencies based on established agreements.

The annual Emergency Plan review/update includes required changes identified during audits, assessments, training, drills, and exercises. The Emergency Preparedness Director is responsible for determining which recommended changes are incorporated into a plan or emergency procedure revision. In those years when the review does not warrant a revision, a letter to that affect will be issued.

The Emergency Plan and its Annex shall be revised as needed and the most current approved revisions shall remain in effect so long as they are certified as current. Revisions to the Emergency Plan are reviewed by the Station's Plant Operational Review Committee (PORC) prior to approval. Changes to the plan are made without NRC approval only if such changes do not result in a reduction in effectiveness of the plan per 10 CFR 50.54(q), and the plan as changed continues to meet the standards of 10 CFR 50.47(b) and the requirements of 10 CFR 50, Appendix E. Proposed changes that reduce or have a potential to reduce the effectiveness of the approved plan are not implemented without prior approval by the NRC.

- Proposed revisions to the Emergency Plan and Station Annex shall be completed in accordance with the Constellation Nuclear review and approval processes.

- Emergency Plan and Station Annex changes shall be categorized as (1) minor/ administrative or (2) significant programmatic changes. Minor/administrative changes shall be implemented within 30 days of approval. Significant programmatic changes shall be implemented as soon as practical and within 60 days of final approval.

- After review and approval, the Emergency Plan and Station Annex shall be:

  a) Reviewed by the applicable Emergency Preparedness Manager(s) and EP Corporate Functional Area Manager, or designee(s), and

  b) Approved for use by the Vice President, Licensing and Regulated or designee.

- The Implementing Procedures shall be developed and revised concurrent with the Emergency Plan and Annex, and reviewed every two years.

Annually, each Letter of Agreement is reviewed and certified current in order to assure the availability of assistance from each supporting organization not already a party to the individual State Plan for Radiological Accidents.

5. Emergency Plan Distribution

Emergency Plan manuals, Station Annex, and implementing procedures are distributed on a controlled basis to the Emergency Response Facilities. All controlled documents holders are issued revision changes upon approval. Selected Federal, state, and local agencies, and other appropriate locations requiring them are also issued copies. Procedures are in place that control the revision of the Emergency Plan and require the use of revision bars and individual page identifications (i.e. section of plan, revision number, etc.).

6. Supporting Emergency Response Plans

Other plans that support this Emergency Plan are:

- MD 8.2, US Nuclear Regulatory Commission, "NRC Incident Response Program"

- National Response Framework (NRF), Nuclear/Radiological Incident Annex.

- Commonwealth of Pennsylvania Radiological Emergency Response Plan.

- Nuclear Station Security Plans - Note: The Station Security Plan contains industrial security information that must be withheld from public disclosure under provisions of 10 CFR 2.390(d).

7. Implementing and Supporting Procedures

Appendix 2 of this plan contains a listing, by number and title, of those procedures that implement this plan during an emergency. Additionally, administrative procedures that outline the steps taken to maintain the Constellation Emergency Preparedness Program have been developed and are listed in Appendix 2.

8. Cross Reference to Planning Criteria

The Plan is formatted in the same manner as 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." The use of this format lends itself to uncomplicated comparison of the criteria set forth in NUREG-0654, FEMA-REP-1.

9. Audit/Assessment of the Emergency Preparedness Program

To meet the requirements of 10 CFR 50.54(t), Constellation Nuclear Oversight shall coordinate an independent review the Emergency Preparedness Program to examine conformance with 10 CFR 50.47, 10 CFR 50.54, and 10 CFR 50 Appendix E. Included in the audit/assessment are the following:

- The Emergency Plan and associated implementing procedures.
- The Emergency Preparedness Training Program including drills and exercises.
- The readiness of the station Emergency Response Organization to perform its function.
- The readiness of facilities and equipment to perform as outlined in the plan and procedures.
- The interfaces between Constellation, the state, and county governmental agencies pertaining to the overall Emergency Preparedness Program.

Results of this audit are submitted for review to Corporate Management and the Station Vice President. The Emergency Preparedness Manager ensures that any findings that deal with offsite interfaces are reviewed with the appropriate agencies. Written notification will be provided to the state and counties of the performance of the audit and the availability of the audit records for review at Constellation facilities. Records of the audit are maintained for at least five years.

10. Maintenance of Emergency Organization Telephone Directory

Names and phone numbers of the Emergency Response Organization and support personnel shall be reviewed and updated at least quarterly.

Appendix 1: References

References consulted in the writing of this Emergency Plan are listed in this section. With exception of regulatory requirements, inclusion of material on this list does not imply adherence to all criteria or guidance stated in each individual reference.

1. 10 CFR 50.47, Emergency Plans

2. 10 CFR 50.72, Immediate Notification Requirements for Operating Nuclear Power Reactors

3. 10 CFR 50 Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants

4. 10 CFR 50 Appendix E, Emergency Planning and Preparedness for Production and Utilization Facilities

5. 10 CFR 20, Standards for Protection Against Radiation

6. 10 CFR 70, 73, and 100.

7. 33 CFR 153.

8. 40 CFR 110, 112, 116, 118, 265, 302, and 355.

9. 44 CFR 350.

10. 44 CFR 401.

11. 49 CFR 171 and 172.

12. NUREG-0654, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," Revision 1, November 1980 and Revision 2, December 2019.

13. NUREG-0654, Supplement 1, "Criteria for Utility Offsite Planning and Preparedness."

14. NUREG-0654, Supplement 3, "Criteria for Protective Action Recommendations for Severe Accidents."

15. NUREG-0396, "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants," Dec. 1978.

16. NUREG-0578, "TMI-2 Lessons Learned Task Force Status Report and Short-Term Recommendations."

17. NUREG-0696, Functional Criteria for Emergency Response Facilities

18. NUREG-0737, Clarification of TMI Action Plan Requirements, dated October 1980.

19. NUREG-0737, Supplement 1, Requirements for Emergency Response Capability, December 1982.

20. NUREG-0728, "Report to Congress: NRC Incident Response Plan."

21. US NRC Regulatory Guide 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors," revision 4, July, 2003.

22. U.S. NRC Response Technical Manual (RTM-96)

23. NEI 99-01, Methodology for Development of Emergency Action Levels.

24. EPA 400-R-92-001, May 1992, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents."

25. FEMA-REP-10, Guide for Evaluation of Alert and Notification Systems for Nuclear Power Plants

26. FEMA Radiological Emergency Preparedness Program Manual, December 2023

27. FEMA-Guidance Memorandum, MS-1 "Medical Services"

28. Constellation Nuclear Quality Assurance Topical Report (QATR), NO-AA-10

29. INPO Emergency Resources Manual

30. "Maintaining Emergency Preparedness Manual," dated December, 1996 INPO 96-009.

31. "Federal Bureau of Investigation and Nuclear Regulatory Commission Memorandum of Understanding for Cooperation Regarding Threat, Theft, or Sabotage in U.S. Nuclear Industry," Federal Register, Vol. 44, p. 75535, December 20, 1979.

32. "Voluntary Assistance Agreement By and Among Electric Utilities involved in Transportation of Nuclear Materials," dated November 1, 1980.

33. Comprehensive Environmental Response, Compensation and Liability Act of 1980.

34. Accidental Radioactive Contamination of Human Food and Animal Feeds; Recommendation for State and Local Agencies, Volume 47, No. 205, October 22, 1982.

35. American Nuclear Insurers Bulletin #5B (1981), "Accident Notification Procedures for Liability Insureds".

36. "Potassium Iodide as a Thyroid Blocking Agent in a Radiation Emergency: Final Recommendations on Use," Federal Register Vol. 47, No. 125, June 29, 1982.

37. Letter from William J. Dircks, Executive Director for Operations, NRC, to Dr. Donald F. Knuth, President KMC, Inc. dated October 26, 1981.

38. INPO Coordination agreement on emergency information among USCEA, EPRI, INPO, NUMARC and their member utilities, dated April (1988).

39. Babcock and Wilcox Company, Post Accident Sample Offsite Analysis Program (1982).

40. ANI/MAELU Engineering Inspection Criteria For Nuclear Liability Insurance, Section 6.0, Rev. 1, "Emergency Planning."

41. NRC RIS 2006-12, Endorsement of Nuclear Energy Institute Guidance "Enhancement to Emergency Preparedness Programs for Hostile Action."

42. NRC Bulletin 2005-02, "Emergency Preparedness and Response Actions for Security-Based Events."

43. NRC Information Notice 2009-01, National Response Framework

44. American Nuclear Insurers Bulletin #11-01 (Rev. 2) (2024), "Emergency Notification Procedures for ANI Policyholders"

Appendix 2: Procedure Cross-Reference to NUREG-0654

Criteria	Planning Standard	Procedure/Document
NUREG-0654.II.A	Assignment of Responsibility (Organization Control)	EP-AA-120, Emergency Plan Administration
		Letters of Agreement
NUREG-0654.II.B	Onsite Emergency Organization	EP-AA-112, Emergency Response Organization (ERO) / Emergency Response Facility (ERF) Activation and Operation
NUREG-0654.II.C	Emergency Response Support and Resources	EP-AA-112-400, Emergency Operations Facility Activation and Operations
NUREG-0654.II.D	Emergency Classification System	EP-AA-111, Emergency Classification and Protective Action Recommendations
NUREG-0654.II.E	Notification Methods and Procedures	EP-AA-114, Notifications EP-MA-121-1002, Alert and Notification System (ANS) Program
NUREG-0654.II.F	Emergency Communications	EP-AA-114, Notifications
		EP-AA-124, Inventories and Surveillances
NUREG-0654.II.G	Public Education and Information	EP-AA-120, Emergency Plan Administration
NUREG-0654.II.H	Emergency Facilities and Equipment	EP-AA-112, Emergency Response Organization (ERO) / Emergency Response Facility (ERF) Activation and Operation
		EP-AA-121, Emergency Response Facilities and Equipment Readiness
		EP-AA-120-1006, EP Reportability – Loss of Emergency Preparedness Capabilities
		EP-AA-123, Computer Programs
		EP-AA-124, Inventories and Surveillances
		EP-AA-125-1004, Emergency Response Facilities & Equipment Performance Indicators Guidance
NUREG-0654.II.I	Accident Assessment	EP-AA-110, Assessment of Emergencies
		EP-AA-123, Computer Programs
NUREG-0654.II.J	Protective Response	EP-AA-113, Personnel Protective Actions
		EP-AA-123, Computer Programs
NUREG-0654.II.K	Radiological Exposure Control	EP-AA-110, Assessment of Emergencies
		EP-AA-113, Personnel Protective Actions
NUREG-0654.II.L	Medical and Public Health Support	EP-AA-120, Emergency Plan Administration
UREG-0654.II.M	Recovery and Reentry Planning and Post-Accident Operations	EP-AA-115, Termination and Recovery
		EP-AA-120-1002, Offsite Readiness Evaluation
NUREG-0654.II.N	Exercises and Drills	EP-AA-122, Drills & Exercises Program

Criteria	Planning Standard	Procedure/Document
		EP-AA-125-1001, EP Performance Indicator Guidance
		EP-AA-125-1002, ERO Performance – Performance Indicators Guidance
		EP-AA-125-1003, ERO Readiness - Performance Indicators Guidance
NUREG-0654.II.O	Radiological Emergency Response Training	TQ-AA-113, ERO Training And Qualification
NUREG-0654.II.P	Responsibility for the Planning Effort: Development, Periodic Review and Distribution of Emergency Plans	EP-AA-1, Emergency Preparedness
		EP-AA-10, Emergency Preparedness Program Description
		EP-AA-11, Operating Stations Emergency Preparedness Process Description
		EP-AA-1101, EP Fundamentals
		EP-AA-1102, ERO Fundamentals
		EP-AA-120, Emergency Plan Administration
		EP-AA-125, Emergency Preparedness Self Evaluation Process
		Emergency Response Facilities Telephone Directory

Appendix 3: List of Corporate Letters of Agreements

Organization/Agreement Type

Department Of Energy (DOE) Radiation Emergency
Assistance Center/Training Site, REAC/TS (Letter on File)
Medical Consultant

Environmental, Inc. (P.O.)
Radiological Environmental Monitoring

Landauer, Inc. (P.O.)
Emergency Dosimetry

INPO (Letter on File)
Emergency Event Support

Murray & Trettel, Inc. (P.O.)
Meteorological Support

Teledyne Brown Engineering (P.O.)
Bioassay Analysis/Radiochemical Analysis

Red Alert Service (P.O.)
Fire Foam Supply

Appendix 4: Glossary of Terms and Acronyms

Accident Assessment	Accident assessment consists of a variety of actions taken to determine the nature, effects and severity of an accident and includes evaluation of reactor operator status reports, damage assessment reports, meteorological observations, seismic observations, fire reports, radiological dose projections, in plant radiological monitoring, and environmental monitoring.
Activation	(1) "ERO Activation" is the process of initiating actions to notify and mobilize Emergency Response Organization (ERO) personnel following an event classification under the emergency plan. (2) "Facility Activation" refers to the decision to consider a facility fully operational based on the minimum staffing required in ERO staffing tables contained within the station specific Annex and the ability of facility staffing and equipment to perform its designed function(s).
Annual	Frequency of occurrence equal to once per calendar year, January 1 to December 31.
Assembly/Accountability	A procedural or discretionary protective action taken for all persons within the security "Protected Area", which involves the gathering of personnel into pre-designated areas, and the subsequent verification that the location of these personnel is known.
Assessment Actions	Those actions taken during or after an emergency to obtain and process information that is necessary to make decisions to implement specific emergency measures.
Biennial	Frequency of occurrence equal to once per two calendar year periods.
Biennial Exercise	An event that tests the integrated capability and a major portion of the basic elements existing within an emergency plan. An exercise usually involves participation of personnel from state and local governments, utility personnel, and may involve participation of Federal government personnel.

Classification	The classification of emergencies is divided into FIVE (5) categories or conditions, covering the postulated spectrum of emergency situations. The first four (4) emergency classifications are characterized by Emergency Action Levels (EALs) or event initiating conditions and address emergencies of increasing severity. The fifth, the Recovery classification, is unique in that it may be viewed as a phase of the emergency, requiring specific criteria to be met and/or considered prior to its declaration.
Command and Control	When in Command and Control, the designated Emergency Director (Shift, Station or Corporate) has overall responsibility for Constellation Nuclear's emergency response efforts, including the nondelegable responsibilities of Command and Control.
Committed Dose Equivalent (CDE)	The Dose Equivalent to organs or tissues of reference that will be received from an intake of radioactive material by an individual during the 50-year period following the intake.
Corrective Action	Those emergency measures taken to lessen or terminate an emergency situation at or near the source of the problem, to prevent an uncontrolled release of radioactive material, or to reduce the magnitude of a release. Corrective actions include, equipment repair or shutdown, installation of emergency structures, firefighting, repair, and damage control.
Damage Assessment	Estimates and descriptions of the nature and extent of damages resulting from an emergency or disaster; of actions that can be taken to prevent or mitigate further damage; and of assistance required in response and recovery efforts based on actual observations by qualified engineers and inspectors.
Damage Control	The process of preventing further damage from occurring and preventing the increase in severity of the accident.
Decontamination	The reduction or removal of contaminated radioactive material from a structure, area, material, object, or person. Decontamination may be accomplished by (1) treating the surface so as to remove or decrease the contamination; (2) letting the material stand so that the radioactivity is decreased as a result of natural decay; and (3) covering the contamination.

Dedicated Communications	A communications link between two or more locations, access to which is limited to designated locations, and used only for the purpose intended. The communications link may be either telephone or radio.
Deep Dose Equivalent (DDE)	The dose equivalent at a tissue depth of 1 cm (1000 mg/cm^2); applies to external whole body exposure.
Dose	A generic term that means absorbed dose, dose equivalent, effective dose equivalent, deep dose equivalent, committed dose equivalent, committed effective dose equivalent, or total effective dose equivalent.
Dose Equivalent (DE)	The product of the absorbed dose in tissue, quality factor, and all other necessary modifying factors at the location of interest. The unit of dose equivalent is the Rem.
Dose Projection	The calculated estimate of a radiation dose to individuals at a given location (normally off-site), determined from the source term/quantity of radioactive material (Q) released, and the appropriate meteorological dispersion parameters (X/Q).
Dose Rate	The amount of ionizing (or nuclear) radiation to which an individual would be exposed per unit of time. As it would apply to dose rate to a person, it is usually expressed as rems per hour or in submultiples of this unit, such as millirems per hour. The dose rate is commonly used to indicate the level of radioactivity in a contaminated area.
Dosimeter	An instrument such as a Dosimeter of Legal Record (DLR), self-reading pocket dosimeter (SRPD), or electronic dosimeter (ED) for measuring, registering, or evaluating total accumulated dose or exposure to ionizing radiation.
Dosimeter of Legal Record (DLR)	Specific station type dosimeters used for monitoring personnel and the environment.
Drill	A supervised instruction period aimed at testing, developing and maintaining skills in a particular operation.
Early Phase	The period at the beginning of a nuclear incident when immediate decisions for effective use of protective actions are required and must be based primarily on predictions of radiological conditions in the environment. This phase may last from hours to days. For the purposes of dose projections it is assumed to last four days.

Emergency Action Levels (EALs)	A pre-determined, site-specific, observable threshold for a plant Initiating Condition that places the plant in a given emergency class. An EAL can be an instrument reading; an equipment status indicator; a measurable parameter (onsite or offsite); a discrete, observable event; or another phenomenon which, if it occurs, indicates entry into a particular emergency class.
Emergency Alert System (EAS)	A network of broadcast stations and interconnecting facilities which have been authorized by the Federal Communications Commission to operate in a controlled manner during a war, state of public peril or disaster, or other national or local emergency. In the event of a nuclear reactor accident, instructions/notifications to the public on conditions or protective actions would be broadcast by state or local government authorities on the EAS.
Emergency Director	Individual in Command and Control. One of the following: the Shift Emergency Director (Control Room), Station Emergency Director (TSC) or the Corporate Emergency Director (EOF).
Emergency Notification System (ENS)	The NRC Emergency Notification System hot line is a dedicated telephone system that connects the plant with NRC headquarters in White Flint, Maryland. It is directly used for reporting emergency conditions to NRC personnel.
Emergency Operations Facility (EOF)	Designated location from which the Licensee Emergency Response Organization conducts the company's overall emergency response in coordination with Federal, State and designated emergency response organizations.
Emergency Operating Procedures (EOPs)	EOPs are step-by-step procedures for direct actions taken by qualified operators to mitigate and/or correct an off normal plant condition through the control of plant systems.
Emergency Operations Center (EOC)	A facility designed and equipped for effective coordination and control of emergency operations carried out within an organization's jurisdiction. The site from which civil government officials (municipal, county, state, and Federal) exercise direction and control in a civil defense emergency.
Emergency Personnel	Those organizational groups that perform a functional role during an emergency condition. Within Constellation Nuclear, emergency personnel include the Managers and Directors of the Emergency Response Organization, accident assessment personnel, radiological monitoring teams, fire brigades, first aid teams and security personnel.

Emergency Planning Zones (EPZ)	That area surrounding a nuclear station in which emergency planning is conducted for the protection of the public. With respect to protecting the public from the plume exposure resulting from an incident, the EPZ is usually an area with a radius of about 10 miles surrounding the facility. With respect to the ingestion exposure pathway, the EPZ is usually an area with a radius of about 50 miles.
Emergency Preparedness	A state of readiness that provides reasonable assurance that adequate protective measures can and will be taken upon implementation of the Emergency Plan in the event of a radiological emergency.
Emergency Response Data System (ERDS)	ERDS is a continuous direct near real-time electronic data link between the licensee's onsite computer system and the NRC Operations Center that provides for the automated transmission of a limited data set of selected parameters.
Environmental Monitoring	The use of radiological instruments or sample collecting devices to measure and assess background radiation levels and/or the extent and magnitude of radiological contamination in the environment around the plant. This may be done in various stages such as pre-operational, operational, emergency, and post operational.
Essential Personnel	Essential personnel are those needed to achieve the goals and tasks as deemed necessary by the Station Emergency Director.
Evacuation	The urgent removal of people from an area to avoid or reduce high level, short-term exposure usually from the plume or from deposited activity.
Exclusion Area	An Exclusion Area is an area specified for the purpose of reactor site evaluation in accordance with 10 CFR 100. It is an area of such size that an individual located at any point on its boundary for two hours immediately following onset of the postulated release would not receive a total radiation dose to the whole body in excess of 25 rem or a total radiation dose of 300 rem to the thyroid from iodine exposure.
Exercise	An event that tests the integrated capability of a major portion of the basic elements existing within emergency preparedness plans and organizations.
Exercise Cycle	An eight-year period.

Fission Product Barrier	The fuel cladding, reactor coolant system boundary, or the containment boundary.
Hazardous Material	A substance or material which has been determined by the United States Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated in 49 CFR 172.
Health Physics Network (HPN) Line	In the event of a Site Area Emergency, the NRC HPN line will be activated by the NRC Operations center in White Flint, Maryland. This phone is part of a network that includes the NRC Regional Office and the NRC Operations Headquarters in White Flint, Maryland. This system is dedicated to the transmittal of radiological information by plant personnel to NRC Operations Center and the Regional office. HPN phones are located in the TSC and EOF.
High Radiation Sampling System	Post-accident sampling capability to obtain and perform radioisotopic and chemical analyses of reactor coolant and containment atmosphere samples.
Imminent	Mitigation actions have been ineffective and trended information indicates that the event or condition will occur within 2 hours.
Ingestion Exposure Pathway	The potential pathway of radioactive materials to the public through consumption of radiologically contaminated water and foods such as milk or fresh vegetables. Around a nuclear power plant this is usually described in connection with the 50-mile radius Emergency Planning Zone (50 mile EPZ).
Initiating Condition	A predetermined UNIT condition where either the potential exists for a radiological emergency or such an emergency has occurred.
Integrated Drill	A drill conducted in the year that a Biennial Exercise is not scheduled including at least two Emergency Response Facilities in order to demonstrate at least two of the functions of management and control of emergency response, accident assessment, protective action decision-making, or plant system repair and corrective action.
Intermediate Phase	The period beginning after the source and releases have been brought under control and reliable environmental measurements are available for use as a basis for decisions on additional protective actions.

Joint Information Center	A Corporate Emergency Facility activated by Constellation and staffed by Constellation, state, and Federal Public Information personnel. This facility serves as the single point of contact for the media and public to obtain information about an emergency.
Late Phase	The period beginning when recovery action designed to reduce radiation levels in the environment to acceptable levels for unrestricted use are commenced and ending when all recovery actions have been completed. This period may extend from months to years (also referred to as the recovery phase).
Local Evacuation	The evacuation of personnel from a particular area, such as a room or building.
Low Population Zone (LPZ)	As defined in 10 CFR 100.3, the area immediately surrounding the exclusion area which contains residents, the total number and density of which are such that there is a reasonable probability that appropriate protective measures could be taken in their behalf in the event of a serious accident.
Main Control Room	The operations center of a nuclear power plant from which the plant can be monitored and controlled.
Monthly	Frequency of occurrence equal to once per calendar month.
Non-Essential Site Personnel	Those personnel not needed for the continuing existence or functioning of the ERO. They are personnel not required to fill certain positions in the ERO. Identification of non-essential personnel is circumstance-oriented as determined by the Station Emergency Director.
Notification, Public	Public notification means to communicate instructions on the nature of an incident that prompted the public alerting/warning and on protective or precautionary actions that should be taken by the recipients of the alert. A state and local government process for providing information promptly to the public over radio and TV at the time of activating the alerting (warning) signal (ANS). Initial notifications of the public might include instructions to stay inside, close windows, and doors, and listen to radio and TV for further instructions. Commercial broadcast messages are the primary means for advising the general public of the conditions of any nuclear accident. (See Emergency Alert System.)

Off-Site	The area around a nuclear generating station that lies outside the station's "site boundary".
Offsite Dose Calculation Manual (ODCM)	The ODCM presents a discussion of the following: 1. The ways in which nuclear power stations can affect their environment radiologically 2. The regulations which limit radiological effluents from the nuclear power stations; and 3. The methodology used by the nuclear power stations to assess radiological impact on the environment and compliance with regulations.
On-Site	The area around a nuclear generating station that lies within the station's "site boundary".
Owner Controlled Area	Company owned property on which a Nuclear Station is located and may include Constellation Nuclear leased lands adjacent to that Nuclear Station.
Operations Support Center (OSC)	An emergency response facility at the Plant to which support personnel report and stand by for deployment in an emergency situation.
Personnel Monitoring	The determination of the degree of radioactive contamination on individuals, using standard survey meters, and/or the determination of dosage received by means of dosimetry devices.
Plume Exposure Pathway	The potential pathway of radioactive materials to the public through: (a) whole body external exposure from the plume and from deposited materials, and (b) inhalation of radioactive materials.
Population-at-Risk	Those persons for whom protective actions are being or would be taken. In the 10-mile EPZ the population-at-risk consists of resident population, transient population, special facility population, and industrial population.
Potassium Iodide	(Symbol KI) A chemical compound that readily enters the thyroid gland when ingested. If taken in a sufficient quantity prior to exposure to radioactive iodine, it can prevent the thyroid from absorbing any of the potentially harmful radioactive iodine-131.

Potential	Mitigation actions are not effective and trended information indicates that the parameters are outside desirable bands and not stable or improving.
Projected Dose	That calculated dose that some individuals in the population group may receive if no protective actions are implemented. Projected doses are calculated to establish an upper limit boundary.
Protected Area	That onsite area within the security boundary as defined in each station's Security Plan.
Protection Factor (PF)	The relation between the amount of radiation that would be received by a completely unprotected person compared to the amount that would be received by a protected person such as a person in a shielded area. PF = Shielded dose rate / Unshielded dose rate.
Protective Action	Those emergency measures taken for the purpose of preventing or minimizing radiological exposures to affected population groups.
Protective Action Guide (PAG)	Projected radiological dose values to individuals in the general population that warrant protective action. Protective Action Guides are criteria used to determine if the general population needs protective action regarding projected radiological doses, or from actual committed (measured) dose values.
Protective Action Recommendations (PARs)	Recommended actions to the States for the protection of the offsite public from whole body external gamma radiation, and inhalation and ingestion of radioactive materials. Access control and other recommendations concerning the safeguards of affected food chain processes may be issued by the States as PARs.
Public Alerting/Warning	The Alert and Notification System (ANS) for Crane relies on the Integrated Public Alert & Warning System (IPAWS)-WEA (Wireless Emergency Alerts) and IPAWS-EAS (Emergency Alert System) as the primary means of alerting and notifying the public, respectively, and an independent electronic Mass Notification System (MNS) as the backup means.

Puff Release	A controlled containment vent that will be terminated prior to exceeding 60 minutes in duration and is less than the limit as defined in the Station Annex.
Quarterly	Frequency of occurrence equal to once in each of the following four periods: January 1 through March 31; April 1 through June 30; July 1 through September 30; October 1 through December 31.
Recovery	The process of reducing radiation exposure rates and concentrations of radioactive material in the environment to levels acceptable for unconditional occupancy or use.
Release	A '*Release in Progress*' is defined as ANY radioactive release that is a result of, or caused by, the emergency event.
Restricted Area	Any area, access to which is controlled by Constellation for purposes of protection of individuals from exposure to radiation and radioactive materials.
Restricted Area Boundary	For classification and dose projection purposes, the boundary is a 400-meter (1/4-mile) radius around the plant. The actual boundary is specified in the ODCM.
Safety Analysis Report, Updated Final (UFSAR)	The UFSAR is a comprehensive report that a utility is required to submit to the NRC as a prerequisite and as part of the application for an operating license for a nuclear power plant. The multi-volume report contains detailed information on the plant's design and operation, with emphasis on safety-related matters.
Semi-Annual	Frequency of occurrence equal to once in each of the following periods: January 1 through June 30; July 1 through December 31.
Shall, Should, and May	The word "shall" is used to denote a requirement, the word "should" to denote a recommendation and the word "may" to denote permission, neither a requirement nor a recommendation.
Shielding	Any material or barrier that attenuates (stops or reduces the intensity of) radiation.
Site Boundary	The Site Boundary is described in detail in the ODCM.
Site Evacuation	The evacuation of non-essential personnel from the plant site.

Source Term	Radioisotope inventory or amount of radioisotope released to the environment, often as a function of time.
Technical Support Center (TSC)	A center outside of the Control Room in which information is supplied on the status of the plant to those individuals who are knowledgeable or responsible for engineering and management support of site operations in the event of an emergency, and to those persons who are responsible for management of the on-site emergency response.
Threshold Value	Measurable, observable detailed conditions which must be satisfied to determine an EAL applicability.
Thyroid Blocking Agent	An agent which when properly administered to an individual will result in sufficient accumulation of stable iodine in the thyroid to prevent significant uptake of radioiodine. Potassium Iodide is such an agent.
Total Effective Dose Equivalent (TEDE)	The sum of the deep dose equivalent (for external exposure) and the committed effective dose equivalent (for internal exposure) and 4 days of deposition exposure.
Unrestricted Area	Any area to which access is not controlled by the licensee for protecting individuals from exposure to radiation and radioactive materials, and any area used for residential quarters.
Vital Areas	Areas within the station security fence which contain vital equipment. Examples include Control Rooms, Reactor Buildings, Turbine Buildings and Electrical Equipment Rooms.
Vital Equipment	Any equipment, system, device or material, the failure, destruction, or release of which could directly or indirectly endanger the public health and safety by exposure to radiation. Equipment or systems which would be required to function to protect public health and safety following such failure, destruction, or release are also considered to be vital.
Weekly	Frequency occurrence equal to once per calendar week: Monday through Sunday.

Any abbreviation followed by a lower case 's' denotes the plural form of the term.

ACRONYMS

ac ..... alternating current

ALARA ..... as low as reasonably achievable

ANI ..... American Nuclear Insurers

ANS ..... Alert and Notification System

ANSI ..... American National Standards Institute

ARM ..... Area Radiation Monitor

ASLB ..... Atomic Safety Licensing Board

CB ..... citizen band

cc ..... cubic centimeter

CDE ..... Committed Dose Equivalent

CEOC ..... County Emergency Operation Center

CFR ..... Code of Federal Regulations

CHRMS ..... Containment High Range Monitoring System

CHRRMS ..... Containment High Range Radiation Monitoring System

cm2 ..... square centimeter

CNO ..... Chief Nuclear Officer

cpm ..... count per minute

CR ..... Control Room

CRO ..... Control Room Operator

CRT ..... Cathode Ray Tube

Cs ..... Cesium

dc ..... direct current

DEP ..... Drill and Exercise Performance

DEQ ..... Department of Environmental Quality

DER/BRP ..... Dept of Environmental Resources, Bureau of Radiation Protection (PA)

DFO..... Disaster Field Office

DGI..... Digital Graphics Incorporated

DHFS ..... Department of Health and Family Services

DLR .....Dosimeter of Legal Record

DOE ..... U. S. Department of Energy

DOT.....U. S. Department of Transportation

DPH.....Department of Public Health

dpm ..... disintegration per minute

EAL .....Emergency Action Level

EAS ..... Emergency Alerting System

EMA ..... Emergency Management Agency

ENC.....Emergency News Center

ENS..... Emergency Notification System (NRC)

EOC .....Emergency Operations (or Operating) Center

EOF.....Emergency Operations Facility

EOP..... Emergency Operating Procedure

EPA..... U. S. Environmental Protection Agency

EPDS .....Emergency Preparedness Data System

EPZ ..... Emergency Planning Zone

ERF ..... Emergency Response Facility

ESF .....Engineered Safety Feature

FEMA ..... Federal Emergency Management Agency

FRMAC .....Federal Radiological Monitoring and Assessment Center

FRMAP..... Federal Radiological Monitoring and Assessment Plan

FRPCC.....Federal Radiological Preparedness Coordinating Committee

FSAR..... Final Safety Analysis Report

Ge .....Germanium

GET.....General Employee Training

GM ..... Geiger Mueller (radiation detection tube)

HEPA ..... high efficiency particulate air

HPN..... Health Physics Network (NRC)

hr ..... hour

I ..... Iodine

INPO .....Institute of Nuclear Power Operations

JIC..... Joint Information Center

LGEOC.....Local Government Emergency Operations Center

Li .....Lithium

LOCA .....Loss of Coolant Accident

LPZ.....Low Population Zone

MAELU..... Mutual Atomic Energy Liability Underwriters

MCP .....Municipal Command Post

mR..... milliroentgen

NARS .....Nuclear Accident Reporting System

NCRP ..... National Council on Radiation Protection

NOP ..... Nuclear Organization Procedure

NRC ..... U. S. Nuclear Regulatory Commission

NRF..... National Response Framework

NRR ..... Nuclear Reactor Regulation (NRC)

NWS.....National Weather Service

NSRAC.....Nuclear Safety Review and Audit Committee

OSC .....Operations Support Center

PAG.....Protective Action Guide

PANS ..... Prompt Alert and Notification System

PAR ..... Protective Action Recommendation

PASS ..... Post Accident Sampling System

PEMA ..... Pennsylvania Emergency Management Agency

QATR ..... Quality Assurance Topical Report

R ..... roentgen

RAA ..... Remote Assembly Area (off-site)

RAC ..... Regional Advisory Committee (FEMA)

REP ..... Radiological Emergency Preparedness

RERP ..... Radiological Emergency Response Plan

RMS ..... Radiation Monitoring System

SCBA ..... Self Contained Breathing Apparatus

SEOC ..... State Emergency Operations Center

SFCP ..... State Forward Command Post

SGTS ..... Standby Gas Treatment System

SPCC ..... Spill Prevention Control and Countermeasure

SPDS ..... Safety Parameter Display System

Sr ..... Strontium

SRC ..... State Radiological Coordinator

SSC ..... State Staging Center

STA ..... Shift Technical Advisor

TDD ..... Telecommunications Device for the Deaf

TEDE ..... Total Effective Dose Equivalent

TSC ..... Technical Support Center

µCi ..... microcurie

UFSAR ..... Updated Final Safety Analysis Report

Appendix 5

Table 5-1: Emergency Response Organization (ERO) Staffing and Augmentation Plan

Emergency Preparedness (EP) Functions	On-Shift	TSC / OSC		EOF - Alert or Greater
		Alert or Greater Augment w/in 60 min.	Alert or Greater Augment w/in 90 min.	Augment w/in 60 min.
Command and Control • Provide overall ERO command and control, until relieved. • Approve emergency action level (EAL) and/ or protective action recommendation (PAR) classifications, until relieved. • Authorize personnel dose extensions, until relieved.	(1) Shift Emergency Director	(1) Station Emergency Director	Not applicable	(1) Corporate Emergency Director
Communications[3] • Communicate EAL and PAR classifications to offsite response organizations (OROs), including the NRC, until relieved.	Shift Communicator[1]	(1) ENS Communicator (TSC)	Not applicable	(1) State / Local Communicator
Radiation Protection[4] • Provide qualified radiation protection coverage for responders accessing potentially unknown radiological environments during emergency conditions. • Provide in-plant surveys. • Control dosimetry and radiologically controlled area access.	(2)Shift Radiation Protection Technician	(3) Additional Radiation Protection Personnel *[In addition to personnel on-shift]* (OSC)	(3) Additional Radiation Protection Personnel *[In addition to personnel on-shift and those responding within 60 min.]* (OSC)	Not applicable

Emergency Preparedness (EP) Functions	On-Shift	TSC / OSC		EOF - Alert or Greater
		Alert or Greater Augment w/in 60 min.	Alert or Greater Augment w/in 90 min.	Augment w/in 60 min.
Supervision of Radiation Protection Staff and Site Radiation Protection • Evaluate and assess plant and offsite radiological data in the development of onsite protective actions and offsite PARs, until relieved. • Recommend onsite protective actions and offsite PARs to the applicable decision- maker, until relieved. • Direct all radiation protection activities, including field monitoring team (FMT) direction, until relieved. • Provide relevant information to applicable communicators who are communicating offsite PARs to OROs, until relieved.	(1) Shift Emergency Director	(1) TSC Radiation Protection Manager (RPM) (TSC)	Not applicable	(1) EOF Radiation Protection Manager (EOF)
Dose Assessments/ Projections • Perform dose assessments/projections and provide input to applicable PAR decision- maker, until relieved.	(1) Shift Dose Assessor [1],	Not applicable	Not applicable	(1) Dose Assessment Coordinator (EOF)

Emergency Preparedness (EP) Functions	On-Shift	TSC / OSC		EOF - Alert or Greater
		Alert or Greater Augment w/in 60 min.	Alert or Greater Augment w/in 90 min.	Augment w/in 60 min.
Emergency Classifications • Evaluate plant conditions and recommend emergency classifications, until relieved.	Emergency Classification Advisor[1]	(1) Operations Manager (TSC)	Not applicable	Not applicable
Engineering • Provide engineering coverage related to the specific discipline of the assigned engineer, until relieved.	(1) **Core/ Thermal Hydraulics Engineer - STA**[1] • Evaluate reactor conditions.	**TSC Engineering Staff** • (1) Electrical/ Instrumentation and Control (I&C): Provide engineering coverage for the ERO related to electrical or I&C equipment. • (1) Mechanical: Provide engineering coverage for the ERO related to mechanical equipment. • (1) Core/Thermal Hydraulics: Evaluate reactor conditions.	As needed	Not applicable
Security	Security staffing per the site-specific security plan.	(1) **Security Coordinator (TSC)** • Coordinate security- related activities and information with the Emergency Coordinator.	Not applicable	Not applicable

Emergency Preparedness (EP) Functions	On-Shift	TSC / OSC		EOF - Alert or Greater
		Alert or Greater Augment w/in 60 min.	Alert or Greater Augment w/in 90 min.	Augment w/in 60 min.
Repair Team Activities	Not applicable	**Maintenance Personnel (OSC)** • (1) Electrical Maintenance Technician: Provide electrical support for ECCS equipment, event mitigation, and equipment repair. • (1) Mechanical Maintenance Technician: Provide mechanical support for ECCS equipment, event mitigation, and equipment repair.	**Maintenance Personnel (OSC)** • (1) I&C Technician: Provide assistance with logic manipulation, support for event mitigation and equipment repair, and support of digital I&C if applicable. Additional I&C staff may be called out if needed. • Electrical Maintenance Technicians – As needed. • Mechanical Maintenance Technicians – As needed.	Not applicable

Emergency Preparedness (EP) Functions	On-Shift	TSC / OSC		EOF - Alert or Greater
		Alert or Greater Augment w/in 60 min.	Alert or Greater Augment w/in 90 min.	Augment w/in 60 min.
Supervision of Repair Team Activities	Not applicable	(1) **OSC Director/Repair Team Lead** • Supervise OSC activities as directed by Emergency Coordinator.	**OSC Supervisors** • (1) Electrical Maintenance Supervisor /Lead: Supervise OSC activities related to electrical equipment. • (1) Mechanical Maintenance Supervisor / Lead: Supervise OSC activities related to mechanical equipment. • (1) I&C Supervisor / Lead: Supervise OSC activities related to I&C equipment. May be combined with Electrical Supervisor. • (1) Radiation Protection Supervisor / Lead: Supervise OSC activities related to radiation protection.	Not applicable

Emergency Preparedness (EP) Functions	On-Shift	TSC / OSC		EOF - Alert or Greater
		Alert or Greater Augment w/in 60 min.	Alert or Greater Augment w/in 90 min.	Augment w/in 60 min.
Field Monitoring Teams (FMTs)	Not applicable	**Onsite FM Individual** • (1) Qualified individual to assess the protected area for radiation and contamination and provide input to the TSC RPM. Responsible for radiation protection coverage for the FMT as directed by TSC RPM or EOF RPM. . **Offsite FMT A** • (1) Qualified individual to assess the area(s) outside the protected area for radiation and contamination, and for radioactive plume tracking, as directed by, and under the control of, the EOF DAC or RPM. Responsible for the radiation protection coverage of the FMT as directed by EOF RPM. • (1) Driver to provide transportation.	**Offsite FMT B** • (1) Qualified individual to assess the area(s) outside the protected area for radiation and contamination, and for radioactive plume tracking, as directed by, and under the control of, the EOF DAC or RPM. Responsible for the radiation protection coverage of the FMT as directed by EOF RPM. • (1) Driver to provide transportation.	Not applicable

Emergency Preparedness (EP) Functions	On-Shift	TSC / OSC		EOF/JIC - Alert or Greater[2]
		Alert or Greater Augment w/in 60 min.	Alert or Greater Augment w/in 90 min.	Augment w/in 90 min.
Media Information • Manage and coordinate media information related to the event.	Not applicable	Not applicable	Not applicable	Corporate Spokesperson JIC Director Public Information Director

Emergency Preparedness (EP) Functions	On-Shift	TSC / OSC		EOF/JIC - Alert or Greater[2] Augment w/in 90 Min
		Alert or Greater Augment w/in 60 min.	Alert or Greater Augment w/in 90 min.	
JIC/EOF Information Technology (IT)	Not applicable	Not applicable	Not applicable	(1) EOF/JIC Computer Specialist (@ 90 min from Alert or higher)[1]

Notes:

1. Other personnel may be assigned this function if no collateral duties are assigned to an individual that are beyond the capability of that individual to perform at any given time. For the Shift Dose Assessor, it is performed by one of the two Radiation Protection Technicians assigned to the shift.
2. Constellation's Communication Department will perform necessary JIC functions at the Unusual Event declaration and initially upon a higher initial EAL declaration. The JIC facility will be activated within 90 minutes of an Alert declaration; however, some functions may continue to be performed by the Constellation Communications Department. Some JIC functions such as Public Information Director, News Writer, Media Monitor, Rumor Control may be performed remotely.
3. Additional Communications will be staffed at the EOF or TSC if needed.
4. Note for the purposes of this table, RP Personnel consists of Shift RP Technicians and qualified Radiation Protection Personnel. This is consistent with the guidance provided in the NRC's Technical Basis for the Proposed Guidance in NUREG-0654/FEMA-REP-1, Section II.B, "Emergency Response Organization".

ENCLOSURE 2A

Clean Version of EP-CR-1000

Crane Clean Energy Center
Renewed Facility License No. DPR-50

CONSTELLATION NUCLEAR

CRANE CLEAN ENERGY CENTER (CRANE) RADIOLOGICAL EMERGENCY PLAN

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STATION ANNEX

The Station Annex subject to the requirements of this plan is as follows:

EP-AA-1009: Radiological Emergency Plan Annex for Crane Clean Energy Center

REVISION HISTORY

REVISION	EFFECTIVE DATE	DOCUMENT
0	March 2018	EP-TM-1000
1	December 2018	EP-TM-1000
2	September 2019	EP-TM-1000
3	September 2020	EP-TM-1000
0	TBD	EP-CR-1000
1	TBD	EP-CR-1000

Revision History Summary:

In 2017, Constellation (at the time Exelon) announced the intent to permanently shut down the operating Unit-1 reactor at Three Mile Island Station by the fall of 2019. Constellation revised the station Emergency Plan to establish the Three Mile Island Station Emergency Plan as an independent Emergency Plan separated and de-linked from the fleet Standardized Radiological Emergency Plan (Standard Plan). This allowed decommissioning changes to be made to the Station Emergency Plan without impacting the Standard Plan.

A new Emergency Plan procedure was created for Three Mile Island. It contained regulatory commitments applicable to Three Mile Island which were in the fleet Standardized Radiological Emergency Plan. The new procedure was EP-TM-1000, *Three Mile Island (TMI) Station Radiological Emergency Plan*. The 10CFR.54(q) evaluation #17-122 evaluated the changes between the Standard Plan, the Station Annex, and EP-TM-1000.

Upon implementation, the revised Three Mile Island Emergency Plan was independent of the fleet Emergency Plan. The new Three Mile Island Emergency Plan formed the regulatory basis for developing and submitting License Amendment Requests to the NRC to support decommissioning.

In 2024 Constellation announced the intent to restart Three Mile Island Station Unit 1 as the Crane Clean Energy Center, pending NRC approval. Constellation is revising the station Emergency Plan to support restart. The Emergency Plan in place at the time operations were halted was EP-TM-1000 Revision 0. EP-TM-1000 Revision 1 updated the List of Corporate LOAs and update the definition of the Exercise Cycle to eight years. Subsequent revisions to EP-TM-1000 implemented approved regulatory exemptions as the station progressed through the stages of decommissioning. EP-AA-1009, TMI Radiological Emergency Plan Annex, Revision 29 was in effect at the time. As with EP-TM-1000, subsequent revisions to EP-AA-1009 reflected the station's progression through the stages of decommissioning.

The Emergency Plan document was renumbered and revised to reflect the transition from EP-TM-1000 Rev. 1 to EP-CR-1000 Rev. 0. The station annex was revised to reflect the transition from EP-AA-1009 Rev. 29 to EP-AA-1009 Rev. 32.

Section A: Purpose

As required in the conditions set forth by the Nuclear Regulatory Commission (NRC) for the operating licenses for the Constellation Nuclear Stations, the management of Constellation recognizes its responsibility and authority to operate and maintain the nuclear power stations in such a manner as to provide for the safety of the general public. This document describes the Crane Clean Energy Center, henceforth known as CRANE, Emergency Preparedness Program. The philosophy that guides the development and maintenance of this program is the protection of the health and safety of the general public in the communities around the station and the personnel who work at the plant.

The Crane Clean Energy Center Radiological Emergency Plan establishes the concepts, evaluation and assessment criteria, and protective actions that are necessary in order to limit and mitigate the consequences of potential or actual radiological emergencies. It has been prepared to establish the procedures and practices for management control over unplanned or emergency events that may occur at CRANE. It also provides the necessary pre-arrangements, directions and organization so that all nuclear emergencies can be effectively and efficiently resolved.

The Crane Clean Energy Center Emergency Preparedness Program consists of the Emergency Plan, the Station Annex, emergency plan implementing procedures, and associated program administrative documents. The CRANE Emergency Plan outlines the basis for response actions that would be implemented in an emergency. This document is not intended to be used as a procedure.

The Crane Annex contains information and guidance that are unique to the station. The annex addresses site-specific criteria, including:

- Emergency Action Levels (EALs) located in Addendum 3 to the Annex,
- Deviations from the Emergency Plan (such as station specific on-shift staffing, unique aspects of ERO augmentation, and so forth).
- Facility geography and location for a full understanding and representation of the station’s emergency response capabilities.
- Plant specific facilities and equipment associated with the Emergency Preparedness Program.

The Station Annex and its Addenda are part of the plan and are subject to the same review and audit requirements as the plan. In the areas where the Station Annex deviates from the general requirements of the Emergency Plan, the Station Annex shall serve as the controlling document.

Detailed Emergency Plan implementing procedures are maintained separately and are used to guide those responsible for implementing emergency actions.

Section B: Background

In the context of the Emergency Plan, the Station Annex, and implementing procedures, Constellation Nuclear manages the operations of the NRC licensed facility designated as Crane Clean Energy Center.

The primary hazard consideration at the nuclear power station is the potential unplanned release of radioactive material resulting from an accident. The probability of such a release is considered very low due to plant design and strict operational guidelines enforced by the NRC. Notwithstanding, federal regulations require that a solid emergency preparedness program exist for each commercial nuclear power station. A detailed description of the station is in the Updated Final Safety Analysis Report (UFSAR).

In order to minimize the number of ad-hoc decisions made during an emergency and to ensure that necessary equipment, supplies, and essential services are available to meet the needs of an emergency, Constellation Nuclear has developed this Emergency Plan for the Crane Clean Energy Center. The Emergency Plan considers the consequences of radiological emergencies, as required by 10 CFR 50, Paragraph 50.47 and Appendix E.

Additionally, it addresses the guidance and adheres to the intent of the criteria established and provided within NUREG-0654 Rev. 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants". The Emergency Plan also considers the consequences of non-radiological emergencies.

Section C: Scope

This document describes actions to be taken in the event of a radiological accident at CRANE that may impact the health and safety of the general public or station employees. It also serves to limit the damage to facilities and property and provide for the restoration of such facilities in the event of an emergency. If such an accident were to occur, the Emergency Response Organization (ERO) would be put in place and maintained until such time when the plant is returned to a stable condition and the threat to the general public or station personnel no longer exists. This plan describes the functions and operation of the ERO, including assignments of authority and responsibility. It does not, nor is it intended to, provide guidance for actual plant equipment manipulations. These instructions are contained in site-specific normal and emergency operating procedures as required by Technical Specifications and other regulatory guidance. The Emergency Plan provides for: identification and evaluation of emergency situations, protective measures, communications, coordination and notification of governmental authorities, document review and control, emergency preparedness assessment, and training of all emergency personnel. An emergency recovery phase is also described in this Emergency Plan.

Section D: Planning Basis

The Emergency Plan, in conjunction with the Station Annex and implementing and administrative procedures, documents the methods by which the CRANE Emergency Preparedness Program meets the planning standards set forth in 10 CFR 50.47(b) and the requirements of 10 CFR 50 Appendix E. Development of the Emergency Plan was based on NUREG-0654/FEMA-REP-1, Rev. 1.

Acceptable alternate methods, which deviate from NUREG-0654, Rev. 1, are allowed under Regulatory Guide 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors." However, deviations will be documented in the Station Annex and evaluated as continuing to meet the Planning Standards of 10 CFR 50.47(b) and Appendix E to 10 CFR 50 under the 10 CFR 50.54(q) process to ensure the continued effectiveness of the Emergency Plan and Station Annex.

Other applicable regulations, publications, and guidance were used (see Appendix 1, "References") along with site-specific documents to ensure consistency in the planning effort.

Section E: Contiguous-Jurisdiction Governmental Emergency Planning

The Emergency Plan recognizes the state, in cooperation with the local EPZ communities, as the overall authority responsible for protective action directives in order to protect the health and safety of the general public.

Section F: Integrated Emergency Planning

State and local (county level) emergency response plans were utilized in the development of this plan to ensure a consistent and integrated response to a classified event.

Section G: Funding and Technical Assistance

Constellation Nuclear is dedicated to providing the level of support necessary, as dictated by federal regulation, to ensure appropriate integration of the state, county, and utility radiological emergency programs.

Section H: Emergency Response Organization

Constellation Nuclear acknowledges its primary responsibility for planning and implementing emergency measures within the site boundary and for overall plant accident assessment. These emergency measures include corrective actions, protective measures, and aid for personnel onsite. To accomplish these responsibilities, advance arrangements have been made with offsite organizations for special emergency assistance such as ambulance, medical, hospital, fire, and police services.

Section I: Federal Response

Provisions are made within the Emergency Plan for the integration of appropriate elements of the federal assistance activities. Arrangements have been made to accommodate a federal response organization presence at the Constellation Nuclear emergency response facilities as well as support communications between utility and federal emergency facilities.

Section J: Form and Content of Plan

As required by federal regulations, the Emergency Plan is governed by and contained (or referenced) in the Station UFSAR. The Emergency Plan is administratively maintained as a separate document. The Emergency Plan has been formatted similar to NUREG-0654/FEMA-REP-1, Rev. 1. The use of this format lends itself to uncomplicated comparison with the criteria set forth in NUREG-0654/FEMA-REP-1.

Appendix 2, "Procedure Cross-Reference to NUREG-0654", provides a cross-reference between the NUREG-0654 evaluation criteria and the Emergency Plan implementing procedures and applicable administrative documents.

Required Content of the Station Annex

Information that is in the plan need not be restated in the Annex. The Annex shall address what means, methods, and resources are used to satisfy the requirements and responsibilities set forth in the Emergency Plan.

Annex Format and Specific Content: As a minimum, the Station Annex shall address the areas described as follows:

1. Section 1: Introduction

   The station and surrounding area are described by the inclusion of maps, drawings and/or diagrams. A summary statement describes the Annex interface with the Emergency Plan.

2. Section 2: Organizational Control of Emergencies

   The agencies with which the station has independent agreements for support during an emergency are provided. Station specific differences from the Emergency Plan, such as on-shift staffing or ERO augmentation, shall be outlined. The justification for differences shall be provided as required under 50.54(q) documentation.

3. Section 3: Classification of Emergencies

   The Classification levels are described in this Section. Note that the Site Specific EALs are located in Addendum 3 to the Annex and are included for all emergency classes for the purpose of event classification.

4. Section 4: Emergency Measures

   Maps indicating the location of Assembly Areas, site evacuation routes, and centers for the monitoring of evacuated nonessential personnel are included. Roadway/traffic control measures of roads under control of the station are addressed.

5. Section 5: Emergency Facilities and Equipment

   - Descriptions of the station Control Room, Technical Support Center, and Operational Support Center are provided.
   - A description of the specific equipment is provided.
   - A description of the capability and resources available to categorize accidents.

Section A: Assignment of Responsibility

This section describes the primary responsibilities and organizational control of Constellation, federal, state, county, and other emergency response organizations within the Plume Exposure Pathway and the Ingestion Pathway Emergency Planning Zones (EPZs). Various supporting organizations are also described as well as staffing for initial and continuous response.

1. Concept of Operations

The relationships and the concept of operations for the organizations and agencies who are a part of the overall ERO are as follows:

a. Identified below are federal, state, and county organizations that are involved in a response to an emergency at Crane Clean Energy Center.

1) Federal Agencies: The National Response Framework (NRF), Nuclear/Radiological Incident Annex outlines the statutory and regulatory responsibilities. The primary federal response for supporting an emergency at a Constellation station include:

a) Nuclear Regulatory Commission (NRC): The NRC is responsible for licensing and regulating nuclear facilities and materials and for conducting research in support of the licensing and regulatory process. These responsibilities include protecting the public health and safety, protecting the environment, protecting and safeguarding materials and plants in the interest of national security and assuring conformity with antitrust laws.

The NRC Regional Office has the responsibility for auditing of nuclear power stations. It is responsible for ensuring that such activities are conducted in accordance with the terms and conditions of such NRC licenses and that as a result of such operations, there is no undue risk to the health and safety of the public.

The NRC Office of Nuclear Reactor Regulation, established by the Energy Reorganization Act of 1974, as amended, performs licensing functions associated with the construction and operation of nuclear reactors and with the receipt, possession, ownership, and use of special nuclear and byproduct materials used at reactor facilities.

With regard to emergency preparedness, the NRC shall:

- Assess licensee emergency plans for adequacy;
- Review the Federal Emergency Management Agency findings and determinations on the adequacy and capability of implementation of state and local plans; and
- Make decisions with regard to the overall state of emergency preparedness and issuance of operating licenses.

The NRC shall respond to incidents at licensed facilities or vehicular accidents involving licensed materials, including radionuclides, in transit. The NRC shall act as the lead Federal agency with regard to technical matters during a nuclear incident including radiological assistance. The NRC shall be prepared to recommend appropriate protective actions for the public and technical actions to the licensee. FEMA shall act as the lead Federal agency for offsite, non-technical concerns.

During an incident, the Chairman of the Commission is the senior NRC authority for all aspects of a response. The Chairman shall transfer control of emergency response activities to the Director of Site Operations when deemed appropriate by the Chairman.

All NRC Regions as well as Headquarters are prepared to respond to potential emergencies. All Regions and Headquarters have developed plans and procedures for responding to radiological incidents involving NRC licensees. Headquarters has developed the NRC Incident Response Plans and Implementing Procedures. Each NRC Region has developed Regional Supplements that detail how the Region will fulfill all of the responsibilities assigned in the NRC Incident Response Plan. All NRC organizations are responsible for maintaining an effective state of preparedness through periodic training, drills and exercises.

Each Region and Headquarters have established and maintain an Incident Response Center designed to centralize and coordinate the emergency response function. Adequate communications are established to link the licensee, Headquarters and the Region. The NRC has established lines of communications with local government, state government, other Federal agencies, Congress and the White House. Public information will be disseminated in a timely manner and periodically.

Each Region is prepared to send a team of qualified specialists to the scene expediently. All of the necessary supplies and equipment needed for emergency response will be provided and maintained by the NRC.

The NRC Incident Response Plan objectives are to provide for protection of the public health and safety, property, and the environment, from the effects of radiological incidents that may occur at licensed facilities or which involve licensed materials, including radio-nuclides in transit.

The objectives of the agency plan set forth the organizational and management concepts and responsibilities needed to assure that NRC has an effective emergency response program.

The plan is intended to ensure NRC preparedness:

- To receive and evaluate notification information of incidents, accidents and unusual events and determine the extent of NRC response necessary to meet NRC responsibilities for mitigating the consequences of these events;

- To determine the cause of incidents, accidents, and unusual events in order to ensure that appropriate corrective actions are taken by the licensee to minimize the consequences of these events;

- To provide onsite expertise in a timely manner, to evaluate the nature and extent of the incident, ascertain plant status (for reactors and fuel facilities), monitor licensee activities, determine compliance, make recommendations, and, if necessary, issue orders relative to the event;

- To inform the public and others of plant status and technical details concerning the incident;

- To recommend adequate protective actions to the responsible local and/or state agencies;

- To provide technical assistance;

- To ensure the plant is returned to a safe condition; and

- To return the NRC Headquarters and Regional office to normal operations.

b) Federal Emergency Management Agency (FEMA): Per the National Response Framework (NRF), FEMA is responsible for the overall coordination of a multi-agency Federal response to a significant radiological incident. The primary role of FEMA is to support the state by coordinating the delivery of Federal non-technical assistance. FEMA coordinates state requests for Federal assistance, identifying which Federal agency can best address specific needs. If deemed necessary by FEMA, it will establish a Federal Response Center from which it will manage its assistance activities.

c) Federal Radiological Preparedness Coordinating Committee (FRPCC): The FRPCC consists of the Federal Emergency Management Agency, which chairs the Committee, the Nuclear Regulatory Commission, the Environmental Protection Agency, the Department of Health and Human Services, the Department of Energy, the Department of Transportation, the Department of Defense, the Department of Agriculture, the Department of Commerce, and where appropriate and on an ad hoc basis, other Federal departments and agencies. The FRPCC shall assist FEMA in providing policy direction for the program of Federal assistance to state and local governments in their radiological emergency planning and preparedness activities.

d) U.S. Department of Energy (DOE): The Department of Energy (DOE) has extensive radiological monitoring equipment and personnel resources that it can assemble and dispatch to the scene of a radiological incident. The Department of Energy (DOE) local operations office can assist Constellation Nuclear following a radiological incident as outlined in the Federal Radiological Monitoring and Assessment Plan (FRMAP). If Constellation Nuclear, the NRC or the affected state(s) deem that assistance from DOE is necessary or desirable, the affected state(s) would notify the appropriate DOE operations office.

e) Environmental Protection Agency (EPA): Assists with field radiological monitoring/sampling and non-plant related recovery and reentry guidance.

f) The U.S. Coast Guard (USCG): The USCG patrols and ensures the safety of navigable waterways in the United States. The USCG is promptly notified of any oil or hazardous substance discharges into rivers or lakes or radioactive contamination of rivers or lakes under its jurisdiction at levels requiring assistance to effect protective actions. The USCG is contacted by the appropriate state agencies in the event of an incident at an applicable nuclear power plant. The USCG is responsible for officially closing the waterways to all commercial traffic [Refer to the appropriate State Plan].

g) U.S. Army Corps of Engineers: The U.S. Army Corps of Engineers control barge and boat traffic at locks and dams on navigable waterways in the United States. The Corps of Engineers will be contacted by the appropriate state agencies in the event of an incident at an applicable nuclear power plant. The Corps will be responsible for closing their locks and dams to all waterway traffic leading to the affected area, allowing only traffic leaving the area [Refer to the State Plan].

h) Federal Bureau of Investigation (FBI): Support from the FBI is available through its statutory responsibility based in Public Law and the US code, and through a memorandum of understanding for cooperation with the NRC. Notification to the FBI of emergencies in which they would have an interest will be through provisions of the Nuclear Station's Security Plan, or by the NRC.

i) National Weather Service (NWS): Provides meteorological information during emergency situations, if required. Data available will include existing and forecasted wind directions, wind speed, and ambient air temperature.

2) State Agencies

a) The Commonwealth of Pennsylvania: The Commonwealth organizations having prime responsibility in matters of radiation hazards are the Pennsylvania Emergency Management Agency and the Bureau of Radiation Protection (BRP) of the Pennsylvania Department of Environmental Protection.

- Pennsylvania Emergency Management Agency: Responsibilities of PEMA are outlined in The Nuclear/Radiological Plan (formerly Annex E)of the Commonwealth of Pennsylvania Emergency Operations Plan. PEMA is the primary State agency to interface with FEMA. Any BRP requests for non-technical assistance from FEMA are coordinated through PEMA.

- Department of Environmental Protection, Bureau Of Radiation Protection (DEP/BRP): Responsibilities of DEP/BRP are outlined in the Nuclear/Radiological Plan (formerly Annex E).

- Pennsylvania State Police: Responsibilities of the State Police are set forth in the Nuclear/Radiological Plan (formerly Annex E).

3) County Government Agencies

Constellation and the surrounding communities that comprise the Plume Exposure Pathway EPZs have developed integrated emergency response programs that call upon the resources of their community. The community organizations are responsible for implementing and coordinating the community response to an emergency.

The County Emergency Operations Centers (EOCs) serve as the primary coordinating center for local government response within the county's jurisdiction and for coordination between counties.

b. During an event classified as an Alert, Site Area Emergency, or General Emergency, the Constellation Nuclear ERO replaces the normal plant organization. The ERO consists of three major response sub-organizations:

1) The Station Organization, directed by the Station Emergency Director, provides for:

- Control and operation of the plant.

- Mitigation of the emergency condition.

- Protection of station personnel.

- Emergency event classification.

- Notification of the appropriate individuals and Federal agencies prior to EOF taking Command and Control.

- Emergency support for operations, engineering, maintenance, firefighting, material acquisition, security, and first aid.

2) The Corporate Organization, directed by the Corporate Emergency Director, provides for:

- Emergency notifications to state and local agencies.
- Offsite radiological accident assessment and Protective Action Recommendations to offsite authorities.
- The primary interface between Constellation Nuclear and outside organizations responsible for the protection of the public.

3) The Public Information Organization, directed by the Corporate Spokesperson, coordinates with public information officers from other organizations to provide information to the public through the news media.

c. Interrelationships between major Constellation Nuclear organizations and sub-organizations in the total response effort are illustrated in a block diagram in Figures A-1 and A-2. For a more detailed diagram of the Constellation Nuclear ERO, see Figures CRANE B-1a to CRANE B-1d.

d. The Corporate Emergency Director is a senior Constellation employee with overall responsibility for coordinating emergency response actions in support of the affected Constellation Nuclear station, Emergency Public Information Organization, and affected state and local agencies.

e. Procedures for training and maintenance of the emergency organization are in place to ensure 24-hour per day staffing for emergency response, including established communication links.

2. State and County Functions and Responsibilities

The state and counties have emergency response plans that specify the responsibilities and functions for the major agencies, departments, and key individuals of their emergency response organizations. This information is located in their respective plans.

3. Agreements in Planning Effort

Written agreements establishing the concept of operations developed between Constellation and other support organizations having an emergency response role within the EPZs have been developed. These agreements identify the emergency measures to be provided, the mutually accepted criteria for implementation, and the arrangements for exchange of information. Agreement letters are not necessary with Federal Agencies who are legally required to respond based on Federal law; however, agreements are necessary if the agency was expected to provide assistance not required by law. Letters of Agreement with private contractors and others who provide services in support of the station shall be obtained by the station and are maintained on file at the station. Constellation Corporate Emergency Preparedness maintains Letters of Agreement with organizations that provide support to multiple stations. A contract/purchase order with a private contractor is considered acceptable in lieu of a Letter of Agreement for the specified duration of the contract.

4. Continuous Coverage

Constellation maintains 24-hour emergency response capability at CRANE. The normal on-shift complement provides the initial response to an emergency. This group is trained to handle emergency situations (e.g. initiate implementation of the Emergency Plan, make initial accident assessment, emergency classification, notifications, communications, protective action recommendations) until the augmented ERO arrives. The ERO is composed of a broad spectrum of personnel with specialties in operations, maintenance, engineering, radiochemistry, health physics, material control, fire protection, security, and emergency planning and are available and trained to augment on-shift personnel in an emergency. Procedures for training and maintenance of the emergency organization are in place to provide the capability of continuous (24-hour) operations.

The Corporate Emergency Director, located in the EOF, has the authority and responsibility for assuring continuity of resources (technical, administrative, and material) in the event of the activation of the ERO.

Figure A-1: Constellation Emergency Response Organization Interrelationships

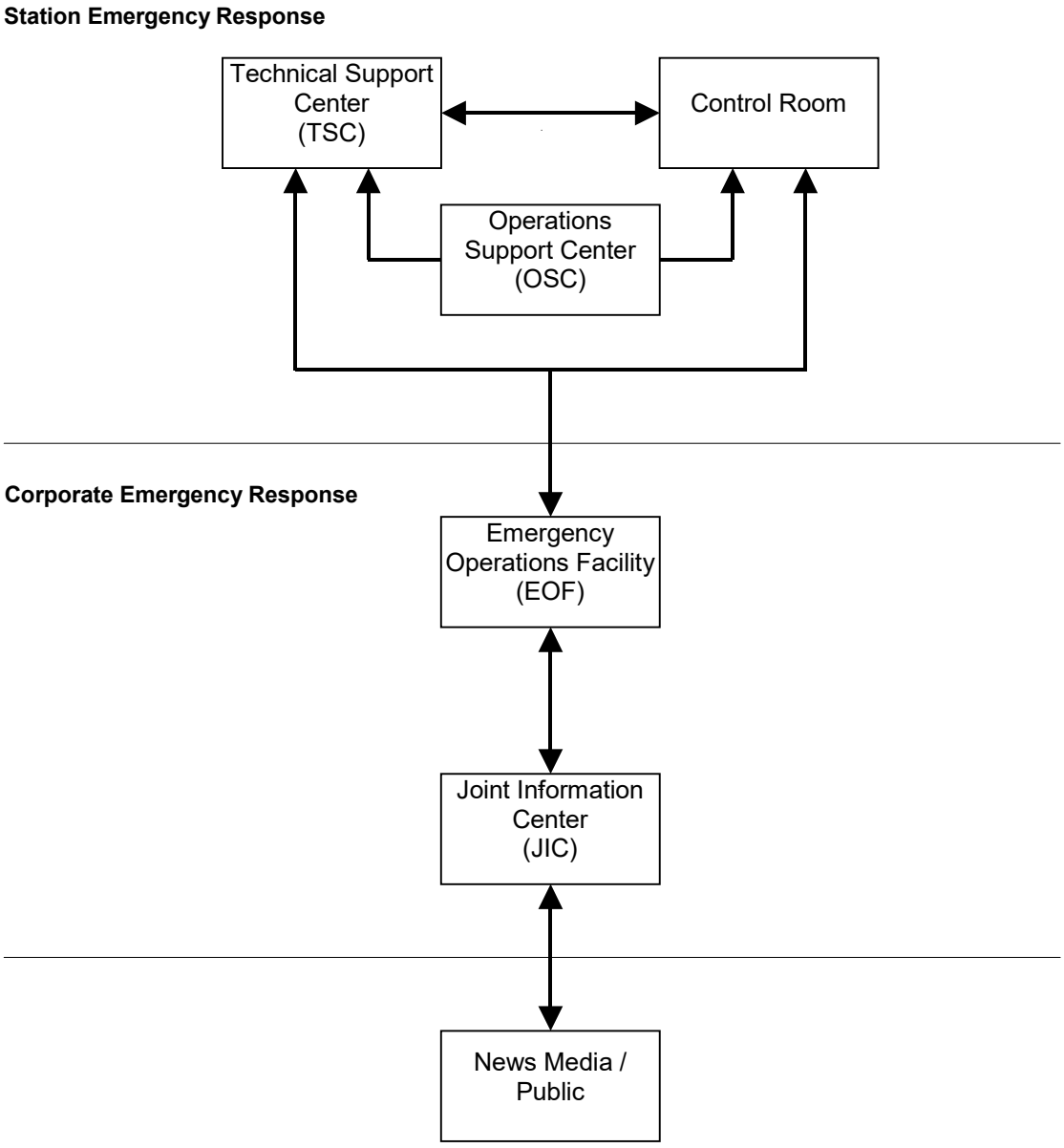
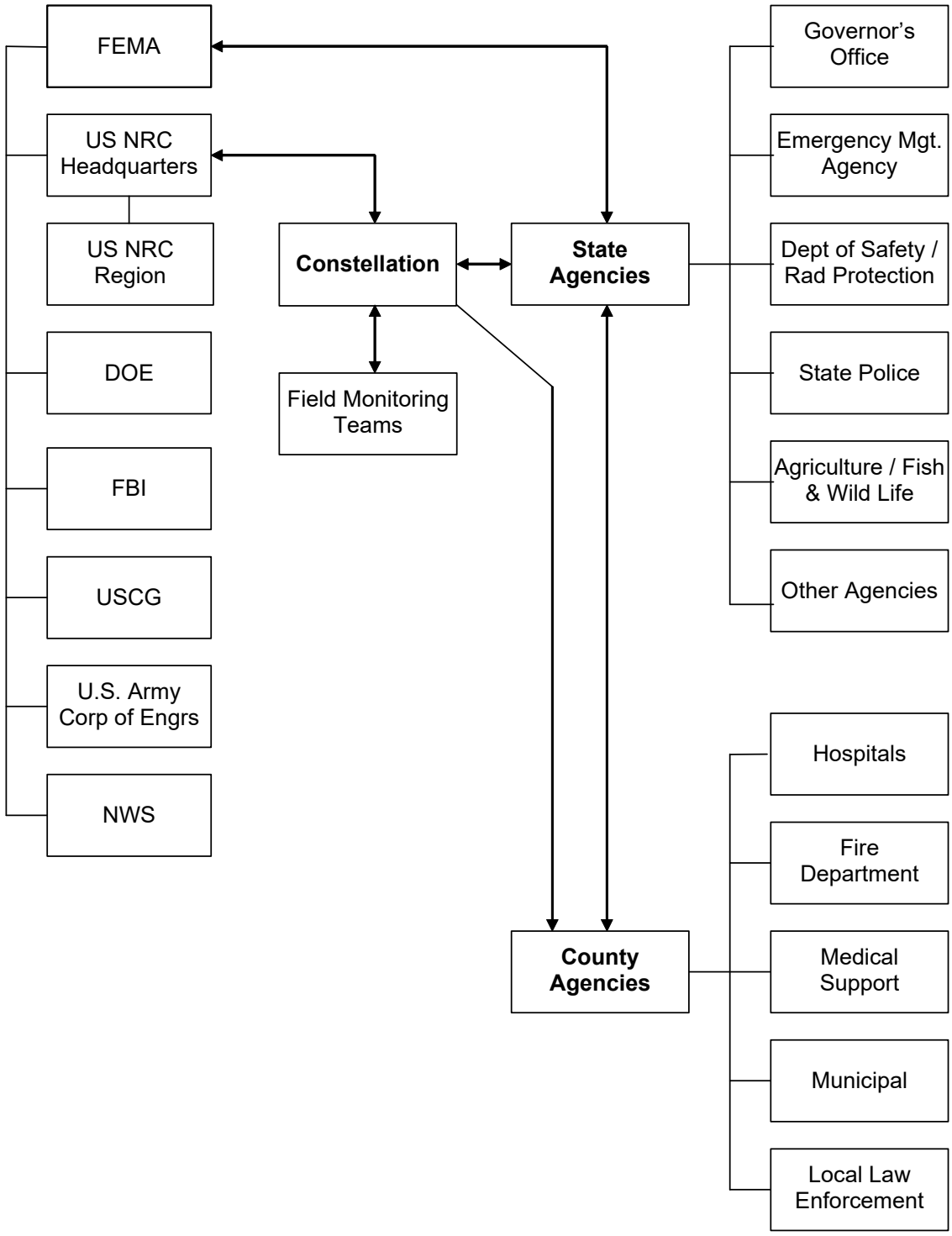


Figure A-2: Agency Response Organization Interrelationships



Section B: Constellation Nuclear Emergency Response Organization

This section describes the Constellation Nuclear ERO, its key positions, and associated responsibilities. It outlines the staffing requirements which provide initial emergency response actions and provisions for timely augmentation of on-shift personnel when required. It also describes interfaces among Constellation Nuclear emergency response personnel and specifies the offsite support available to respond to CRANE.

1. On-Shift Emergency Response Organization Assignments

The normal plant personnel complement is established with the Station Plant Manager having overall authority for station operations. The Station Plant Manager directs the site organization in the management of the various departments while the Shift Manager retains the responsibility for actual operation of plant systems. Emergency Preparedness must consider the capabilities of the normal plant organization, the Station and Corporate Emergency Response Organizations of Constellation Nuclear, and the non-Constellation Nuclear Emergency Response agencies. The initial phases of an emergency situation at a nuclear station will most likely involve a relatively small number of individuals. These individuals must be capable of (1) determining that an emergency exists; (2) providing initial classification and assessment; and (3) promptly notifying other groups and individuals in the emergency organization. The subsequent phases of the emergency situation may require an increasing augmentation of the emergency organization.

CRANE has personnel on-shift at all times that can provide an initial response to an emergency event. ERO staffing tables contained within this Emergency Plan outline the plant on-shift emergency organization and its relation to the normal staff complement. Members of the on-shift organization are trained on their responsibilities and duties in the event of an emergency and are capable of performing all response actions in an Unusual Event or the initial actions of higher classifications.

On-Shift Personnel: CRANE has the capability at all times to perform detection, mitigation, classification, and notification functions required in the early phases of an emergency. Shift augmentation and further ERO involvement will be determined by the extent and magnitude of the event.

Shift Manager: While acting as Shift Emergency Director, will take immediate action during an emergency and will activate the Station ERO, as appropriate. In the Shift Manager's absence or incapacitation, the line of succession is defined by CRANE procedures.

Shift Technical Advisor (STA): During normal plant operations, the Senior Reactor Operators report to the Shift Manager and directly supervise the licensed Reactor Operators and all activities in the Control Room. During an abnormal condition, the Shift Manager assumes direct supervision of personnel and all activities in the Control Room while a qualified individual steps back and assumes an overview role as an STA with the specific responsibility of monitoring the maintenance of core cooling and containment integrity. An individual assigned the duty as the STA shall be available to the Control Room at all times.

Radiation Protection: The Station Radiation Protection personnel are responsible for the handling and monitoring of radioactive materials. Included in this organization are Health Physicists, Radiation Protection Supervisors, and Technicians.

Security: The Station Security personnel are responsible for the physical security of the site. Included in this organization are Security Supervisors and Security Guards.

2. Authority Over the Emergency Response Organization

The Emergency Director in Command and Control is the designated Constellation Nuclear individual who has overall authority and responsibility, management ability, and technical knowledge for coordinating all emergency response activities at the nuclear power station.

- Control Room: Shift Emergency Director (Shift Manager)
- TSC: Station Emergency Director
- EOF: Corporate Emergency Director

3. Criteria for Assuming Command and Control (Succession)

Emergency personnel assume responsibility for their positions upon receiving notification to activate. The responsibility for initial assessment of and response to an emergency rests with the Shift Manager. The Shift Manager is the Shift Emergency Director and has the Station and Corporate Emergency Director's responsibilities and authority until relieved. The Corporate Emergency Director, once having relieved the Shift Manager of the Emergency Director responsibilities, is responsible for continued assessment of the severity of the emergency and for the necessary functions as described in the Emergency Plan, the Station Annex, and the emergency implementing procedures.

The Shift Emergency Director is relieved of Command and Control as soon as possible after the declaration of an Alert (or higher classification if Alert not declared). Following the Command and Control turnover, the Corporate Emergency Director shall have overall Command and Control of the Emergency Response. Note that the Station Emergency Director takes responsibility for onsite Non-Delegable Responsibilities including Classification and Emergency Exposure Control. The Corporate Emergency Director takes responsibility for offsite Non-Delegable Responsibilities including Protective Action Recommendations and State/local Notifications. Command and Control does not transfer until the following criteria have been met:

- Adequate staff levels are present in support of the non-delegable responsibilities.
- The staff has been fully briefed as to the status of the event and the currently proposed plan of action.
- A turnover between the Emergency Director relinquishing Command and Control and the Emergency Director assuming Command and Control has been made.

Although the CRANE ERO fulfills all regulatory requirements for emergency response, it may be altered by the Emergency Director. This type of alteration will be based upon identified needs within the ERO, event dependent criteria, and identified needs of the company as a whole.

4. Non-Delegable Responsibilities

Non-delegable responsibilities include the following functions:

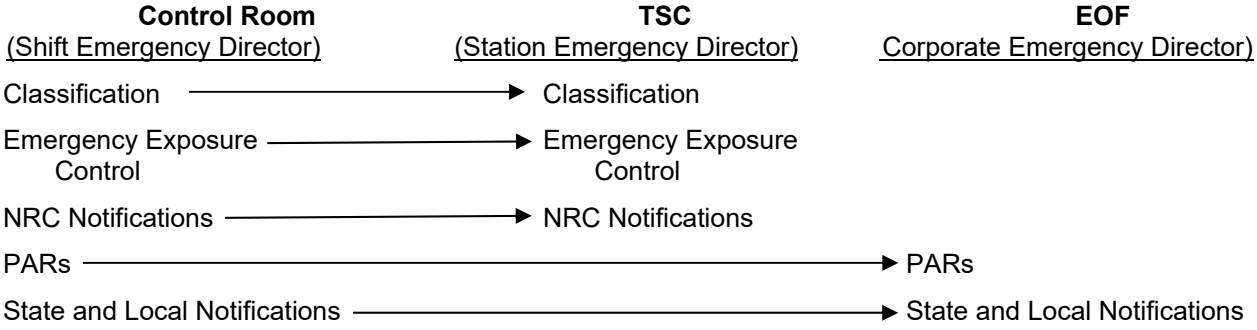
- Event classification.
- Protective Action Recommendations (PARs) for the general public.
- Notification of offsite authorities (approval of state/local and NRC notifications).
- Authorization of emergency exposure controls in excess of 5 Rem TEDE and the issuance of potassium iodide (KI), for Constellation Nuclear emergency workers per EPA-400.

The Shift Manager is responsible for the initial classification of an event and assumes the position as Shift Emergency Director. In this capacity, the Shift Manager has responsibility for performing the non-delegable responsibilities until relieved.

The Shift Emergency Director is relieved of Command and Control as soon as possible after the declaration of an Alert (or higher classification if Alert not declared). Command and Control is transferred to the Station Emergency Director but may be transferred directly to the Corporate Emergency Director.

When the Station Emergency Director assumes overall authority and responsibility for Classification and Emergency Exposure Control and NRC Communications. The Corporate Emergency Director (EOF) will assume the non-delegable responsibilities for PAR determination and notifications to State and Local authorities.

Transition of "Non-Delegable" Responsibilities



5. Emergency Response Organization Positional Responsibilities

The Emergency Plan designates two types of augmented ERO responders. Those designated as Minimum Staff are those key ERO needed to relieve the on-shift staff of key EP functions/tasks required in response to the Emergency and are those required to activate their respective Emergency Response Facility (ERF). Specifically, these are the ERO that are the absolute minimum needed to implement the emergency plan (i.e., if any position or function is not staffed then the emergency plan may not be effectively implemented). These positions in most cases are required to respond to their respective ERF within 60 minutes of the declaration of an Alert or higher classification. See Appendix 5, Table 5-1 for the list of On-shift and Minimum Staff positions.

The positions which are considered Full Augmented staff (i.e., non-minimum staff) are those positions which provide support for the minimum staff in their response to the Emergency. The Full Augmentation positions consist mostly of liaisons, coordinators and additional communicators which help facilitate communication and the emergency response effort over time but are not directly needed to implement the functions/tasks identified in the Emergency Plan.

ERO staffing tables contained within this Emergency Plan outline ERO positions required to meet minimum staffing of the on-shift complement at an Alert or higher classification, and the major tasks assigned to each position. The full augmentation staffing levels described in Emergency Preparedness Implementing Procedures (EPIPs). For extended events (ones which last for more than 24 hours), actual staffing will be established by the Emergency Director based on the event and personnel availability. However, additional staffing or reduced staffing will only occur after discussion concerning the impact on plant operations and emergency response.

In addition to maintaining adequate documentation of the event, responsibilities for each position are as follows:

a. Station Emergency Response Organization: The Station ERO is the onsite group that is activated during an emergency. It functions under the Station Emergency Director, who is responsible for organizing and coordinating the emergency efforts at and within the immediate vicinity of the station (including carrying out all onsite emergency efforts and the initial offsite environs monitoring efforts necessary to assess plant releases).

   The Station ERO consists of station personnel who are involved with emergency response efforts necessary to control the plant during an incident. This organization operates out of the Control Room, the Technical Support Center (TSC) and the Operations Support Center (OSC). Collectively, members of the Station ERO provide for the following activities during an emergency:

   - Plant systems operations
   - Radiological survey and monitoring (including Environs Monitoring)

- Firefighting
- Rescue operations and First Aid
- Decontamination
- Security of plant and access control
- Repair and damage control
- Personnel protection including Assembly, Accountability and Evacuation
- Communications

1) Shift Manager (Shift Emergency Director) Control Room

A Shift Manager is on duty 24 hours a day and is the Shift Emergency Director in a declared emergency until relieved of this function. While serving in this capacity the Shift Manager is responsible for:

- Activating the ERO (as deemed appropriate or as procedurally required).

- Performing those duties outlined in Section B.5.a.2 for the Station Emergency Director. The on-duty Shift Manager directs the activities of the operating crew and is responsible for the safe operation of the plant in compliance with the station NRC operating license and the station operating procedures. The Shift Manager, after relinquishing Command and Control, functionally reports to the Operations Manager in the TSC.

  The Shift Manager's responsibilities, when not in Command and Control, are described below:

  - The authority and responsibility to shut down the reactor when determined that the safety of the reactor is in jeopardy or when operating parameters exceed any of the reactor protection circuit set-points and automatic shutdown does not occur.

  - To ensure a review has been completed to determine the circumstance, cause, and limits under which operations can safely proceed before the reactor is returned to power following a trip or an unscheduled or unexplained power reduction.

  - The responsibility to be present at the plant and to provide direction for returning the reactor to power following a trip or an unscheduled or unexplained power reduction.

  - The responsibility to adhere to the station Technical Specifications and to review routine operating data to assure safe operation.

  - The responsibility to identify applicable EALs and emergency classifications; and

- The responsibility to adhere to plant operating procedures and the requirements for their use. During an emergency, operations personnel may depart from approved procedures where necessary to prevent injury to personnel, including the public, or damage to the facility consistent with the requirements of 10 CFR 50.54(x) and (y).

- Supervise the activities of the Control Room Crew.

2) Station Emergency Director TSC

The Station Emergency Director reports to the Corporate Emergency Director and supervises and directs the Station ERO. The Station Emergency Director's responsibilities include organizing and coordinating the onsite emergency efforts. Additionally, the Station Emergency Director has the requisite authority, plant operating experience and qualifications to implement in-plant recovery operations.

a) Station Emergency Director Responsibilities while in Command and Control:

- Activate the facility.

- Conduct personnel assembly/accountability and evacuation of non-essential personnel at Site Area Emergency, General Emergency or as conditions warrant.

- If the emergency involves a hazardous substance and/or oil discharges, ensure that appropriate notifications and responses have been made.

- Determine if the OSC is to remain activated at the Alert Classification.

- Event classification.

- Emergency exposure controls.

- Protective actions for all onsite personnel.

- Supervision of the Station ERO.

- Inform the Corporate Emergency Director and onsite NRC as to the status of the plant.

- Assist the Corporate Emergency Director in the acquisition of information for the state/local notifications, NRC notifications and offsite agency updates.

- Provide information and recommendations to the Corporate Emergency Director.

- Implement plans, procedures and schedules to meet emergency response objectives as directed by the Corporate Emergency Director.

- Request from the Corporate ERO any additional material, personnel resources or equipment needed to implement response plans and operations.

3) ENS Communicators CR/TSC

Responsibilities assigned to all the ENS Communicators include:

- Establish communications with appropriate parties as directed.

- Transmit information that has been reviewed and/or approved by the responsible Manager or Coordinator.

- Document time, date and information being transmitted or received on appropriate forms.

- Record and relay inquiries and the responses to those inquiries.

- Assist appropriate Managers and Coordinators in maintaining proper records and logs of emergency related activities.

- Gather, record, and post appropriate information.

  - Notify the NRC of changes in event classification, , and assist in completing the NRC Event Notification Worksheet and responding to NRC inquiries.

  - Provide real time updates of significant changes to plant and system status and responses to NRC inquiries.

  - Maintain continuous communications with the NRC, if requested, via the NRC ENS phone or commercial telephone line.

4) Operations Manager TSC

The Operations Manager reports to the Station Emergency Director. Major functions include determining the extent of station emergencies, initiating corrective actions, and implementing protective actions for onsite personnel. In the event that the Station Emergency Director becomes incapacitated and can no longer fulfill the designated responsibilities, the Operations Manager will normally assume the responsibilities until relieved by another qualified Station Emergency Director. Responsibilities include:

- Coordinate TSC efforts in determining the nature and extent of emergencies pertaining to equipment and plant facilities in support of Control Room actions.

- Initiate immediate corrective actions to limit or contain the emergency invoking the provisions of 10 CFR 50.54(x) if appropriate.
- Recommend equipment operations checks and miscellaneous actions to the Control Room in support of restoration and accident mitigation.
- Approve emergency special procedures, and implement as required under the provisions of 10 CFR 50.54(x).
- Assist in determining the priority assigned to OSC activities.
- Organize and direct medical response efforts for injured personnel.
- Ensure adequate staffing of the Control Room and TSC subordinates.
- Ensure the Shift Manager is informed of OSC staffing utilization and activities.
- Identify steps or procedures that the Operations staff should be utilizing to properly respond to the emergency condition.
- Assist the Station Emergency Director in evaluating changes in event classification.
- Supervise the activities of the ENS Communicator in the TSC.
- Act as the TSC liaison with the appropriate NRC Site Team Representative.

5) Technical Support Staff TSC

The TSC Technical Support Staff consists of the following minimum staff engineering positions:

- Electrical Engineer
- Mechanical Engineer
- Core/Thermal Hydraulic Engineer - serves as Core Damage Assessment Methodology (CDAM) Evaluator, as applicable.

In addition, station Engineering support will be augmented on an as needed basis to support accident assessment and mitigation activities.

6) Radiation Protection Manager (RPM) TSC

The Radiation Protection Manager reports to the Station Emergency Director The TSC RPM directs a staff in determining the extent and nature of radiological or hazardous material problems onsite. Responsibilities include:

- Accumulate, tabulate, and evaluate data on plant conditions such as meteorological and radiological monitoring readings, and other pertinent data.
- Act as the TSC liaison with the appropriate NRC Site Team representative.
- Ensure use of protective clothing, respiratory protection, and access control within the plant as deemed appropriate to control personnel exposures.
- Ensure that appropriate bioassay procedures have been implemented for onsite personnel when a radioactivity incident has occurred.
- Ensure that personnel are decontaminated, if necessary.
- Authorize personnel exposures below 5 Rem TEDE (EPA-400 lower limit).
- Assist the Station Emergency Director in determining if exposures in excess of the 5 Rem TEDE (EPA-400 lower limit) are necessary.
- Advise the Station Emergency Director of situations when the use of KI should be considered.
- Advise the Station Emergency Director and EOF Radiation Protection Manager of changes in radiological release status.
- Assist the Operations Manager in planning rescue operations and provide monitoring services as required, including the transfer of injured and/or contaminated personnel.
- Coordinate with the Security Coordinator to determine the routes to be used for evacuation of non-essential personnel.
- Assure additional radiation protection personnel and/or equipment is arranged for, as necessary.

7) Security Coordinator TSC

The Security Coordinator reports to the Station Emergency Director and maintains plant security and personnel accountability at the nuclear station. Responsibilities include:

- Maintain plant security and account for all personnel within the protected area.

- Assist the Station Emergency Director in evaluating changes in security related threats and event classifications.
- Identify any non-routine security procedures and/or contingencies that are in effect or that require a response.
- Expedite ingress and egress of emergency response personnel.
- Coordinate with the Radiation Protection Manager in controlling ingress and egress to and from the Protected Area if radiological concerns are present.
- Provide for access control to the Control Room, TSC and OSC, as appropriate.
- Expedite entry into the Protected Area, as necessary, for the NRC Site Team.
- Act as the TSC liaison with the appropriate NRC Site Team representative.
- Assist the Radiation Protection Manager in determining personnel evacuation routes as necessary.
- Coordinate the evacuation of station non-essential personnel with the appropriate Local Law Enforcement Agencies (LLEAs).

8) Operations Support Center Director OSC

The OSC Director reports to the Emergency Director and supervises the activities of OSC personnel. Responsibilities include:

- Assign tasks to designated Leads as available:
  - I&C Maintenance
  - Mechanical Maintenance
  - Electrical Maintenance
  - Radiation Protection
- Coordinate with the OSC Operations Lead in the dispatch of Operations personnel to support Control Room and OSC Team activities.
- Notify the Control Room and TSC prior to dispatch of any OSC teams into the plant.
- Maintain OSC resources including personnel, material, and equipment.

- Maintain accountability for all individuals dispatched from the OSC.
- Conduct periodic briefings on the overall plant status, emergency response activities, and station priorities.
- Assemble and dispatch the Field Monitoring Teams as required.

9) OSC Leads OSC

OSC Leads report to the OSC Director and are assigned from the following station departments:

- Mechanical Maintenance
- Electrical
- Instrument and Control
- Radiation Protection

The OSC Lead assigned to an OSC team is responsible at all times for the safety of team personnel and to keep the OSC Director apprised of team status. Specifically, the OSC Leads are responsible for the managing and supervising OSC team personnel, including:

- Conduct of adequate pre-dispatch briefings.
- Ensuring adequate protective equipment and measures have been identified.
- Tracking of OSC team activities while dispatched.
- Debriefing of team personnel upon return to the OSC.

b. Corporate Emergency Response Organization

1) Corporate Emergency Director EOF

a) The ongoing responsibilities include:

- Coordinate all Constellation Nuclear activities involved with the emergency response.
- Ensure off-site agency updates are periodically communicated as required/requested.
- Coordinate Constellation Nuclear press releases with the Nuclear Duty Officer and Constellation Communications and Public Affairs.
- Request assistance from non-Constellation Nuclear emergency response organizations, as necessary.

- Direct and coordinate the activation of the EOF.

b) Following assumption of Command and Control, the additional responsibilities assigned to the Corporate Emergency Director include:

- Assume overall Command and Control of emergency response activities and the non-delegable responsibilities for PAR determination and the notification of offsite authorities.

- Ensure that Federal, state and local authorities and industry support agencies remain cognizant of the status of the emergency situation. If requested, dispatch informed individuals to offsite governmental Emergency Operation Centers (EOCs).

- Approve the technical content of Constellation Nuclear press releases prior to their being released to the media.

2) Radiation Protection Manager EOF

The Radiation Protection Manager directs the activities of the EOF Radiation Protection staff. Specific responsibilities include:

- Recommend changes in event classification and PARs based upon effluent releases or dose projections.

- Assist the Corporate Emergency Director in the evaluation of the significance of an emergency with respect to the public.

- Notify the Corporate Emergency Director of meteorological changes that may impact identification of downwind areas.

- Advise the Corporate Emergency Director of protective actions taken by the station for plant personnel.

- Assist the TSC in the planning and coordination of activities associated with the evacuation of non-essential personnel.

- Advise the Corporate Emergency Director on the need for emergency exposures or for issuance of KI to the Field Monitoring Teams or Constellation personnel required to enter the plume.

- Determine the need for and contact Occupational Health/Industrial Safety Services personnel for assistance.

- Monitor plant radiological conditions and advise the TSC Radiation Protection Manager of any adverse trends or potential release pathways that may impact existing event classification.

- Assist in the completion and review of the state/local notification form.

- Maintain cognizance of environmental sampling activities.
- Ensure state authorities are provided information pertaining to Constellation Field Monitoring Team activities and sample results.
- Assist the affected station in the following areas:
  - Planning and coordination of activities associated with the evacuation of non-essential personnel.
  - Acquisition of additional instrumentation, dosimetry, protective equipment and radiological support personnel.
- Assist and interface with the EOF Technical Support Group and the station in the development of plans for plant surveys, sampling, shielding, and special tools in support of waste systems processing and design modification activities.
- Upon request, provide in-plant health physics data to Emergency Public Information personnel.
- Coordinate Field Monitoring Team Activities.
- Determine needs of the Dose Assessment Coordinator and the Environmental Coordinator for updates on Field Monitoring Team data and ensure distribution of new data to them in accordance with those needs.
- Promptly report new environmental or Field Monitoring Team exposure data to the Dose Assessment Coordinator.

3) Dose Assessment Coordinator EOF

The Dose Assessment Coordinator reports to the EOF Radiation Protection Manager. Responsibilities include:

- Interpret radiological data and provide PARs based upon dose projections to the EOF Radiation Protection Manager.
- Advise the EOF Radiation Protection Manager of changes in event classification based on effluent releases or dose projections.
- Initiate evaluation of the need for administering KI to Constellation nuclear workers.
- Remain cognizant of forecast and meteorological data and ensure the status is updated periodically.
- Notify the EOF Radiation Protection Manager of meteorological changes that may impact identification of downwind areas.

- Upon request, provide release and dose assessment data to Emergency Public Information personnel.
- Perform dose projections using the Dose Assessment computer models
- Monitor meteorological and plant effluent conditions.
- Evaluate the need for administering KI to Constellation nuclear workers.

4) Computer Specialist EOF

The Computer Specialist reports to the Emergency Director. Responsibilities include:

- Assist any personnel in logging in, initializing or using a desired computer program.
- Investigate and repair problems encountered with communications equipment and computer equipment/applications.

5) State/Local Communicator EOF

The State/Local Communicator reports to the Corporate Emergency Director. Responsibilities include:

- Communicate and receive information via the Nuclear Accident Reporting System (NARS) circuit or commercial telephone line with appropriate state and county agencies.

c. Public Information Emergency Response Organization

1) Corporate Spokesperson JIC

The Corporate Spokesperson reports to the Corporate Emergency Director and is responsible for directing the Constellation Emergency Public Information Organization and providing news information to the media. Responsibilities include:

- Maintain command and control of the Joint Information Center.
- Coordinate with Federal, state and local agencies, as well as with other organizations involved in the emergency response, to maintain factual consistency of information to be conveyed to the news media/public.
- Conduct periodic briefings with the news media.
- Interface with the Public Information Director.
- Coordinate and direct responses to media inquiries.

- Ensure that the composition and timeliness of Constellation News Releases are adequate.

- Provide for timely exchange of information between other spokespersons.

2) JIC Director JIC

The JIC Director reports the Corporate Spokesperson to ensure the operability of and to supervise the activities in the JIC. Responsibilities include:

- Maintain cognizance of conditions of the plant and environment, and the actions of Constellation Nuclear and governmental support personnel.

- Coordinate with Federal, state and local agencies, as well as with other organizations involved in the emergency response, to maintain factual consistency of information to be conveyed to the news media/public.

- Participate, as needed, in rumor control activities.

- Ensure that adequate information flow between the EOF and the JIC is coordinated through the Public Information Director.

- Authorize admittance of non-Constellation Nuclear officials to the JIC.

- Until the JIC is fully staffed, work with Corporate Communications to compose draft news releases.

- Provide the drafted news releases to the Corporate Emergency Director for technical review prior to Public Information Director approval.

- Until the JIC is fully staffed, work with Corporate Communications to ensure that rumors are reviewed, documented and responded to by Constellation Nuclear personnel as deemed appropriate.

- Until the JIC is fully staffed, work with Corporate Communications to document and respond to rumors as quickly as possible, through the Constellation Communications and Public Affairs.

- Until the JIC is fully staffed, work with Corporate Communications to ensure that the media is being monitored and that Constellation Nuclear personnel review the information detailed or contained in media releases.

3) Public Information Director (PID) JIC

When the Emergency Public Information Organization is activated, the Public Information Director reports to the Corporate Spokesperson and is responsible for all emergency event related information intended to be conveyed from Constellation Nuclear to the news media/public. The Public Information Director may perform this function at remote locations. Responsibilities include:

- Provide the Corporate Emergency Director with an overview of the public and media impacts resulting from the Constellation Nuclear and governmental activities.
- Participate with the Corporate Emergency Director regarding information to be released to the public.
- Authorize the issuance of news releases.
- Interface with the Corporate Spokesperson at the JIC.
- Act as a liaison between the ERO and Constellation Nuclear's corporate executives.
- Maintain cognizance of conditions of the plant and environment, and the actions of Constellation Nuclear and governmental support personnel.
- Coordinate information flow between the EOF and the JIC.
- Review and access media coverage of the emergency event.

6. Crane Clean Energy Center Emergency Response Organization Block Diagram

ERO staffing tables contained within the Emergency Plan in Appendix 5, list the key positions of the ERO. Figures CRANE B-1a through CRANE B-1d illustrate the overall emergency response organization. Section B.5 discusses specific responsibilities and the interrelationships for key positions.

7. Constellation Corporate Emergency Response Organization

The Corporate ERO consists of the EOF Organization and the Emergency Public Information Organization. Personnel staffing these corporate organizations are covered in detail in Section B.5 of this plan.

The Corporate Emergency Response Organization is staffed by Constellation personnel, and operates out of the Emergency Operations Facility (EOF) and the Joint Information Center (JIC). The Corporate ERO is supported by News Media Spokespersons, environmental assessment staff and monitoring teams that provide long-term support to the affected station. Additionally, the Corporate ERO has long term liaison responsibilities with federal, state, and local authorities. These positions are further described in the EPIPs.

The Emergency News Center (ENC) function is responsible for the collection and analysis of event information and status, and development of Company news statements. This information is then communicated to the JIC Spokespersons. The ENC function may be located at either the EOF or the JIC.

The EOF is activated at an Alert. The EOF Organization is responsible for evaluating, coordinating and directing the overall company activities involved in the emergency response. Within the EOF, the Corporate Emergency Director shall assume Command and Control from the Shift Emergency Director when classification escalates to an Alert or higher, unless the EOF capabilities are limited such that the overall control and responsibility for PARs and offsite notifications cannot be assumed. The EOF may also function in a supporting role to the station when the Station Emergency Director maintains Command and Control. The JIC is activated within 90 minutes of an Alert or higher. Some JIC functions may continue to be performed by the Constellation Communications organization until transferred to the JIC.

8. Industry/Private Support Organizations

Constellation Nuclear retains contractors to provide supporting services to nuclear generating stations. A contract/purchase order with a private contractor is acceptable in lieu of an agreement letter for the specified duration of the contract. Among services currently provided are the following:

a. Institute of Nuclear Power Operations (INPO): Experience has shown that a utility may need resources beyond in-house capabilities for the recovery from a nuclear plant emergency. One of the roles of the Institute of Nuclear Power Operations (INPO) is to assist affected utilities by quickly applying the resources of the nuclear industry to meet the needs of an emergency. INPO has an emergency response plan that enables it to provide the following emergency support functions:

- Assistance to the affected utility in locating sources of emergency personnel, equipment and operational analysis.

- INPO, Electric Power Research Institute (EPRI) and Nuclear Energy Institute (NEI) maintain a coordination agreement on emergency information with their member utilities.

- INPO provides the "Nuclear Network", or its replacement, electronic communications system to its members, participants, NEI, and EPRI to coordinate the flow of media and technical information about the emergency.

- Constellation Nuclear may obtain utility industry information and assistance from any party to this agreement through the coordination of INPO.

To support these functions, INPO maintains the following emergency support capabilities:

- A dedicated emergency call number.
- Designated INPO representative(s) who can be quickly dispatched to the utility emergency response organization to coordinate INPO support activities and information flow.
- The 24-hour per day operation of an Emergency Response Center at INPO headquarters.

Constellation Nuclear will notify INPO (via the designated emergency call number) for all situations involving an Alert, Site Area Emergency, or General Emergency declaration per the Constellation Nuclear Reportability Manual.

INPO has coordinated the preparation of a Voluntary Assistance Agreement for Transportation Accidents. Constellation Nuclear has signed this agreement which establishes the rights and responsibilities of electric utilities in requesting or providing assistance for response to a nuclear materials Transportation Accident.

b. American Nuclear Insurers (ANI): In early 1982, ANI issued Bulletin #5B (1981) "Accident Notification Procedures for Liability Insurers" which provides revised criteria for the notification of the Pools in the event of a nuclear emergency at one of the liability insured nuclear power reactor sites. This revision brings the ANI/MAELU (Mutual Atomic Energy Liability Underwriters) notification criteria into alignment with the standard emergency classification system adopted by the nuclear industry. This document also identifies a suitable channel for follow-up communication by ANI after initial notification.

- ANI/MAELU Emergency Assistance: In the event of an extraordinary nuclear occurrence (as defined in the Price-Anderson Law) ANI and MAELU (the insurance pools) have plans prepared to provide prompt emergency funding to affected members of the public.
- ANI/MAELU Emergency Assistance (Claims Handling Procedures): The pools' emergency assistance arrangements contemplate the mobilization and dispatch of emergency claims teams to directly dispense emergency assistance funds to affected members of the public.

The pools should be notified in the event of a nuclear emergency requiring notification of state or Federal governmental agencies, or if the insured believes that offsite persons may be affected and financial assistance of a nature discussed may be required. In these instances, ANI expects notification as soon as possible after the initiation of the emergency. Constellation notification to the pools in the event of an Alert, Site Area Emergency, or General Emergency will be in accordance with the Constellation Nuclear Reportability Manual.

Even if it appears to be remote that offsite persons will be affected, the pools should be notified in order that response plans can be initiated to the point of alerting teams of adjusters to stand by. Response activity can be discontinued if it proves less severe and does not require pool response.

All nuclear occurrences of an emergency or non-emergency nature that fall under the nuclear liability policy should be reported formally in writing to ANI by the Constellation Nuclear Insurance Administrator.

- Emergency Notification and Follow-up Procedures: Pre-established lines of communication exist between each utility and ANI in order to exchange all required information during a developing emergency situation.

  ANI Bulletin 11-01, “Revised Emergency Notification Procedures for ANI Policyholders”, has four specific instances which require notification to ANI. They generally include 1) Notification of A Facility Nuclear Incident, 2) Notification of a Transportation Incident Involving Radioactive Materials, 3) Notification of a Drill or Test of the ANI Emergency Number, and 4) Continued Incident Reporting.

  ANI maintains 24-hour coverage of an emergency notification number. ANI’s emergency notification call center is fully automated with no hold times for reporting a nuclear incident, a transportation event, a facility drill, or a test of the ANI emergency contact. The ANI emergency response contact number has not changed and continues to be: (877) 680-2644. The contact number is monitored 24 hours a day, 7 days a week, 365 days a year. Emergency response procedures and records must include this number.

  In addition to ANI emergency response telephone contact, the insured must include ANI on copies of all e-mail data and/or written facsimile emergency notifications that are required and sent to State and Federal authorities. Email data should be delivered to ANI.ER@amnucins.com. The ANI facsimile number is: (860)-659-0002

  In order that follow-up information is available to the Insurance Pool Constellation Nuclear has established the Corporate Emergency Director or their designee as a Point of Contact that ANI personnel may use to update themselves regarding the status of the emergency.

> **NOTE:** For the below listed support services, the specific contractors may change but the functions are maintained.

c. Environmental Monitoring Services:

Environmental Inc.: Environmental Inc. provides emergency Radiological Environmental Monitoring Program (REMP) services. These services include:

- Sample collection
- Handling, packaging and storage of test samples
- Sample shipment
- Chain of Custody

The Environmental Inc. Midwest Laboratory in Northbrook, Illinois analyzes environmental samples for their radioactivity content and reports results to Constellation Nuclear. The REMP sample collection activities at certain Mid-Atlantic and Northeast stations have been subcontracted to Constellation Industrial Services (also referred to as Fort Smallwood) while others are performed by station personnel.

d. Teledyne Brown Engineering: Teledyne Brown Engineering provides bioassay analysis and radiochemical analysis services.

e. Department Of Energy (DOE) Radiation Emergency Assistance Center/Training Site (REAC/TS): DOE REAC/TS provides services of medical and health physics support. REAC/TS advises on the health physics aspects of situations requiring medical assistance.

f. Murray and Trettel, Inc.: Murray and Trettel, Inc. provide meteorological monitoring services, including weather forecasts. Murray and Trettel maintain all Constellation Nuclear station meteorological facilities. Murray and Trettel have computer capability to poll remotely the meteorological facilities to ascertain local conditions and to detect instrument failure.

g. Landauer, Inc.: Landauer provides extremity dosimetry services. In an emergency Landauer would provide additional dosimetry to the affected nuclear station and EOF, if needed.

h. Manufacturer Design and Engineering Support: Under established contracts, the following will provide available engineering expertise, specialized equipment and other services identified as needed and deemed appropriate to assist in an emergency situation:

- General Electric (GE) Nuclear Energy
- Westinghouse Electric Company

- Framatome Inc.

9. Supplemental Emergency Assistance to the ERO

Agreements are maintained with outside support agencies who do not take part in the organizational control of the emergency that provide assistance when called on during an emergency or during the recovery phase. These agreements identify the emergency measures to be provided, the mutually accepted criteria for implementation, and the arrangements for exchange of information. These support agencies (named in the Station Annex) provide services of:

a. Law enforcement;

b. Fire protection;

c. Ambulance services;

d. Medical and hospital support

Support groups providing transportation and treatment of injured station personnel are described in Section L of this plan.

Figure CRANE B-1a: Constellation Overall ERO Command Structure

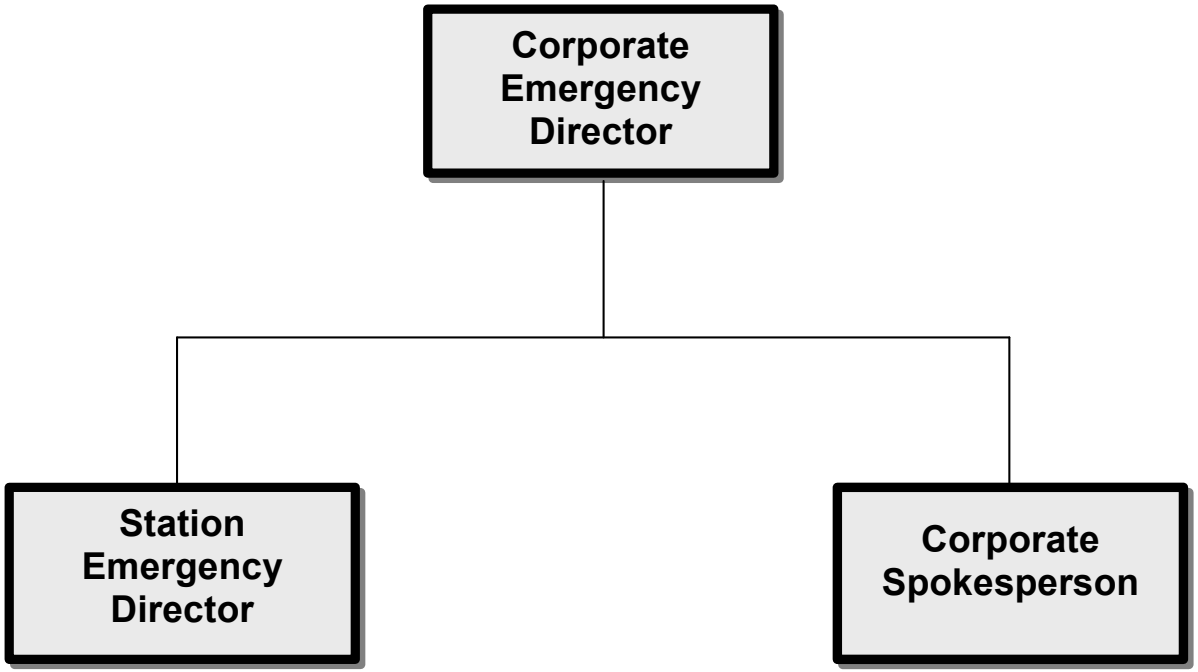
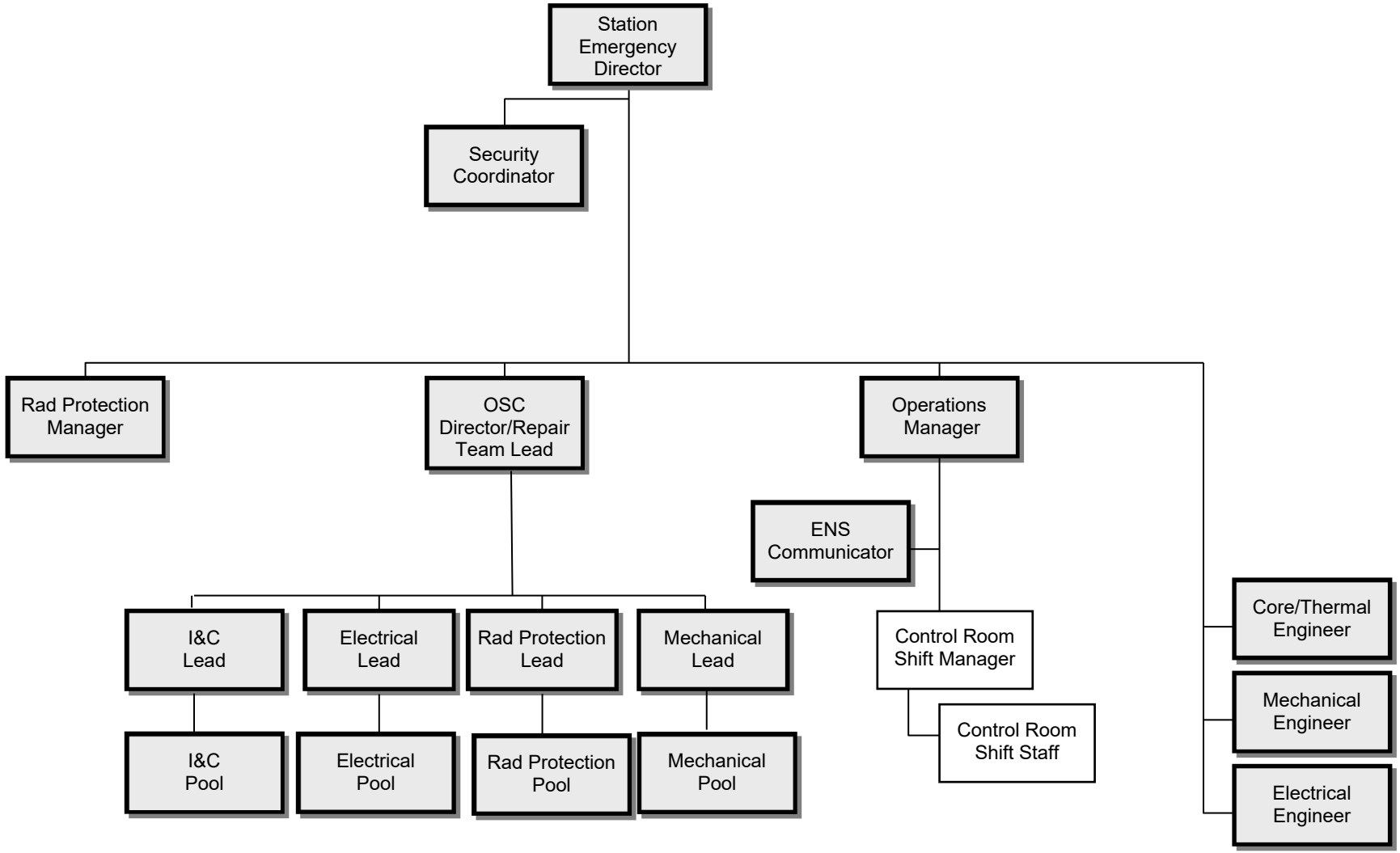


Figure CRANE B-1b: Emergency Onsite Organization



ERO response pool personnel do not include the on-shift complement.

Figure CRANE B-1c: Emergency Offsite Organization

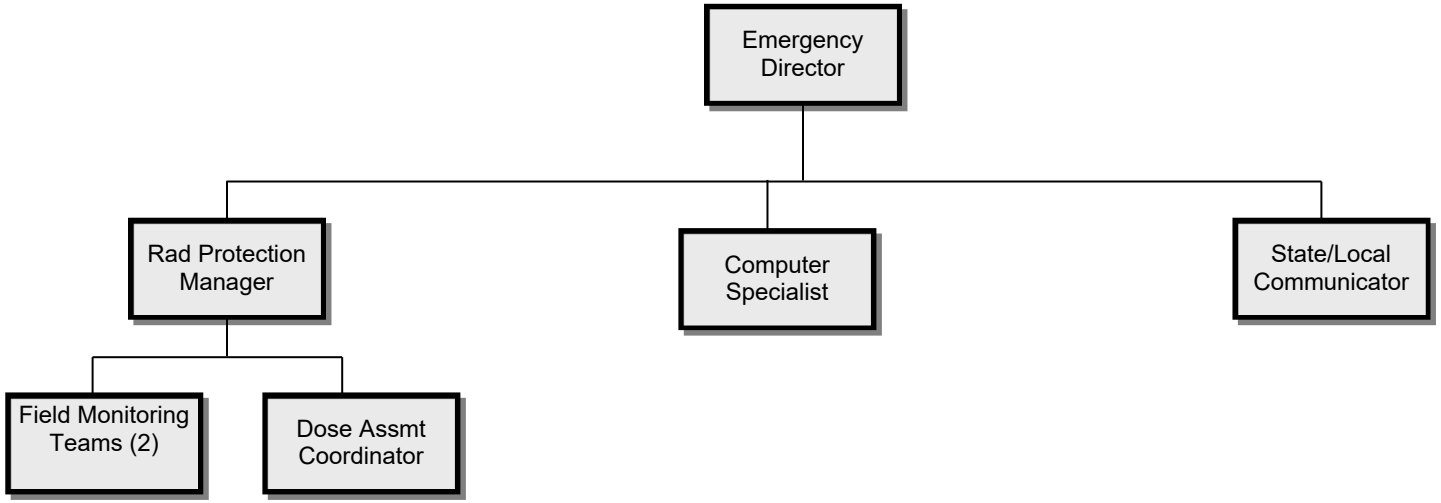
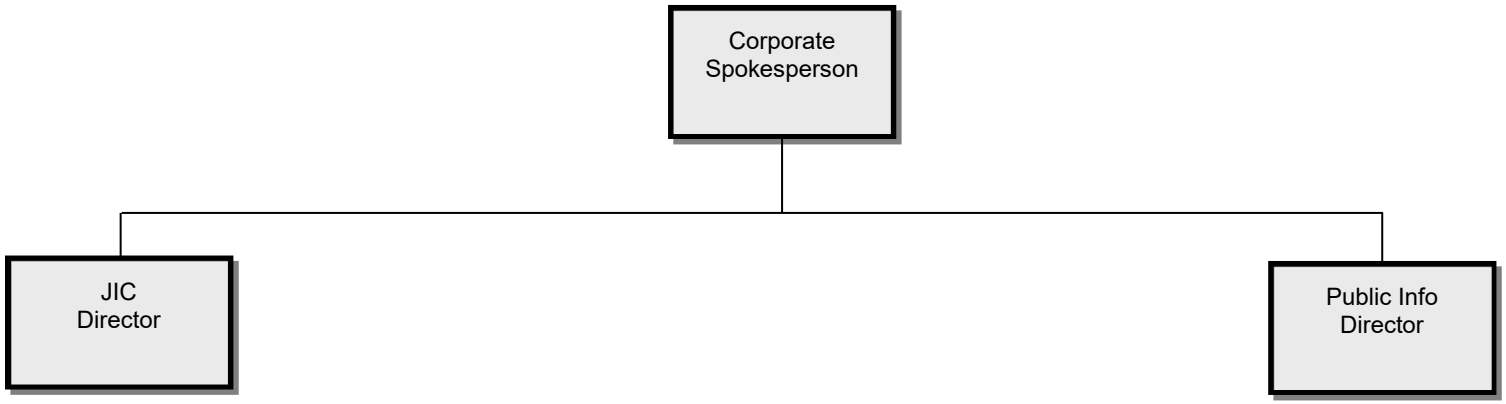


Figure CRANE B-1d: Emergency Public Information Organization



Section C: Emergency Response Support and Resources

This section describes the provisions for requesting and effectively utilizing support resources and for accommodating offsite officials at the Constellation Nuclear emergency response facilities.

1. Federal Response Support and Resources

Assistance is available from federal agencies through the National Response Framework (NRF). The lead federal agency who provides direct assistance to Constellation during an emergency is the Nuclear Regulatory Commission (NRC). Other federal agencies, such as the Federal Emergency Management Agency (FEMA) and the Department of Energy (DOE), provide assistance to the state through implementation of the NRF.

a. Sections A and B of this plan identify the specific individuals by title who are authorized to request federal assistance.

b. Federal agencies that may provide assistance in direct support of Constellation Nuclear in the event of an accident are identified in Section A of this plan. If needed, federal resources are made available to Constellation Nuclear in an expeditious and timely manner.

c. Each emergency response facility has the equipment and communications capability necessary for a continuous high level of response, interaction, and communication among key personnel during emergency conditions. The emergency facilities are able to accommodate federal representatives with working areas provided for their use. Accommodations for the expected NRC site response team assume the following approximate numbers for each facility:

	Initial Activation (minimum)	Full Activation
EOF	9	16
TSC	3	5
CR	1	1
JIC	1	10

The Constellation Emergency Response Organization will provide senior management support for site response teams and communications over a Management Counterpart Link to federal response headquarters.

2. Liaisons

a. The NRC, FEMA, and the state may dispatch representatives to the EOF where accommodations have been provided.

b. At the Alert level and above, Constellation Nuclear personnel may be assigned as liaisons to the requesting state and/or county Emergency Operations Center (EOC). These representatives act as technical liaisons to interpret emergency action levels and protective action recommendations made by Constellation.

3. Radiological Laboratories

Support of the radiation monitoring and analysis effort is provided by an onsite laboratory. The onsite laboratory is the central point for receipt and analysis of all onsite samples and includes equipment for chemical analyses and for the analysis of radioactivity. Additional facilities for counting and analyzing samples can be provided by the other Constellation Nuclear generating stations, state, federal or contracted laboratory services. These laboratories can act as backup facilities in the event that the plant's counting room and laboratory become unusable or the offsite radiological monitoring and environmental sampling operation exceeds the capacity or capability of the station laboratory during an emergency. Additional outside analytical assistance may be requested from contracted vendors or state and federal agencies. The equipment and analytical capabilities for Crane laboratories are listed in the Station Annex. The state, federal and contract laboratories maintain independent evaluation and certification processes and have the capability of quantitative analysis of terrestrial, marine and air samples.

4. Other Assistance

Any unaffected Constellation Nuclear Generating station is available to provide certain types of assistance and support, including engineering, design, consultation, whole body counting, and dosimetry evaluation and equipment. Additional facilities, organizations, and individuals, as listed in the Emergency Response Facilities (ERF) Telephone Directory, are available and may be used in support of emergency response. In addition, American Nuclear Insurers (ANI) provides insurance to cover Constellation legal liability up to the limits imposed by the Price-Anderson Act, for bodily injury and/or property damage caused by the nuclear energy hazard resulting from an incident at the plant. Written agreements which describe the level of assistance and resources provided to Constellation Nuclear by external sources are included in Appendix 3 as applicable.

Section D: Emergency Classification System

This section describes the classification and emergency action level scheme used to determine the minimum response to an abnormal event. This scheme is based on plant systems, effluent parameters, and operating procedures. The initial response of federal, state, and county agencies is dependent upon information provided by the ERO. Constellation works closely with the state and county agencies to ensure consistency in classification schemes and procedural interfaces.

1. Emergency Classification System

The Emergency Plan provides for classification of emergencies into five (5) categories or conditions, covering the postulated spectrum of emergency situations. The first four (4) categories: Notification of Unusual Event (referred to as Unusual Event), Alert, Site Area Emergency, and General Emergency, are characterized by Emergency Action Levels (EALs) or event initiating conditions and address emergencies of increasing severity. The fifth, the Recovery classification, is unique in that it may be viewed as a phase of the emergency requiring specific criteria to be met and/or considered prior to its declaration. Recovery is that period when the emergency phase is over and activities are in progress to return the situation to a normal state (acceptable condition).

a. Unusual Event - Events are in process 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.

   This is the least severe of the four (4) levels. The purpose of this classification is to bring response personnel and offsite agencies to a state of readiness in the event the situation degrades and to provide systematic handling of information and decision making. The Shift Manager, as Shift Emergency Director will classify an Unusual Event.

   Required actions at this classification include:

   - Notifications to station management and the NDO.
   - Notification, within 15 minutes, of the state and local communities.
   - At the discretion of the Emergency Director, station management or the Nuclear Duty Officer (NDO), full or selective staffing of the TSC, OSC, and EOF may be initiated.
   - Notification of the NRC immediately after notification of the appropriate State and local agencies and not later than 60 minutes of classification.
   - Assessment of the situation and response as necessary, which may include escalating to a higher classification if conditions warrant.

- When the event is terminated, close-out is performed over communication links to offsite authorities participating in the response (i.e., NRC, state, county), followed by formal transmission of a state/local notification form within 24 hours.

b. Alert - Events are in process or have occurred which indicate 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 EPA Protective Action Guideline exposure levels.

The purpose of this classification is to ensure that emergency response personnel are readily available and to provide offsite authorities with current status information. An Alert will be classified as the initiating event or as escalation from an Unusual Event. In either case, the classification will most likely be made by the Shift Manager (Shift Emergency Director) prior to the transfer of Command and Control.

Required actions at this classification include:

- Notifications to station management and the NDO.
- Notification, within 15 minutes, of the state and local communities. The EOF will assume state update responsibilities.
- Activation of the TSC, OSC, EOF, and the JIC organizations.
- Transfer of Command and Control.
- Notification of the NRC immediately after notification of the appropriate State and local agencies and not later than 60 minutes of classification.
- Notification of ANI.
- Assessment of the situation and response as necessary, which may include escalating to a higher classification if conditions warrant.
- On-site and off-site Field Monitoring Teams are sent to staging areas or dispatched to monitor for releases of radiation to the environment.
- Keeping offsite authorities informed of plant status by providing periodic updates to include meteorological and radiological data.
- When the event is terminated, notification is performed over communication links followed by an Initial Incident Report to offsite authorities participating in the response (i.e., NRC, state, county) within 8 hours.

c. Site Area Emergency - Events are in process 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 Protective Action Guideline exposure levels beyond the site boundary.

   The purpose of this classification, in addition to those of the Alert level, is to ensure that all emergency response centers are staffed and provisions are made for information updates to the public through offsite authorities and the news media. The classification will most likely be made by the Station Emergency Director following activation of the TSC.

   Required actions at this classification, in addition to those listed under the Alert level, include:

   - If not previously performed, Assembly/Accountability shall be performed and Site Evacuation of non-essential personnel shall be initiated.

   - Keeping offsite authorities informed of plant status by providing periodic updates to include meteorological data and projected or actual doses for any releases that have occurred.

d. General Emergency - Event(s) are in process or have occurred which involve actual or imminent substantial fuel degradation or melting or HOSTILE ACTION that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area.

   The purpose of this classification, in addition to those of the Site Area Emergency level, is to initiate predetermined protective actions for the public and provide continuous assessment of information from monitoring groups. The classification will most likely be made by the Station Emergency Director following activation of the TSC.

   Required actions at this classification, in addition to those listed under the Alert and Site Area Emergency, include:

   - A Protective Action Recommendation will be determined.

   - Assessment of the situation and response as necessary.

e. Recovery: That period when the emergency phase is over and activities are being taken to return the situation to a normal state (acceptable condition). The plant is under control and no potential for further degradation to the plant or the environment is believed to exist.

   Recovery will be classified by the Station Emergency Director after obtaining authorization from the Corporate Emergency Director.

   Required actions at this classification include:

   - The affected state(s) and the NRC should be consulted prior to entry into Recovery.
   - Notifications will be made to station management, the NDO, state(s) and NRC.
   - A Recovery organization will be established to manage repairs to return the Unit to an acceptable condition, and support environmental monitoring activities as requested in coordination with Federal and state efforts.
   - ANI is notified of Recovery classification.

f. Classification Downgrading: Constellation Nuclear policy is that emergency classifications shall not be downgraded to a lower classification. Once declared, the event shall remain in effect until no Classification is warranted or until such time as conditions warrant classification to Recovery.

g. Guidance for Termination of an Emergency: The purpose of terminating an emergency is to provide an orderly turnover of plant control from the Emergency Response Organizations to the normal plant organization. Termination of the emergency is authorized by the Emergency Director in Command and Control. The considerations provided in the Recovery/Termination Checklist in the emergency implementing procedures must be performed prior to exiting the emergency event. Consultation with governmental agencies and other parties should be conducted prior to termination of an event classified as Site Area or General Emergency. Notifications shall be transmitted to appropriate agencies to terminate an event.

h. Station Nuclear Security Plan: The station has a Security Plan that complies with the requirements of 10 CFR 73. The interface between the Emergency Plan and the Security Plan is one of parallel operation. The plans are compatible. The Emergency Plan response measures, once initiated, are executed in parallel with measures taken in accordance with the Security Plan.

Threats made to Crane Clean Energy Center are evaluated in accordance with established threat assessment procedures and the Security Plan. The Security Plan, Appendix C, Contingency Events, identifies situations that could be initiating conditions for EAL classifications. Contingency events include bomb threats, attack threats, civil disturbances, protected area intrusions, loss of guard/post contact, vital area intrusions, bomb devices discovered, loss of guard force, hostages, extortion, fire/explosions, internal disturbances, security communications failure, and obvious attempts of tampering. The Security Plan provides guidance for decisions and actions to be taken for each security contingency event. As guidance, the Security Plan allows for differing responses depending upon the assessment of the actual situation within each contingency event classification.

The assessment of any security contingency event and the decision to initiate, or not to implement the Emergency Plan, will be the responsibility of the Shift or Station Emergency Director. All identified security contingency events have the potential of being assessed as initiating conditions for a radiological emergency declaration.

Determination of a credible security threat may require the staffing of emergency response facilities based on the classification of an Unusual Event per the Emergency Action Levels (EALs).

2. Emergency Action Level Technical Bases

Addendum 3 to the Station Annex includes Site Specific Emergency Action Levels (EALs) consistent with the general class descriptions and provided in NEI guidance documentation in accordance with Regulatory Guide 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors." Where possible, these EALs will be related to plant instrumentation readings.

Emergency classifications are characterized by Emergency Action Levels (EALs). The Threshold Values are referenced whenever an Initiating Condition is reached. An Initiating Condition is one of a predetermined subset of unit conditions where either the potential exists for a radiological emergency, or such an emergency has occurred. Defined in this manner, an Initiating Condition is an emergency condition, which sets it apart from the broad class of conditions that may or may not have the potential to escalate into a radiological emergency. Initiating Conditions are arranged in one of the Recognition Categories.

EALs are for unplanned events. A planned evolution involves preplanning to address the limitations imposed by the condition, the performance of required surveillance testing, and the implementation of specific controls prior to knowingly entering the condition. Planned evolutions to test, manipulate, repair, perform maintenance or modifications to systems and equipment that result in an EAL Threshold Value being met or exceeded are not subject to classification and activation requirements as long as the evolution proceeds as planned. However, these conditions may be subject to the reporting requirements of 10 CFR 50.72.

An emergency is classified after assessing abnormal plant conditions and comparing them to EAL Threshold Values for the appropriate Initiating Conditions. Matrix tables organized by recognition categories are used to facilitate the comparison.

All recognition categories should be reviewed for applicability prior to classification. The initiating conditions are coded with a letter and/or number designator. All initiating conditions, which describe the severity of a common condition (series), have the same initial designator.

3. Timely Classification of Events

Classification of an emergency condition occurs within 15 minutes after the availability of indications from plant instrumentation, plant alarms, computer displays, or incoming verbal reports that an EAL has been exceeded and, is then promptly made upon identification of the appropriate EAL. The 15-minute period encompasses all assessment, classification, and declaration actions associated with making an emergency declaration from the first availability of a plant indication or receipt of a report up to and including the declaration of the emergency.

Validation or confirmation of plant indications or reports of the condition are to be accomplished within the 15-minute period as part of the assessment. Since this validation or confirmation is being performed to determine the validity of an alarm, indication, or report, the 15-minute period starts with the availability of the alarm, indication, or report to any qualified EAL assessor, and not the completion of the validation or confirmation, because the former is the time that the information was first available.

A qualified EAL assessor means any member of the plant staff who, by training and experience, is qualified to assess the indications or reports for validity and to compare the same to the EALs. A qualified EAL assessor may be, but need not be, a licensed operator or member of the ERO. Qualified EAL assessors may be in the MCR or in another facility where emergency declarations are performed. A qualified EAL assessor does not include personnel such as chemists, radiation protection technicians, craft personnel, security personnel, and others whose positions require they report, rather than assess, abnormal conditions to the MCR.

The 15-minute criterion ends as soon it is determined that an EAL has been exceeded and upon identification of the appropriate Emergency Classification Level (ECL) and when the Emergency Director makes the emergency declaration. The emergency condition should be declared as soon as possible following the identification of the appropriate ECL. As used here, “promptly” means the next available opportunity unimpeded by activities not related to the emergency declaration, unless such activities are necessary for protecting health and safety.

The 15-minute criterion is not to be construed as a grace period in which attempts to restore plant conditions are taken to avoid declaring an EAL that has already been exceeded. This statement does not preclude taking actions to correct or mitigate an off-normal condition, but once an EAL has been recognized as being exceeded, the emergency declaration shall be made promptly without waiting for the 15-minute period to elapse. The 15-minute criterion shall not prevent the implementation of response actions deemed necessary to protect public health and safety provided that any delay in the declaration would not deny the State and local authorities the opportunity to implement measures necessary to protect the public health and safety.

For EAL thresholds that specify duration of the condition, the emergency declaration process runs concurrently with the specified threshold duration. Once the condition has existed for the duration specified in the EAL or it is determined that the duration time will likely be exceeded, no further assessment is necessary—the EAL has been exceeded.

4. Offsite Classification Systems

Constellation Nuclear works with the state to ensure consistency between classification schemes. The content of the EALs is reviewed with the state and county authorities on an annual basis.

5. Offsite Emergency Procedures

Constellation Nuclear works with the state and county authorities to ensure that procedures are in place that provide for emergency actions to be taken which are consistent with the protective actions recommended by Constellation accounting for local offsite conditions that exist at the time of the emergency.

Section E: Notification Methods and Procedures

This section describes the notification of state and county response organizations and Constellation emergency response personnel. It outlines the content of initial and follow-up messages to response organizations within the Plume Exposure Pathway Emergency Planning Zone (EPZ).

1. Bases for Emergency Response Organization Notification

Constellation Nuclear, in cooperation with state and county authorities, has established mutually agreeable methods and procedures for notification of offsite response organizations consistent with the emergency classification and action level scheme. Notifications to offsite agencies include a means of verification or authentication such as the use of dedicated communications networks, verification code words, or providing call back verification phone numbers.

Notification for Transportation Accidents: A Transportation Accident is defined in 49 CFR 171.15 and 49 CFR 171.16. If a Transportation Accident involving material in the custody of an Constellation facility occurs, Constellation Nuclear will notify the appropriate internal and offsite agencies in accordance with the Constellation Nuclear Reportability Manual.

2. Notification and Mobilization of Emergency Response Personnel

Emergency implementing procedures are established for notification and mobilization of emergency response personnel as follows:

a. Onsite: When an emergency is declared, reclassified, or terminated an announcement is made (over the plant public address system or by other means) that includes the emergency classification declared and response actions to be taken by site personnel.

   At the Unusual Event classification, select ERO augmentation personnel are notified and requested to remain available to respond. At an Alert classification or higher ERO augmentation personnel are notified for activation of the TSC, OSC, EOF, and JIC using the ERO Notification System.

b. Offsite: Notifications are promptly made to offsite emergency response organizations as follows:

   1) State/Local Agencies: A notification shall be made within fifteen (15) minutes of:

      - The initial emergency classification.
      - Classification escalation.
      - The issuance of or change to a Protective Action Recommendation (PAR) for the general public.

- Changes in radiological release status, occurring outside of an event classification or PAR notification, based on an agreement with the state(s).

The emergency warning points are simultaneously notified using the Nuclear Accident Reporting System (NARS), or a commercial telephone line as backup.

A notification will also be initiated to cognizant state/local government agencies as soon as possible but within one hour of the termination of an event classification, or entry into Recovery Phase.

2) Nuclear Regulatory Commission (NRC): An event will be reported to the NRC Operations Center immediately after notification of the appropriate state or local agencies but not later than one (1) hour after the time of initial classification, escalation, termination or entry into the Recovery Phase. The NRC is notified by a dedicated telephone system called the Emergency Notification System (ENS). If the ENS is inoperative, the required notification is made via commercial telephone service, other dedicated telephone service, or any other method that shall ensure that a report is made as soon as practical. An NRC Event Notification Worksheet should be utilized to transmit initial information to the NRC. If a continuous communication is requested and established, a log is used in lieu of the ENS Worksheet.

   Specific requirements for the notifications to the NRC for classified emergency events are detailed in 10 CFR 50.72 with guidance provided in the Constellation Reportability Manual.

Mobilization of federal, state, and county response organizations is performed in accordance with their applicable emergency plan and procedures. At a minimum, mobilization of federal response organizations and activation of state and county EOCs is expected to occur at the declaration of a Site Area Emergency.

The state and county authorities are responsible for the process of notification of the general public.

c. Support Organizations: When an emergency is initially classified, escalated or terminated, notifications are promptly made to the following support organizations:

- Medical, rescue, and firefighting support services are notified for assistance as the situation dictates.

- The American Nuclear Insurers (ANI) are notified at an Alert or higher classification with requests for assistance as necessary.

- Vendor and contractor support services are notified for assistance as the situation dictates.

3. Initial Notification Messages

Constellation Nuclear, in conjunction with state and county authorities, has established the contents of the initial notification message form transmitted during a classified emergency. The contents of the form include, as a minimum:

- Designation ("This is a Drill" or "Actual Event").
- Identity of site.
- Event classification.
- EAL number (as agreed upon with state authorities).
- Non-technical event description (as agreed upon with state authorities).
- Date and time of declaration (or entry into Recovery or Termination).
- Whether a release is taking place (Note: "Release" means a radiological release attributable to the emergency event.)
- Wind direction and speed.
- Whether offsite protective measures may be necessary.
- Potentially affected Subareas (or Sectors as applicable) when a General Emergency is declared.

Notification approval, transmittal date and time, and offsite agencies contacted are recorded either on the notification form or in an event logbook.

4. Follow-up Messages

For all emergency classifications, update messages to state authorities will be provided at the time of the notification on a prearranged frequency. The facility in Command and Control is responsible for ensuring that the updates are completed. State updates contain the prearranged information plus any additional information requested at the time of the notification.

Follow-up notifications are provided to the NRC Operations Center as soon as possible, but not later than one (l) hour after significant new information is available involving:

a. The results of evaluations or assessments of plant conditions.

b. The effectiveness of response or protective measures taken.

c. Information related to plant behavior that is not understood.

If requested by the NRC, an open, continuous communications channel will be maintained with the NRC Operations Center over the Emergency Notification System (ENS) and/or Health Physics Network (HPN) Circuits.

5. State and County Information Dissemination

The state and county emergency response plans describe procedures for state and county officials to make a public notification decision promptly (within about 15 minutes) on being informed by the plant of an emergency. The system for disseminating information to the public includes notification by pre-scripted messages through appropriate broadcast media such as the Emergency Alert System (EAS).

6. Notification of the Public

The capability exists for the prompt notification of the general public within the Plume Exposure Pathway Emergency Planning Zone (EPZ) for CRANE.

The Alert and Notification System (ANS) for Crane relies on the Integrated Public Alert Warning System (IPAWS)-WEA (Wireless Emergency Alerts) and IPAWS-EAS (Emergency Alert System) as the primary means of alerting and notifying the public, respectively, and an independent electronic Mass Notification System (MNS) as the backup means.

The use of IPAWS, WEA, and EAS strengthens the ability to alert populations, including residents, visitors, commuters, and individuals with access and functional needs. Counties also apply a whole community approach by identifying and addressing the communication needs of diverse populations and community groups, including individuals with limited access to technology, to help ensure emergency information reaches all segments of the public.

The Integrated Public Alert Warning System (IPAWS) is operated by local governmental agencies and maintained by FEMA. A more specific description of the various prompt public notification systems is presented in the FEMA ANS Design Report for Crane.

7. Messages to the Public

The respective States have developed EAS messages for the public consistent with the classification scheme. These draft messages are included as part of the States' Emergency Plan and contain instructions with regard to specific protective actions to be taken by occupants and visitors of affected areas. Messages may include instructions such as: take shelter and go indoors, close windows and doors, turn off ventilation systems; directions given for evacuation; directions to stay tuned to specific stations for further information, ad-hoc respiratory protection, (e.g. handkerchief over mouth, etc.). Constellation will provide support for the content of these messages when requested. The States control the distribution of radioprotective drugs to the general public.

Section F: Emergency Communications

This section describes the provisions utilized for prompt communications among principal emergency response organizations, communications with the ERO and communications with the general public.

1. Communications/Notifications

Constellation Nuclear has extensive and reliable communication systems installed at CRANE and Corporate Headquarters. Examples of the communications network include systems such as normal and dedicated telephone lines on landlines, and fiber-optic voice channels, cell phones, satellite phones, mobile radio units, handi-talkies and computer peripherals. This network provides:

- Voice communication through normal telephone, dedicated lines , conference call capability, speaker phones, and operator assistance where required.

- Communications between selected Constellation vehicles and appropriate fixed locations, as well as with state mobile units and fixed locations.

- Facsimile, network, and modem transmission.

Figure F-1 depicts the initial notification paths and the organizational titles from the Constellation Nuclear Emergency Response Facilities (ERFs) to federal, state and local emergency response organizations, and industry support agencies. The Constellation primary and alternate methods of communication, and the NRC communications network, are illustrated on Figures F-2 and F-3.

a. Constellation Nuclear maintains the capability to make initial notifications to the designated offsite agencies on a 24-hour per day basis. The offsite notification system, referred to as the Nuclear Accident Reporting System (NARS) provides communications to state and county warning points and Emergency Operations Centers from the CR, TSC, and EOF. Backup methods include facsimile and commercial telephone lines. state and county warning points are continuously staffed. The Emergency Offsite Notification System (EONS) supports the notification of State/local agencies.

b-d. Constellation Nuclear has established several dedicated communication systems that ensure reliable and timely exchange of information necessary to provide effective Command and Control over any emergency response; (1) between Constellation and state and local agencies within the EPZs, (2) with federal emergency response organizations, (3) between the plant, the EOF, and the state and county EOCs, and (4) between Emergency Response Facilities and Field Monitoring Teams. A general description of the systems is as follows:

1) Nuclear Accident Reporting System (NARS): The NARS is a dedicated communications system that has been installed for the purpose of notifying state and local authorities of declared nuclear emergencies. This system links together the station Control Rooms, the EOF, TSCs and state and local authorities as appropriate. The specific design, operation, and responsibility for maintenance of the NARS systems vary between Constellation Nuclear regions.

2) Operations Status Line: A vendor-hosted conference bridge called the Operations Status Line that enables communication between the Control Room, the TSC, OSC and the EOF to monitor the activities throughout the Emergency Response Facilities (see Figure F-2). The Operations Status line consists of a Voice Over Internet Protocol (VoIP) system.

3) Director's Hotline: A vendor-hosted conference bridge called the Director's Hotline that enables direct Emergency Director communication between the Control Room, TSC, and the EOF (see Figure F-2).

4) Local Commercial Telephone System: This system provides standard commercial telephone service through the public infrastructure, consisting of central offices and the wire line.

5) Emergency Response Data System (ERDS): ERDS will continuously supply the NRC with selected plant data points on a near real time basis. The selected data points are transmitted automatically to the NRC at approximately 1-minute intervals.

6) Field Monitoring Team (FMT) Communications: A separate communications system has been installed to allow coordinated environmental monitoring and assessment during an emergency. This system consists of the necessary hardware to allow communication via Satellite phones, TSC, EOF, and mobile units in Constellation Nuclear vehicles. Commercial cell phones are available as back up to the primary field team communications system.

7) Electronic Offsite Notification System (EONS): EONS is a system of software and hardware components that supports off-site State & Local notifications via an electronic transfer of data between Constellation Emergency Response Facilities and offsite agencies.

In addition, station communication links exist to ensure appropriate information transfer capabilities during an emergency. The station may also utilize its Public Address System, station radios and notification devices to augment its emergency communications.

e. ERO Notification System: Constellation Nuclear utilizes an automated ERO Notification System to rapidly notify members of the ERO. The system consists of a network of physical infrastructure capable of initiating and receiving contact via multiple notification devices. When activated, the system contacts the notification devices (e.g., through commercial and cellular phone, email, text message) belonging to members of the ERO. The System includes redundant activation methods via the internet as well as redundant, geographically separated call centers and data centers, with redundant power sources. Implementing procedures specify the course of action to be taken if the primary ERO Notification System activation path fails to respond. The ERO Notification System provides primary and back-up notification functions.

f. NRC Communications (ENS and HPN)
Communications with the NRC Operations Center will be performed via the ENS and HPN circuits or commercial telephone line. Information is normally communicated from an approved NRC Event Notification Worksheet prior to establishing an open ENS and/or HPN line.

Installation and use of these NRC telephones is under the direction of the NRC (see Figure F-3).

Emergency Notification System (ENS): Dedicated telephone equipment is in place between the Control Room and the NRC, with an extension of that line in the TSC. A separate line is available in the EOF with the capability of being patched with the station through the NRC. This line is used for NRC event notifications and status updates.

Health Physics Network (HPN): There also exists a separate dedicated telephone between the NRC, the TSC, and EOF for conveying health physics information to the NRC as requested or as an open line.

2. Medical Communications

Communications are established with the primary and backup medical hospitals and transportation services via commercial telephone that is accessed by station personnel.

3. Communications Testing

Communications equipment is checked in accordance with Section H.10. Communications drills between Constellation Nuclear and state and county government facilities are conducted in accordance with Section N.2.a. In addition, minimum ANS testing is performed in accordance with the site-specific ANS Design Report.

Figure F-1: Constellation Notification Scheme (For Full Augmentation)

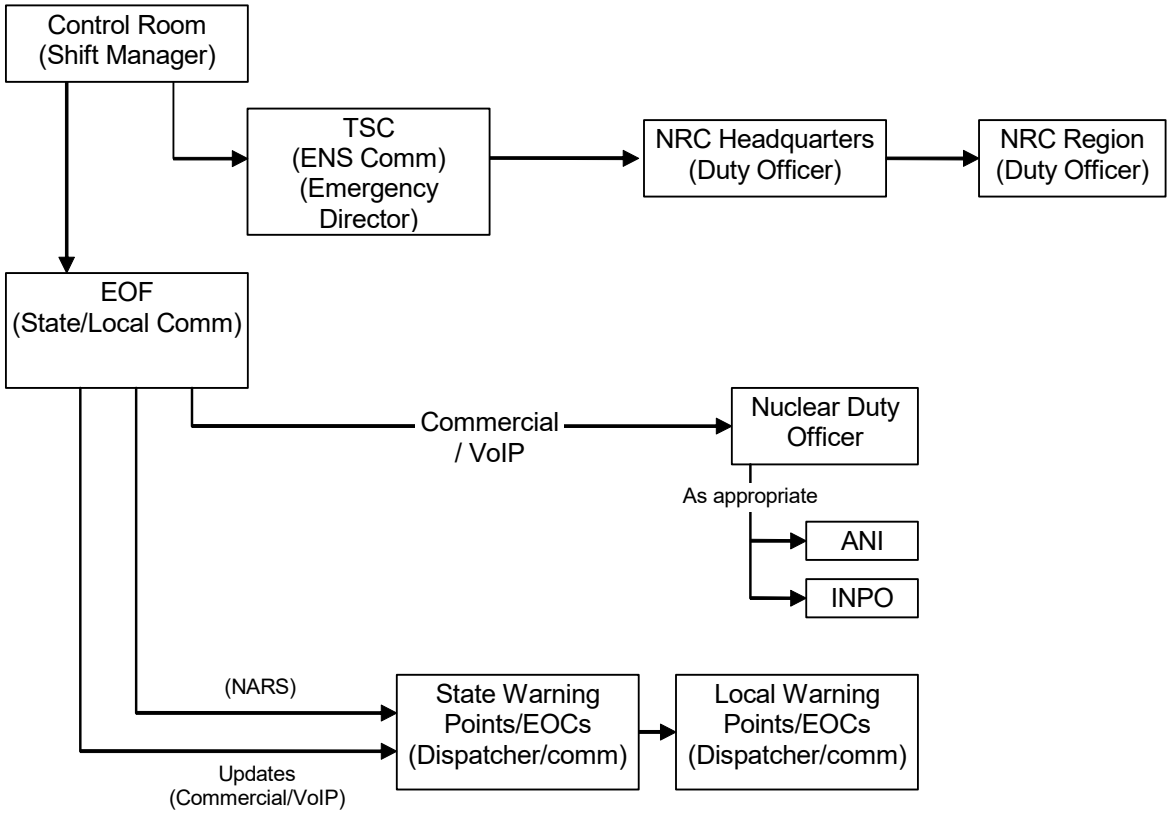
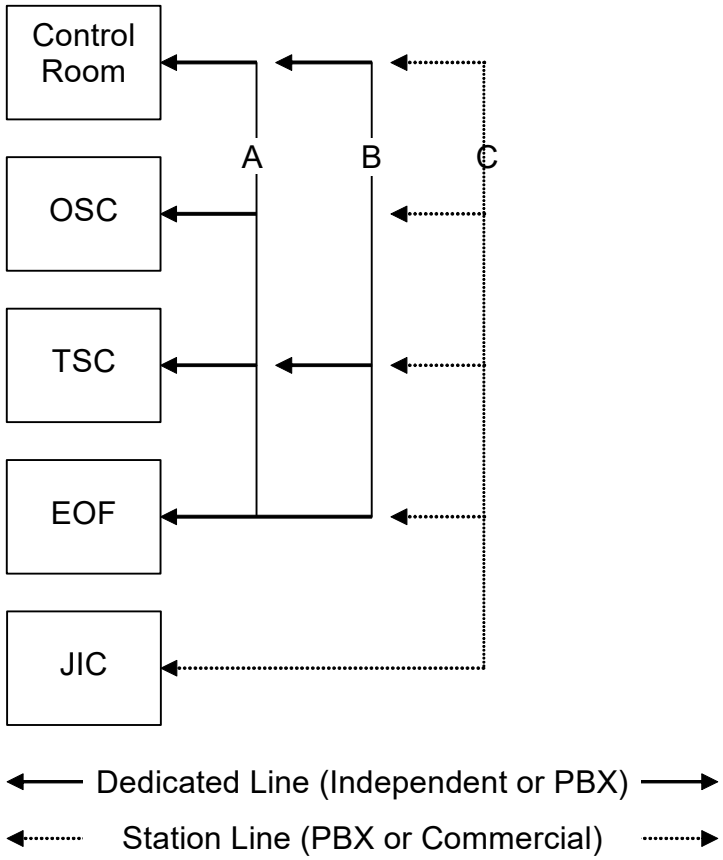


Figure F-2: ERF Communications Matrix

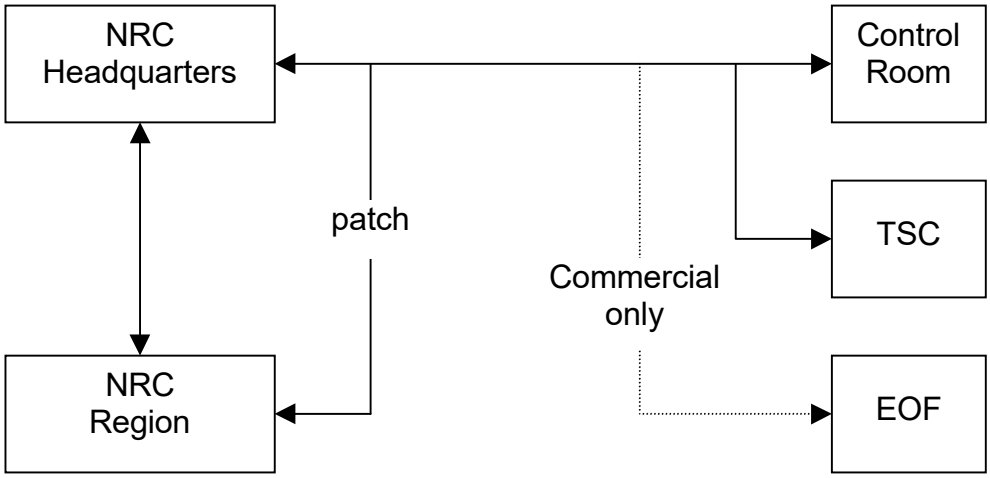


A = Operational Status Line between the OSC, TSC, EOF, and Control Room.

B = Directors Hotline line between the Control Room, TSC and EOF.

E = Station telephone line.

Figure F-3: NRC Communications for Nuclear Response



NOTE: ENS circuits may use the Federally maintained system, company tie lines or PBX as dedicated primary communications systems and have commercial backups.

Section G: Public Education and Information

This section describes the Constellation Nuclear public education and information program. It outlines the methods for distributing public information materials on an annual basis and describes how the public is informed in the event of an emergency.

1. Public Information Publication

The state has overall responsibility for maintaining a continuing disaster preparedness public education program. The emergency public information publication for the Constellation Nuclear generating stations is updated annually, in coordination with state and county agencies, to address how the general public is notified and what their actions should be in an emergency. Constellation distributes the publication, or internet links to the publication on an annual basis by mail to all residents within the ten-mile plume exposure EPZs and to appropriate locations where a transient population may obtain a copy. The public information publication includes the following information:

a. Educational information on radiation.

b. A description of the times that require public notification (what to do if a take-shelter or evacuate recommendation is given).

c. A map of major evacuation routes.

d. A list of communities likely to serve as host shelter areas and instructions on how to obtain additional information, especially for the disabled or their caretakers and those without transportation.

2. Public Education Materials

Public information publications instruct the public to follow the IPAWS-WEA messages which will provide information and instructions related to the emergency.

3. Media Accommodations

a. The Constellation Communications and Public Affairs Department is notified when an Unusual Event or higher Emergency condition exists. They will handle public and media inquiries in the early stages of the event (until the JIC is activated) by distributing background information, news releases, and providing information to corporate management.

   1) The Emergency Public Information Organization: The Emergency Public Information Organization is part of the Corporate ERO. It may be activated at any time at the discretion of the Nuclear Duty Officer. However, when there is a procedural requirement to activate the EOF, the Emergency Public Information Organization shall also be activated.

The primary purpose of the Emergency Public Information Organization is to disseminate information from Constellation Nuclear's ERO about the emergency events to the public, via the news media. However, the authority for issuance of news releases for the classification of an Unusual Event or prior to ERO activation will always reside with the Constellation Communications and Public Affairs Department. Upon activation, the Emergency Public Information Organization has the responsibility and authority for issuance of news releases to the public.

The Emergency Public Information Organization is comprised of senior managers from Constellation Nuclear who will function as spokespersons, and other Constellation Nuclear individuals including personnel from the Governmental Affairs and Human Relations areas. Constellation Nuclear's spokespersons disseminate information to the news media/public concerning the emergency events out of a Joint Information Center (JIC).

2) The Joint Information Center (JIC): The JIC is the facility in which media personnel gather to receive information related to the emergency event. The JIC is the location where approved news releases will be provided to the media for dissemination to the public. News releases are coordinated between the EOF and JIC personnel and state and/or Federal representatives in the JIC. Constellation public information personnel operate from the EOF and the JIC, which is under the direction of the Corporate Spokesperson and functions as the single point contact to interface with Federal, state, and local authorities who are responsible for disseminating information to the public.

   Each station has a designated JIC. Each JIC is equipped with appropriate seating, lighting and visual aids to allow for public announcements and briefings to be given to the news media. Additionally, JICs are equipped with commercial telephone lines for making outgoing calls. The Emergency Public Information Organization functions from the JIC and EOF in preparing and releasing utility information about the emergency event. The JIC is activated at the declaration of an Alert or higher classification. Some JIC personnel may perform functions remotely from alternate locations while remaining in contact with personnel in the JIC facility (e.g., media monitoring, rumor control, news writers, issuance of press releases). The JIC Director and Corporate Spokesperson will ensure communication and coordination of these functions with the EOF and JIC staff. Functions of the JIC include:

   - Serving as the primary location for accumulating accurate and current information regarding the emergency conditions and writing news releases.

   - Providing work space and phones for public information personnel from the state, counties, NRC, FEMA, and industry-related organizations.

   - Providing telephones for use by the news media personnel.

- Providing responses to media inquiries through telephones that the media can call for information about an emergency.

b. The news media is not permitted into the EOF during an emergency.

4. Coordination of Public Information

a. The JIC is staffed by Constellation and government public information representatives who will be the source of public information during an emergency at the station. The Corporate Spokesperson is the primary spokesperson for Constellation Nuclear. The Corporate Spokesperson has direct access to all necessary information (see Section B.5).

b. The JIC is staffed by federal, state, county, and utility personnel to assure timely, periodic exchange and coordination of information. Representatives coordinate information prior to conducting news briefings.

c. Rumors or misinformation are identified during an emergency by the JIC Staff. They respond to public and news media calls and monitor media reports.

d. The JIC for the MA Region Stations is co-located with the EOF at 175 North Caln Road, Coatesville, Pennsylvania.

5. Media Orientation

Emergency Preparedness, in conjunction with Constellation Communications and Public Affairs Department, offers training (at least annually) to acquaint news media with the Emergency Plan, information concerning radiation, and points of contact for release of public information in an emergency. Training is provided for those media agencies that accept the training offer.

Section H: Emergency Facilities and Equipment

Onsite and offsite facilities are available for emergency assessment, communications, first aid and medical care, and damage control. Of particular importance are the Emergency Response Facilities (ERFs); the Control Room (CR), the Technical Support Center (TSC), the Operations Support Center (OSC), the Emergency Operations Facility (EOF), and the Joint Information Center (JIC).

This section describes the emergency facilities and equipment used by the Emergency Response Organization and outlines the requirements which aid in timely and accurate response actions. It also describes the surveillance programs used to monitor and ensure that these facilities and equipment are maintained in a high degree of constant readiness.

1. Control Room, Technical Support Center, and Operations Support Center

Crane has established a TSC and an on-site OSC, which are activated upon declaration of an Alert or higher classification. Until they become operational, required functions of these facilities are performed in the Control Room.

Under certain adverse conditions for Security-Based Events, personnel may be assembled in an "ERO Alternative Facility" prior to being dispatched to one of the facility ERFs.

a. Station Control Room: The Control Room is the centralized onsite location from which the Nuclear Station's plant systems necessary to support the spent fuel pool are operated. The Control Room is equipped with instrumentation to supply detailed information on the plant systems. The Control Room is continuously staffed with qualified operators. The Control Room is the first onsite facility to become involved with the response to emergency events. Control Room personnel must evaluate and effect control over the emergency and initiate activities necessary for coping with the emergency until such time that support centers can be activated. These activities shall include:

- Plant control.
- Initial direction of all plant related operations.
- Accident recognition, classification, mitigation and initial corrective actions.
- Alerting of onsite personnel.
- Notification of appropriate individuals.
- Activation of emergency response facilities and ERO notification.
- Notification of offsite agencies.
- Continuous evaluation of the magnitude and potential consequences of an incident.

- Initial dose projections.
- Recommendations for immediate protective actions for the public.

As other ERFs become activated, they will supply support to the Control Room, although overall Command and Control of the emergency will transfer to the SED (TSC) or the CED (EOF). Throughout all emergencies, the Control Room maintains its emergency activation status until its normal operational status may be resumed.

b. Technical Support Center (TSC): CRANE has established a TSC for use during emergency situations by station management, technical, and engineering support personnel. The TSC is activated for all emergencies classified as Alert or higher. Activation for other events is optional. When activated the TSC functions include:

- Support for the Control Room's emergency response efforts.
- Support the SED with assigned Command & Control functions.
- Continued evaluation of event classification.
- Assessment of the plant status and potential offsite impact.
- Coordination of emergency response actions.
- Notification of appropriate corporate and station management.
- Notification and update of the NRC via Emergency Notification System (ENS).

The TSC is the onsite location utilized to support the Control Room for assessment of plant status and potential offsite impact, and for implementation of emergency actions. TSC provides technical data and information to the EOF.

Figure CRANE B-1b illustrates the staffing and organization of the TSC.

The TSC provides reliable voice communications to the Control Room, the OSC, the EOF, the NRC, and state and local Emergency Operations Centers. In addition, it provides facsimile transmissions capability (see Section F.1).

The TSC is sized to accommodate a minimum of 25 spaces and supporting equipment. This includes provisions for five NRC representatives. Adequate space is also available for the appropriate state representative(s).

Personnel in the TSC shall be protected from radiological hazards, including direct radiation and airborne contaminants under accident conditions with similar radiological habitability as Control Room personnel. To ensure adequate radiological protection, permanent radiation monitoring systems have been installed in the TSC and/or periodic radiation surveys are conducted. These systems indicate radiation dose rates and airborne radioactivity inside the TSC while in use. In addition, protective breathing apparatus (full-face air purifying respirators) and KI are available for use as required.

The TSC has access to a complete set of as-built drawings and other records, including general arrangement diagrams, P&IDs, and the electrical schematics. The TSC has the capability to record and display vital plant data, in real time, to be used by knowledgeable individuals responsible for engineering and management support of operations, and for implementation of emergency procedures.

c. Operations Support Center (OSC): CRANE has established an OSC. The OSC is the onsite location to where station support personnel report during an emergency and from which they will be dispatched for assignments or duties in support of emergency operations. The OSC shall be activated whenever the TSC is activated, but need not remain activated at the Alert level if its use is judged unnecessary by the Station Emergency Director. At the Site Area and General Emergency levels, the OSC or an alternate OSC shall be activated at all times. The OSC is not activated for a HOSTILE ACTION when the Alternative Facility is implemented. Activation for other events is optional. Station disciplines that may be called in to support the OSC include, but are not limited to:

- Operating personnel not assigned to the Control Room,
- Radiation Protection Personnel,
- Chemistry Personnel,
- Maintenance Personnel (mechanical, electrical and I&C).

Figure CRANE B-1b illustrates the staffing and organization for the OSC.

Each OSC is equipped with communication links to the Control Room, the TSC and the EOF (see Section F). A limited inventory of supplies will be kept for the OSC. This inventory will include respirators, protective clothing, flashlights and portable survey instruments.

2. Emergency Operations Facility (EOF)

The EOF is the location where the Corporate Emergency Director will direct a staff in evaluating and coordinating the overall company activities involved with an emergency. Activation of the EOF is mandatory within 60 minutes of declaration of an Alert or higher classification. The EOF provides for:

- Management of overall emergency response.

- Coordination of radiological and environmental assessments.
- Determination of recommended public protective actions.
- Management of recovery operations.
- Coordination of emergency response activities with federal, state, and local agencies.

The common MA Region EOF is located west of Philadelphia, in Coatesville PA. This facility supports Limerick, Peach Bottom, Calvert Cliffs and Crane energy centers. The EOF in the MA region is capable of responding to events occurring simultaneously at more than one nuclear power reactor site since the emergency operations facility serves more than one site.

The facility is designed with the following considerations:

- The location provides optimum functional and availability characteristics for carrying out overall strategic direction of Constellation Nuclear onsite and support operations, determination of public protective actions to be recommended to offsite officials, and coordination with Federal, state and local organizations.
- It is well engineered for the design life of the plant and is of sufficient size to accommodate about 50 people.
- It is equipped with reliable voice communications capabilities to the TSC, the OSC, the Control Room, NRC, and state and local emergency operations centers. In addition, the EOF has facsimile transmission capability.
- Equipment is provided to gather, store, and display data needed in the EOF to analyze and exchange information on plant conditions with the Station. The EOF technical data system receives, stores, processes, and displays information sufficient to perform assessments of the actual and potential onsite and offsite environmental consequences of an emergency condition.
- The EOF has ready access to plant records, procedures, and emergency plans needed for effective overall management of Constellation Nuclear emergency response resources.

3. Emergency Operations Centers

EOCs operated by the state and local communities have been established to perform direction and control of emergency response functions.

The Pennsylvania state EOC is capable of continuous (24-hour) operations for a protracted period. The center contains sufficient communications (radio, telephone and teletype) equipment, maps, emergency plans, and status boards to provide the necessary interfaces with other federal, state, county, and Constellation emergency facilities.

The county EOCs serve as Command and Control headquarters for local emergency response activities as well as a center for the coordination of communications to field units and to the state EOC. The EOC has the equipment necessary, (such as facsimile machines, telecommunications equipment, radio gear, photocopiers, wall maps, etc.) to carry out their emergency responsibilities.

4. Activation

NOTE: NUREG-0654 Criterion II.B.5 states that the "licensee must be able to augment on-shift capabilities within a short period after declaration of an emergency". It further defines that short period as 30 and 60 minutes. The time frames for rapid augmentation of a nuclear power plant staff in the event of an emergency are not rigid inviolate requirements but rather goals. It is Constellation Nuclear's intent to expend its best efforts to meet the augmentation criteria goals regarding staffing Emergency Response Facilities with sufficiently skilled individuals capable of handling an emergency. Both the NRC and Constellation Nuclear realize that due to diversity of normal residential patterns for the stations' staff, possible adverse weather conditions, road congestion and site access restrictions, these time frames might be exceeded.

Constellation Nuclear has put into place plans and procedures to ensure timely activation of its emergency response facilities. The Shift Manager (as Shift Emergency Director) will initiate a call-out in accordance with the implementing procedures. The ERO augmentation process identifies individuals who are capable of fulfilling the specific response functions that are listed in ERO staffing tables contained within this Emergency Plan.

Although the response time will vary due to factors such as weather and traffic conditions, a goal of 60 minutes for minimum staffing, following the declaration of an Alert or higher emergency classification, has been established for the ERO personnel responding to the station emergency facilities and the EOF. Additionally, plans have been developed to ensure timely functional activation and staffing of the JIC within 90 minutes of when the classification of Alert or higher is declared.

It is the goal of the organization to be capable of activating the applicable Emergency Response Facility upon achieving minimum staffing. The facility can be declared activated when the following conditions are met:

a. Minimum staffing has been achieved.

b. The facility is functional.

The Director in charge may elect to activate their facility without meeting minimum staffing; if it has been determined that sufficient personnel are available to fully respond to the specific event (this would not constitute a successful minimum staff response).

5. Monitoring Equipment Onsite

CRANE is equipped with instrumentation for seismic monitoring, radiation monitoring, fire protection and meteorological monitoring. Instrumentation for the detection or analysis of emergency conditions is maintained in accordance with station Technical Specifications, if applicable, or commitments made to the NRC. Descriptions of the equipment will appear in the Station Annex. This equipment includes but is not limited to the following:

a. Geophysical Monitors

1) Meteorological Instrumentation: A permanent meteorological monitoring station is located near each station for display and recording of wind speed, wind direction, and ambient and differential temperature for use in making offsite dose projections. Meteorological information is presented in the CR, TSC, and EOF by means of the plant computer system.

With regard to Constellation Nuclear's meteorological monitoring program, there has been a quality assurance program adopted from 10 CFR 50, Appendix B. However, since the meteorological facilities are not composed of structures, systems, and components that prevent or mitigate the consequences of postulated accidents and are not "safety related," not all aspects of 10 CFR 50, Appendix B, apply. Those aspects of quality assurance germane to supplying good meteorological information for a nuclear power station were adopted into the meteorological quality assurance program. The meteorological program is also subject to the requirements of the Restoration Quality Assurance Program.

The National Weather Service (NWS), or regional weather forecast providers, may be contacted during severe weather periods. These providers analyze national and local weather in order to provide localized weather forecasts for the system or for the station area as appropriate.

2) Seismic Monitoring: The seismic monitoring system measures and records the acceleration (earthquake ground motion) of the structure. Earthquakes produce low frequency accelerations which, when detected by the remote sensing devices, are permanently recorded as information which defines the response spectrum. The system remains in a standby condition until an earthquake causes the remote unit(s) to activate the recording circuits and tape transports. It also provides signals for immediate remote indication that specific preset response accelerations have been exceeded.

3) Hydrological Monitors: The design basis flood, probable maximum precipitation, and other improbable, conceivable extremes in hydrologic natural phenomena are well below any design limits for the station as detailed in the UFSAR.

b. Radiological Monitors and Sampling

1) The Radiation Monitoring System (RMS): In-plant radiological measurements provide information that may help determine the nature, extent and source of emergency conditions. The RMS is available to give early warning of a possible emergency and provides for a continuing evaluation of the situation in the Control Room. Radiation monitoring instruments are located at selected areas within the facility to detect, measure, and record radiation levels. In the event the radiation level should increase above a preset level, an alarm is initiated in the Control Room. Certain radiation monitoring instruments also alarm locally in selected areas of the facility. The RMS is divided into 3 subsystems:

   a) Area Radiation Monitors (ARMs) are used for the direct measurement of in-plant exposure rates. The ARM readings allow in-plant exposure rate determinations to be made remotely without requiring local hand-held meter surveys. This information may be used, initially, to aid in the determination of plant area accessibility. In addition to permanent monitors, portable Continuous Air Monitors (CAMs) measure airborne particulate and airborne iodine activities at various locations within the operating areas.

   b) Process Radiation Monitors (PRMs) are used for the measurement of radioactive noble gas, iodine, and particulate concentrations in plant effluent and other gaseous and fluid streams.

   c) The accident, or high range, radiation monitoring system monitors radiation levels at various locations within the operating area. These are high range instruments used to track radiation levels under accident or post-accident conditions.

   The RMS provides the necessary activity or radiation levels required for determining source terms in dose projection procedures. Key RMS data is linked to the plant computer, which allows information to be passed to the TSC and EOF. The isotopic mix, including isotopes such as those in Table 3 of NUREG-0654, is based upon a default accident mix. Refer to the UFSAR for further detail on the RMS capabilities and design.

2) Liquid and Gaseous Sampling Systems: The process sampling system consists of the normal sampling system and additional sampling panels located throughout the plant. Sampling systems are installed or can be modified to permit sampling even under severe accident conditions.

   The sampling systems use a number of manual sampling techniques to enable sampling operations over a wide range of plant conditions. It is capable of providing information relative to post-accident plant conditions to allow operator actions to be taken to mitigate and control the course of an accident. Refer to the UFSAR for further detail on sampling capabilities.

3) Portable Radiation Monitoring Equipment: Portable radiation survey instruments are available for a wide variety uses such as area, sample, and personnel surveys and continued accident assessment. Instruments are stored throughout the plant and in the emergency facilities.

c. Process Monitors: The Control Room and applicable redundant backup locations are equipped with extensive plant process monitors for use in both normal and emergency conditions. These indications include but are not limited to liquid levels, flow rates, status or lineup of equipment components. This instrumentation provides the basis for initiation of corrective actions.

1) Plant Monitoring/Information System: A plant monitoring/information system provides the data acquisition and database capability for performing plant monitoring and functions. The system is designed to scan, convert to engineering units, make reasonability and alarm limit checks, apply required transformations, store for recall and analysis, and display the reading of transformed data from plant instrumentation. The system scans flows, pressures, temperatures, fluid levels, radiation levels, equipment, and valve status at required frequencies. Scanned variables are quality tagged. The system provides for short and mid-term storage of data for on-line retrieval and fast recall, and long term storage to appropriate media.

2) Safety Parameter Display (SPDS) & Plant Parameter Display (PPDS) Systems: SPDS and PPDS provide a display of plant parameters from which the safety status of operation may be assessed in the Control Room, TSC and EOF. The primary function of the SPDS and PPDS is to help operating personnel in the Control Room make quick assessments of plant safety status. SPDS and/or PPDS displays in the TSC and EOF promote the exchange of information between these facilities and the Control Room and assists the emergency organization in the decision making process.

d. Fire Detection System: The Fire Detection System is designed to quickly detect visible or invisible smoke (or other products of combustion) and/or heat in designated areas of the plant. The fire alarm communication systems and subsystems are located at strategic points throughout the plant to warn personnel of a nuclear incident or other emergency conditions. Existing plant alarm systems are sufficiently audible to alert personnel in the event of a fire or need for assembly. These alarm communication systems consist of warning sirens and lights (in high noise areas) and the PA system. Refer to the Fire Hazards Analysis for further description of the station’s fire protection system.

6. Monitoring Equipment Offsite

Constellation has made provisions to acquire data from and have access to the following offsite sources of monitoring and analysis equipment:

a. Geophysical Monitors: In the event that the onsite meteorological tower or monitoring instrumentation becomes inoperative and the contracted weather provider cannot be contacted, meteorological data may be obtained directly from the National Weather Service or the internet.

A considerable array of seismometers are located in the region. A central point of contact to obtain information about a seismic event is the National Earthquake Information Service in Golden, Colorado.

Constellation Nuclear Corporate Offices can coordinate hydrology and seismology expertise in the event onsite information becomes unavailable.

b. Radiological Environmental Monitors and Sampling: Constellation Nuclear has contracted with a company to conduct an extensive offsite environmental monitoring program to provide data on measurable levels of radiation and radioactive materials in the environs. The program (described fully in the Offsite Dose Calculation Manual), includes:

- Fixed continuous air samplers.
- Routine sampling of river water; milk and fish.
- A fixed dosimeter monitoring network.

The dosimeter program consists of the following elements:

- A near-site ring of dosimeters covering the 16 meteorological sectors.
- A 16-sector ring of dosimeters placed in a zone within about 5 miles from the plant.
- Dosimeters placed at each of the normal fixed air sampler locations (typically about 8-15 air samplers per nuclear station).

c. Laboratory Facilities: External facilities for counting and analyzing samples can be provided by the other Constellation Nuclear stations, state, federal or contracted laboratories. These laboratories can act as backup facilities in the event that the affected station's counting room and laboratory become unusable or the offsite radiological monitoring and environmental sampling operation exceeds the capacity or capability of the station laboratory during an emergency. It is estimated that these laboratories will be able to respond within several hours from initial notification.

Outside analytical assistance may be requested from state and federal agencies, or through contracted vendors. The state maintains a mobile radiological laboratory that provides the primary means of analyzing off-site environmental samples. The NRC mobile laboratory may be made available for Site Area and General Emergencies. The DOE, through the Radiological Assistance Program (RAP) has access to any national laboratory with a Bell Lab contract (e.g., Brookhaven, Oak Ridge, Lawrence Livermore, etc.).

A general description of the laboratory capabilities is provided in Section C.3.

7. Offsite Monitoring Equipment Storage

CRANE maintains a sufficient supply of emergency equipment (such as portable survey, counting, and air sampling instrumentation and other radiological monitoring equipment and supplies) that may be used for environmental monitoring. These supplies meet the initial requirements of two environmental Field Monitoring Teams. During subsequent phases of an emergency, additional equipment is available from other Constellation Nuclear generating stations, vendors and offsite response organizations.

8. Meteorological Monitoring

The station has installed and maintains a meteorological tower equipped with instrumentation for continuous reading of the wind speed, wind direction, air temperature and delta air temperature. Additional capabilities are available to obtain representative current meteorological information from other sources, such as the National Weather Service. A full description of the onsite meteorological capabilities is given in Section H.5.a of this Plan.

9. OSC Capabilities

The OSC provides area for coordinating and planning of OSC activities and the staging of personnel. Further space is available in adjacent offices and locker rooms to accommodate additional personnel as may be required. Alternate locations are available. The onsite storeroom maintains a supply of parts and equipment for normal plant maintenance. These parts, supplies and equipment are available for damage control use as necessary.

Sufficient radiation protection equipment (i.e., protective clothing, respiratory protection gear, KI, and other health physics equipment and supplies) is stored and maintained near the OSC (as well as the other emergency response facilities). Damage Control Team equipment is available near the OSC as well as in the maintenance shops. This equipment includes items such as, portable lighting, and additional portable communications equipment. The OSC is stocked with an assortment of first aid and medical treatment equipment and supplies. The OSC maintains reliable voice communications with the CR, TSC, and EOF. For a complete description of communications equipment, refer to Section F. When an emergency condition exists at one station, additional supplies can be obtained from other unaffected stations and Constellation resources upon request.

10. Facility and Equipment Readiness

Emergency facilities and equipment are inspected and inventoried in accordance with emergency preparedness procedures. These procedures provide information on location and availability of emergency equipment and supplies. An inventory of all emergency equipment and supplies is performed on a quarterly basis and after each use in an emergency or drill. During this inventory, radiation monitoring equipment is checked to verify that required calibration period and location are in accordance with the inventory lists. Inspections include an operational check of instruments and equipment. Equipment, supplies, and parts which have a shelf-life are identified, checked, and replaced as necessary. Sufficient reserves of instruments and equipment are maintained to replace those which are removed from emergency kits or lockers for calibration or repair. The station is responsible for maintaining a supply of KI at the site.

11. General Use Emergency Equipment

Inventory procedures identify the equipment that makes up kits used in an emergency situation available within each emergency facility.

12. Collection Point for Field Samples

The onsite chemistry lab has been designated as the central point for the receipt of radiological field monitoring samples. Sampling and analysis equipment is available for quantitative activity determination of marine and air samples, and qualitative activity determination of terrestrial samples. Sufficient field monitoring equipment is maintained at the station for initial sampling. Instrumentation and equipment utilized for sample activity determination are routinely calibrated to ensure timely availability. Additional facilities as described in C.3 and H.6.c are available for sample and analysis of environmental samples.

Refer to the Station Annex for further description of contracted environmental sampling and analysis support for the site.

Section I: Accident Assessment

To effectively coordinate and direct all facets of the response to an emergency situation, diligent accident assessment efforts are required throughout the emergency. All four emergency classifications have similar assessment methods, however, each classification requires a greater magnitude of assessment effort dependent upon the plant symptoms and/or initiating event(s).

1. Plant Parameters and Corresponding Emergency Classification

Plant system and effluent parameter values are utilized in the determination of accident severity and subsequent emergency classification. Environmental and meteorological events are also determining factors in emergency classification. An emergency condition can be the result of just one parameter or condition change, or the combination of several. The specific symptoms, parameter values or events for each level of emergency classification are detailed in the emergency implementing procedures. Specific plant system and effluent parameters that characterize a classifiable event (EALs) are presented in Addendum 3 to each Station Annex.

In order to adequately assess the emergency condition, each emergency facility has the necessary equipment and instrumentation installed to make available essential plant information on a continuous basis. Evaluation of plant conditions is accomplished through the monitoring of plant parameters both from indication in the Control Room and within the plant. Some of the more important plant parameters to be monitored in the Control Room are assembled into a single display location, which is entitled the "Safety Parameter Display System" (SPDS). The SPDS monitors such parameters as: safety system status and effluent monitor readings. The instrumentation and equipment capabilities available for each emergency facility are described in Section H.

2. Onsite Accident Assessment Capabilities

The resources available to provide initial and continuing information for accident assessment throughout the course of an event include plant parameter display systems, liquid and gaseous sampling system, Area and Process Radiation Monitoring Systems, and Accident Radiation Monitoring Systems. Descriptions of these systems are given in Section H.5.b.

3. Source Term Determination

Source term (or fuel damage) estimations serve several roles within the Constellation Emergency Preparedness Program. For planning purposes, fuel damage considerations are used as the bases for several of the Emergency Action Level (EAL) Initiating Conditions and as the threshold for the declaration of a General Emergency (the definition of a General Emergency specifies conditions which involve ‘substantial’ fuel degradation or melting as one of the bases for classification).

From an implementation perspective, fuel damage estimations provide a means of realistically differentiating between no damage, clad failure, and fuel melt to:

- Evaluate the status of the fuel clad and how their status relates to the risks and possible consequences of the accident.

- Provide input on fuel configuration (coolable or uncoolable) for prioritization of mitigating activities.
- Determine the potential quality (type) and/or quantity (%) of source term available for release in support of projected offsite doses and protective action recommendations.
- Provide information that quantifies the severity of an accident in terms that can be readily understood and visualized.
- Support the determination of radiological protective actions that should be considered for long term recovery activities.

The assessment methodologies utilized by CRANE are intended to provide a rapid best estimate of fuel damage which, when evaluated together, help to develop an overall picture of the extent of fuel damage.

* Containment Radiation Monitors: An indirect method used to determine the amount of core damage. Applicable to Loss of Coolant Accident (LOCA) scenarios. Based upon an end-of-life source term and static nuclide ratio assumptions yielding a limited accuracy. Valid any time following an accident.

  * Core Temperatures: Methods such as Core Exit Thermocouple (CET), Peak Core Temperatures and Hot Leg Temperatures provide indirect methods used to indicate the type and/or amount of core damage. Applicable for all types of accidents. Valid any time following an accident.

  * Core Uncovery: Methods such as Core Uncovery Time, RVLIS Level and Source Range Monitor count rate provide indirect methods used to indicate the type of core damage (clad failure or fuel melt). Applicable for all types of accidents. Provides a relatively accurate estimate of the state of the core early in the event. Valid any time following an accident.

  * Containment Hydrogen Concentration: An indirect method used to establish the type of core damage. Applicable to LOCA type accidents where all the hydrogen generated by the metal-water reaction is released into containment. Valid any time following an accident.

  * Sample Analysis - Isotopic Ratio Comparison: A direct method used to establish the type of core damage. Compares expected isotopic ratios with a sample to determine a general core state. Applicable under all types of accidents. Valid any time following an accident.

  * Sample Analysis - Presence of Abnormal Isotopes: A direct method used to provide a go/no go indication of fuel melt by the presence of unusually high concentrations of the less volatile fission products. Applicable under all types of accidents. Valid any time following an accident.

  * Sample Analysis - Concentration Evaluation: A direct method that yields the most accurate numerical estimations of the amount of core damage. Applicable for all types of accidents. Requires the sampled system(s) be in a steady state that usually prevents its use until the plant is in a stable condition.

4. Effluent Monitor Data and Dose Projection

Dose assessment or projection represents the calculation of an accumulated dose at some time in the future if current or projected conditions continue. During an accident, the Plant Parameter Display System and personal computers will provide the ERO with the timely information required to make decisions. Radiological and meteorological instrumentation readings are used to project dose rates at predetermined distances from the station, and to determine the integrated dose received. Dose assessment methods used by Constellation personnel to project offsite doses include:

A. Monitored Release Points - This method utilizes the plant's effluent radiation monitors and system flow rates. Effluent release points are used to directly calculate a release rate. The point of the release determines the way the source term is affected and is adjusted by the dose assessment process.

B. Containment Leakage/Failure - This method uses a variety of containment failures or leak rates in conjunction with available source term estimations to develop a release rate to the environment. A direct vent of containment can be modeled as a failure to isolate.

C. Release Point Samples - This method uses a sample at the release point and an estimated flow rate to develop a release rate at the point of release.

D. Field Monitoring Team Data - This method uses a field survey or sample and the atmospheric model to back calculate a release rate and ratio concentrations of radioactive material at various points up and downwind of plume centerline.

The computer applications used to provide dose calculations are evaluated against the EPA-400 plume exposure Protective Action Guides (PAGs) applicable for the early phase of an accident. These evaluations place an emphasis on determining the necessity for offsite protective action recommendations. Dose assessment actions will be performed in the following sequence:

First: Onset of a release to 1 hour post-accident: Shift personnel will rely on a simplified computerized dose model to assist them in developing offsite dose projections using real time data from effluent monitors and site meteorology.

Second: 1 hour post-accident to event termination: Estimates of off-site doses based on more sophisticated techniques are provided. Dedicated ERO personnel will analyze the offsite consequences of a release using more complex computerized dose modeling. These additional methods are able to analyze more offsite conditions than the simplified quick method, as well account for more specific source term considerations.

5. Meteorological Information

Local meteorological data is available from an onsite meteorological tower. The data available includes wind speed, wind direction, temperature, and delta temperature. These data are used by the utility, state, and NRC to provide near real-time predictions of the atmospheric effluent transport and diffusion. Meteorological data from the tower is available in the CR, TSC, and EOF. A full description of the onsite meteorological capabilities is given in Section H.5.a.

6. Unmonitored Release

Dose projections can be made during a release through use of actual sample data in situations where effluent monitors are either off-scale or inoperative or the release occurs by an unmonitored flow path. In the absence of effluent sample data, a dose projection can be performed simply by specifying the accident category as a default. The selection of a default accident category defines the mix, the total curies, and the release pathway(s). The total number of curies from a default mix for each isotope is used to provide an upper bound for release concentration, and hence, an upper bound for the dose rate and dose to the public.

7. Field Monitoring

In addition to the capabilities and resources described in Section H.6.b and H.7, CRANE maintains the ability to take offsite air samples and to directly measure gamma dose rates the event of an airborne or liquid release. The capability to take offsite soil, water, and vegetation samples is also provided by either the Field Teams or a contracted vendor.

The environmental monitoring equipment, as described in Section H, contain portable survey, counting, and air sampling instrumentation and other radiological monitoring equipment and supplies to be used by the Field Monitoring Teams. Samples are taken at predetermined locations as well as those specified both during and after a release. Environmental measurements are used as an aid in the determination and assessment of protective and recovery actions for the general public.

8. Field Monitoring Teams

Field Monitoring Teams are dispatched by CRANE to perform a variety of functions during conditions that may involve significant releases of radioactive materials from the plant. Radiological survey and sample data is used to define affected area boundaries, verify or modify dose projections and protective action recommendations, and assess the actual magnitude, extent, and significance of a liquid or gaseous release.

In addition to contamination and dose rate measurements, the change out of dosimeters and air sampler cartridges can be performed. Other actions may include soil, water and vegetation sampling.

The initial environmental surveys involve simple-to-perform measurements to quickly confirm or modify the dose projections based on plant parameters. Subsequent environmental monitoring efforts will be aimed at further defining the offsite consequences including instituting an expanded program to enable prompt assessments of any subsequent releases from the plant.

The expertise necessary to conduct limited offsite environmental survey and sampling exists onsite 24 hours a day. A minimum of two offsite Field Monitoring Teams are notified and activated at an Alert or higher classification. Teams are composed of two individuals are assembled at the station to test and inventory dedicated survey and sampling equipment. Teams are then dispatched in company or personal vehicles into the surrounding area when a release is or is expected to occur. Radiological survey and sample data is transmitted to the emergency facilities. Vendor/contractor support can be used to perform collection, shipment and analysis of environmental sample media as described in Section B.8.c.

9. Iodine Monitoring

Field monitoring equipment has the capability to detect and measure airborne radioiodine concentrations as low as 1×10^{-7} $\mu Ci/cm^3$ in the presence of noble gases. Interference from the presence of noble gas and background radiation will be minimized by ensuring that monitoring teams move to areas of low background prior to analyzing the sample cartridge. The collected air sample is measured by hand held survey meter as an initial check of the projection derived from plant data to determine if significant quantities of elemental iodine have actually been released (the chemical form that would pose a health hazard).

10. Dose Estimates

Specific procedures exist for the correlation of air activity levels to dose rate for key isotopes. Provisions have been established for estimating integrated dose from the projected and actual dose rates and for the comparison of these estimates with the protective action guides.

11. State Monitoring Capabilities

The states have the ability to dispatch their own field monitoring teams to track the airborne radioactive plume. The states also have the ability and resources to coordinate with federal and utility monitoring teams to compare sample results.

Section J: Protective Response

Protective response consists of emergency actions, taken during or after an emergency situation, which are intended to minimize or eliminate hazards to the health and safety of the public and/or station personnel. A range of protective actions has been developed for emergency workers and the general public in the Plume Exposure Pathway EPZ. Additionally, guidelines have been established to aid in choosing protective actions during an emergency that are consistent with federal guidance. CRANE is responsible for onsite actions, while the responsibility for offsite actions rests with the state, county, and other offsite response agencies.

1. Notification of Onsite Personnel

For all emergency classifications, all personnel within the Protected Area are notified within 15 minutes of the initial classification or escalation of an emergency by recognizable alarms and/or verbal announcements over the plant Public Address (PA) System. Announcements include the emergency classification and response actions to be taken by personnel onsite (such as ERO, non-ERO, contractor personnel, and visitors). Provisions are made to alert personnel in high noise areas and outbuildings within the Protected Area as applicable.

CRANE has identified locations where people might be expected to be present outside the Protected Area but within the Owner Controlled Area. Accountability of persons within the Owner Controlled Area but outside the Protected Area is not required. However, provisions are established for notification of personnel within the Owner Controlled Area any time a Site Evacuation has been initiated, or as otherwise deemed appropriate.

2. Evacuation Locations

If a Site Evacuation is required, nonessential personnel are directed to either assemble within designated Assembly Areas or to immediately evacuate the site. Personnel will be directed to either proceed to their homes or to reassemble at designated offsite locations. Visitors to the station will assemble with and follow the instructions of their escorts. Nonessential personnel within the Protected Area will normally exit through the security building. Personal transportation (if available) will normally be used and established evacuation routes will be followed. Personnel without transportation will be identified and provided transportation as necessary.

3. Radiological Monitoring of Evacuees

Personnel evacuating the site will be monitored for contamination by the portal monitors as they exit the Protected Area, with portable friskers in Assembly Areas, or sent to offsite monitoring locations on an as needed basis.

4. Evacuation

Evacuation is the primary protective action anticipated for onsite personnel not having immediate emergency response assignments. CRANE has identified locations that serve as Assembly Areas and offsite locations for non-essential personnel when they are not instructed to proceed home. The specific locations of these areas are shown in the Station Annex. Implementing procedures describe equipment, supplies and general operation of these facilities. The Station Emergency Director will designate personnel within the Site Boundary as essential or nonessential. Evacuation of non-essential personnel is usually conducted immediately after accountability if a Site Area Emergency or General Emergency has been declared and conditions permit. Evacuation shall commence in accordance with station procedures as directed by the Station Emergency Director or his/her designee, unless one of the following conditions exist:

a. Severe weather conditions threaten safe transport.

b. A significant radiological hazard would be encountered.

c. There is a security threat occurring, which would have an adverse impact on the personnel while leaving the site.

d. A condition similar to the above in magnitude, which in the opinion of the Station Emergency Director would adversely affect the site personnel.

Security forces will be dispatched, when available, to access road(s) to control entry to site facilities. Unauthorized and non-ERO personnel will be denied entry.

The initiation of a site evacuation will be reported to the appropriate state/local agency.

Constellation has established the implementation of alternate onsite protective actions for security-based events that are more appropriate than the actions for radiological emergencies. These alternate protective actions could include taking immediate cover, immediate protected area evacuation, immediate owner controlled area evacuation, and dispatch of the ERO to their alternate reporting center.

5. Accountability

The purpose of Accountability is to determine the locations of all personnel inside the Protected Area and to muster emergency personnel at prearranged locations. When Accountability of onsite personnel is determined to be necessary by the Station Emergency Director, all personnel within the protected area shall be accounted for and the names of missing individuals (if any) are determined within thirty (30) minutes of a Site Area Emergency or higher classification.

Accountability is usually performed in conjunction with Assembly, and is required to be initiated whenever a Site Area Emergency or higher classification is declared. The movement of personnel for the purposes of Accountability may be delayed if their health and safety could be in jeopardy, such as severe weather or for security concerns.

If it is determined that the prearranged Assembly Area is unfit for personnel, the Station Emergency Director may designate an alternative Assembly Area and direct personnel using appropriate communication systems that are available.

Once established, Accountability within the Protected Area is maintained throughout the course of the event. Should missing personnel be identified, search and rescue operations are initiated.

6. Provisions for Onsite Personnel

CRANE maintains an inventory of respiratory protection equipment, anti-contamination clothing, and KI that is made available to emergency workers remaining onsite should conditions warrant. During the course of an emergency, protective actions are considered to minimize radiological exposures or contamination problems associated with all onsite personnel. For those who must work within the restricted area of the affected site, measures that are considered are:

a. Use of Respirators: On-shift and emergency response personnel use respiratory protection in any environment involving exposure to high level gaseous activity or oxygen deficient atmosphere, or where air quality is in doubt. In the presence of airborne particulates, emergency response personnel may be directed by health physics personnel to use full-face filter type respirators. The criteria for issuance of respiratory protection are described in Radiation Protection procedures.

b. Use of Protective Clothing: Anti-contamination clothing, located in the TSC, OSC and station dress out areas is available for use by onsite personnel. The criteria for issuance of protective clothing are described in Radiation Protection procedures.

c. Use of Potassium Iodide (KI): The use of KI may be recommended when a projected dose of 50 Rem Committed Dose Equivalent (CDE) is exceeded for an emergency worker's thyroid. The basis of the 50 Rem is specified in EPA 400-R-92-001, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents." CRANE is responsible for maintaining a supply of KI onsite. The Station Emergency Director has the responsibility for approval of issuing KI to Constellation Nuclear emergency workers.

7. Mechanism for Implementing Protective Action Recommendations

Plant conditions, projected dose and dose rates, and/or field monitoring data are evaluated to develop PARs for the purpose of preventing or minimizing exposure to the general public. PARs are provided to the offsite agencies responsible for implementing protective actions for the general public within the 10-mile EPZ. PARs are approved by the Emergency Director in Command and Control.

In an emergency that requires immediate protective actions be taken prior to activation of the offsite emergency facilities, PARs are provided directly to the state and county 24 hour warning points by the Emergency Director.

8. Evacuation Time Estimates (ETEs)

The evacuation time estimates (ETE) were developed in accordance with NUREG/CR-7002, Criteria for Development of Evacuation Time Estimate Studies. Section IV of Appendix E to 10CFR50 requires that an analysis of the time required to evacuate be provided for various sectors and distances within the plume exposure pathway EPZ for transient and permanent residents which includes special facilities schools, nursing homes, hospitals, and recreational areas The evacuation time estimate (ETE) is a calculation of the time to evacuate the plume exposure pathway emergency planning zone (EPZ), which is an area with a radius of about 10 miles around the station.

The ETE study uses population data from the decennial census. The evacuation times are based on a detailed consideration of the EPZ roadway network and population distribution. The ETE Study is contained in an addendum to the station Annex and presents evacuation times for daytime and nighttime scenarios under various weather conditions for the evacuation of various areas around the station.

Within 365 days of the availability of each decennial census data from the U.S. Census Bureau, each station shall develop an ETE analysis using this decennial data and submit it under 10CFR50.4 to the NRC. The ETE analysis shall be submitted to the NRC at least 180 days before using it to form protective action recommendations and providing it to State and local governmental authorities for use in developing offsite protective action strategies.

During the years between decennial censuses, EPZ permanent resident population changes are estimated once a year, but no later than 365 days from the date of the previous estimate, using the most recent U.S. Census Bureau annual resident population estimate and State/local government population data, if available. If at any time during the decennial period, the EPZ permanent resident population increases such that it causes the longest ETE value for the 2-mile zone or 5-mile zone, including all affected Emergency Response Planning Areas, or for the entire 10-mile EPZ to increase by 25 percent or 30 minutes, whichever is less, from the currently NRC approved or updated ETE, the ETE analysis will be updated to reflect the impact of that population increase. These estimates are available for NRC inspection during the period between decennial censuses and will be submitted to the NRC with any updated ETE analysis under 10CFR50.4 no later than 365 days after the determination that the criteria for updating the ETE have been met and at least 180 days before using it to form protective action recommendations and providing it to State and local governmental authorities for use in developing offsite protective action strategies.

9. Capability of Implementing Protective Action Recommendations

The responsibility for implementing protective measures based on protective action guides for the offsite population at risk is the responsibility of the state and local governments. Detailed procedures for public protective actions are contained in the state and other local radiological emergency response plans as appropriate.

The state agencies are responsible for evaluation of Constellation Nuclear recommended protective actions and preparing a recommendation to the Governor, or his/her appointed agent. Only when the state acts under the Governor's order does a recommended protective action become a directed protective action.

If the plant conditions are stable and offsite radiological conditions are such that the public health and safety are not endangered, then return to evacuated areas may be discussed with the affected state(s). State authorities are responsible for actually recommending return and transmitting this recommendation.

10. Implementation of Protective Action Recommendations

The utility, state, and county emergency plans used to implement the protective measures for the plume exposure pathway take numerous factors into consideration as stated in NUREG-0654 II.J. Among these considerations are:

a. Most of the public evacuees are expected to travel in their own vehicles, leaving the EPZ via designated evacuation routes. The Station Annex shows the evacuation routes, EPZ Subareas and pre-selected sampling/monitoring points. The state and county plans contain official maps and information on the locations of off-site centers.

b. The population distribution around the station. Population distribution for the plume exposure EPZ is illustrated in the Station Annexes.

c. As indicated in Section E, offsite agencies are notified in the event the Emergency Plan is activated. State and county agencies have the capability to notify all members of the transient and resident population within the Plume Exposure Pathway EPZ.

d. NUREG-0654 II.J.10.d-l items are addressed separately in state and county emergency plans.

e. At a General Emergency classification, Constellation Nuclear will provide the state with recommendations for protective actions for the public. For incidents involving actual, potential, or imminent releases of radioactive material to the atmosphere, EPA 400-R-92-001, the NRC Response Technical Manual (RTM-96) and NUREG-0654, Supp. 3, Revision 1 are used as the basis for the general public PARs.

1) Plant Based PARs

Station specific PAR Flowcharts have been developed to aid Constellation Nuclear personnel providing PARs based on the above. Station specific PAR Flowcharts with Subarea or Sector tables are documented in the Constellation EP Implementing Procedures, including station-specific requirements regarding PAR determination. These flowcharts and tables provide technically based Protective Action Recommendations based on plant conditions and core damage indicators as applicable to the Constellation site and described within the implementing procedures. Possible plant based PARs issued by Constellation Nuclear, in support of NUREG-0654 Supp. 3, at a General Emergency could include as appropriate for the Station:

- Response to a Rapidly Progressing Severe Accident.
- Utilization of the staged evacuation concept as determined by station ETE's.
- Shelter of the general public in response to but not limited to impediments to evacuation, or Hostile Action event.
- Evacuation of the general public.

In addition to the above actions to minimize or prevent potential exposure to radiation, a recommendation of "monitor and prepare**"** will be issued for the remainder of the EPZ.

2) Dose Based PARs

Evacuation is recommended if projected doses reach the minimum EPA PAGs ($\geq$ 1 Rem EPA TEDE[1] or $\geq$ 5 Rem CDE Thyroid).

Many assumptions exist in dose assessment calculations, involving both source term and meteorological factors, which make computer predictions over long distances highly questionable. However, in the event dose assessment results indicate the need to recommend actions beyond the outer EPZ boundaries, which is past 10 miles, Field Monitoring Teams are dispatched to downwind areas to verify the calculated exposure rates prior to issuing PARs outside the EPZ. In the event dose assessment results indicate the need to recommend actions beyond the outer EPZ boundaries (past 10 miles):

- If Field Monitoring Teams have been dispatched from the site, then dose assessment exposure rates will be verified prior to issuing any recommended action.
- If Field Monitoring Teams have not been dispatched from the site, then issuing recommended actions will not be delayed waiting on Field Teams.

[1] EPA TEDE is defined as the sum of the doses from external exposure and inhalation from the plume, and from 4 days of external exposure to deposited materials.

Constellation personnel normally do not have the necessary information to determine whether off site conditions would require sheltering instead of evacuation. External factors (such as road conditions, traffic/traffic control, weather, or offsite emergency response capabilities) are determined by the state.

11. Ingestion Pathway Protective Measures

The responsibility for specifying protective measures to be used for the ingestion pathway rests with the state. These measures include the methods for protecting the public from consumption of contaminated water and foodstuffs.

12. Monitoring of Evacuees

The state and county organizations have the capability to register and monitor evacuees at designated reception centers. This capability includes personnel and equipment capable of monitoring residents and transients evacuating from the plume exposure EPZ and arriving at the reception centers, in accordance with FEMA guidelines.

Section K: Radiological Exposure Control

This section of the plan describes the means for controlling emergency worker radiological exposures during an emergency, as well as the measures that are used by Constellation to provide necessary assistance to persons injured or exposed to radiation and/or radioactive materials. Exposure guidelines in this section are consistent with EPA Emergency Worker and Lifesaving Activity Protective Action Guides described in EPA 400-R-92-001.

1. Emergency Exposure Guidelines

Being licensed by the NRC, all Constellation Nuclear generating stations maintain personnel exposure control programs in accordance with 10 CFR 20 under normal operating conditions. The Station Emergency Director is assigned the non-delegable responsibility for authorizing personnel exposure levels under emergency conditions per EPA-400. In emergency situations, workers may receive exposure under a variety of circumstances in order to assure safety and protection of others and of valuable property. These exposures will be justified if the maximum risks or costs to others that are avoided by their actions outweigh the risks to which the workers are subjected. The Emergency Worker Dose Limits are as follows:

Dose Limit (Rem TEDE)	Activity	Condition
0-5	All	Personnel should be kept within normal 10 CFR 20 limits during bona fide emergencies, except as authorized for activities as indicated below.
5-10	Protecting valuable property	Lower dose not practicable.
10-25	Lifesaving or protection of large populations	Lower dose not practicable.
> 25	Lifesaving or protection of large populations	Only on a voluntary basis to persons fully aware of the risks involved.

Limit dose to the lens of the eye to 3 times the above values and doses to any other organ (including skin and body extremities) to 10 times the above values.

Whenever possible, the concurrence of the Station's Radiation Protection (Department) Manager should be secured before exposing individuals to dose equivalents beyond the EPA-400 lower limit.

2. Emergency Radiation Protection Program

The TSC Radiation Protection Manager is the individual responsible for the implementation of the radiation protection actions during an emergency. Radiation protection guidelines include the following:

- Volunteers over forty-five years of age are considered first for any emergency response action requiring exposure greater than normal limits. Routine dose limits shall not be extended to emergency dose limits for declared pregnant individuals. As in the case of normal occupational exposure, doses received under emergency conditions should be maintained as low as reasonably achievable.

- Persons undertaking any emergency operation in which the dose will exceed 25 Rem TEDE should do so only on a voluntary basis and with full awareness of the risks involved including the numerical levels of dose at which acute effects of radiation will be incurred and numerical estimates of the risk of delayed effects.

- In the context of the emergency limits, exposure of workers that is incurred for the protection of large populations may be considered justified for situations in which the collective dose avoided by the emergency operation is significantly larger than that incurred by the workers involved.

- Exposure accountability is maintained and proper personnel radiological monitoring equipment is provided for all personnel during emergency conditions.

- Access to high radiation areas is only permitted with prior approval of the applicable Radiation Protection Manager. Personnel are not allowed to enter known or potential high radiation areas unless their exposure has been properly evaluated.

- Periodic habitability surveys of emergency facilities are performed during an emergency. If the facility is determined to be uninhabitable, the facility is evacuated in order to prevent or minimize exposure to radiation and radioactive materials. Alternate assembly areas are established, as necessary, to relocate and monitor evacuated personnel.

3. Personnel Monitoring

a. Emergency workers will receive DLR badges and personal self-reading dosimeters capable of measuring expected exposures on a real time basis. The capability exists for the emergency processing of DLRs on a 24-hour per day basis, if necessary.

b. Emergency worker dose records are maintained by the Radiation Protection Managers (as appropriate) in accordance with the emergency and radiological protection procedures. Emergency workers are instructed to read their dosimeters frequently. DLRs may be processed with increased periodicity.

4. Non-Constellation Personnel Exposure Authorization

The responsibility for authorizing non-Constellation emergency workers (i.e. state and local agency emergency workers) to receive exposures in excess of the EPA General Public Protective Action Guides rests with the state and county organizations, except when such emergency workers are onsite. Authorization of exposures in excess of EPA General Public Protective Action Guides, in this latter instance, rests with the Station Emergency Director.

5. Contamination and Decontamination

During an emergency, the Station Emergency Director is responsible for preventing or minimizing personnel exposure to radioactive materials deposited on the ground or other surfaces. Special consideration should be given to setting up contamination control arrangements for personnel entering the OSC after completion of assigned activities.

a. During emergency conditions, normal plant contamination control criteria will be adhered to as much as possible. However, these limits may be modified by the applicable Radiation Protection Manager per existing Radiation Protection procedures, should conditions warrant.

b. Contamination Control Means: Personnel found to be contaminated will normally be attended to at decontamination areas located onsite. Temporary decontamination areas can also be set up inside at various locations. Decontamination showers and supplies are provided onsite with additional personnel decontamination equipment and capabilities. Shower and sink drains in the controlled area are routed to the miscellaneous waste processing system where the liquid is processed and monitored prior to discharge. Potentially contaminated emergency vehicles will be surveyed before they are allowed to leave the plant or offsite assembly area. If the survey area is not suitable for monitoring and decontamination due to radiological or other concerns, vehicles will be surveyed at an alternate location.

6. Contamination Control Measures

Controls are established 24 hours per day to contain the spread of loose surface radioactive contamination.

a. Contaminated areas are isolated as restricted areas with appropriate radiological protection and access control. Personnel leaving contaminated areas are monitored to ensure they and their clothing are not contaminated. If contamination above acceptable levels is found, they will be decontaminated in accordance with plant procedures. If normal decontamination procedures do not reduce personnel contamination to acceptable levels, the case will be referred to a competent medical authority. Supplies, instruments, and equipment that are in contaminated areas or have been brought into contaminated areas will be monitored prior to removal. If found to be contaminated, they will be decontaminated using normal plant decontamination techniques and facilities or may be disposed of as radwaste. Contaminated vehicles will be decontaminated before being released.

b. Measures will be taken to control onsite access to potentially contaminated potable water and food supplies. Under emergency conditions when uncontrolled releases of activity have occurred, eating, drinking, smoking, and chewing are prohibited in all station emergency response facilities until such time as habitability surveys indicate that such activities are permissible.

c. Restricted areas and contaminated items will be returned to normal use when contamination levels have been returned to acceptable levels. Contamination control criteria for returning areas and items to normal use are contained in the plant procedures.

7. Decontamination of Relocated Personnel

Nonessential onsite personnel may be evacuated to an offsite relocation center or assembly area, as discussed in Section J. Radiological controls personnel at that location monitor evacuees and determine the need for decontamination. Existing and temporary facilities to limit contamination and exposure will be utilized and established at the site as necessary during an emergency situation. In the event that decontamination of evacuees locally is not possible, personnel will be sent to designated locations for monitoring and decontamination. Provisions for extra clothing are made and suitable decontaminates are available for the expected type of contaminations, particularly with regards to skin contaminations.

Section L: Medical and Public Health Support

This section describes the arrangements for medical services for contaminated injured individuals sent from the station.

1. Offsite Hospital and Medical Services

Hospital personnel have been trained, and hospitals are equipped to handle contaminated or radiation injured individuals. Specifically, training of medical support personnel at the agreement hospitals will include basic training on the nature of radiological emergencies, diagnosis and treatment, and follow-up medical care. Station personnel are available to assist medical personnel with decontamination radiation exposure and contamination control. Arrangements, by letter of agreement or contract, are maintained by Crane Clean Energy Center with a qualified hospital located in the vicinity of Crane for receiving and treating contaminated or exposed persons with injuries requiring immediate hospital care. Constellation Nuclear shall provide medical consultants to aid in any special care necessary at these facilities.

Arrangements are also maintained with a qualified medical facility well equipped and staffed for dealing with persons having radiation injuries and whenever necessary, such persons will be transferred to this hospital facility for extended specialized treatment. Constellation Nuclear will have available to the staff of this hospital, medical consultants who will provide the direction of the special care necessary for the treatment of persons having radiation injuries.

These agreements are verified annually. Refer to section II.P.4 for details.

2. Onsite First Aid Capability

CRANE maintains onsite first aid supplies and equipment necessary for the treatment of contaminated or injured persons. In general, physicians or nurses are not staffed at CRANE, and as such, medical treatment given to injured persons is of a "first aid" nature. CRANE does have an industrial hygiene advisor. Additionally, the Radiation Protection Technicians at CRANE are experienced in controlling radioactive contamination and decontamination work. Station personnel are also trained and qualified to administer first aid. At least two of these individuals are available on-shift at all times. The functions of station personnel in handling onsite injured people are:

1) Afford rescue;

2) Administer first aid including such resuscitative measures as are deemed necessary;

3) Begin decontamination procedures; and

4) Arrange for suitable transportation to a hospital when required.

Primary attention shall be directed to the actual factors involved in the treatment of casualties, such as: control of bleeding, resuscitation including heart and lung, control of bleeding after resuscitation, protection of wounds from bacterial or radioactive contamination and the immobilization of fractures.

Station personnel provide an initial estimate of the magnitude of surface contamination of the injured and preliminary estimates of total body dose to the injured. Primary rapid and simple decontamination of the surface of the body (when possible and advisable) before transportation to a designated hospital may be carry out as directed or performed by Radiation Protection personnel. When more professional care is needed, injured persons are transported to a local clinic or hospital. Contaminated and injured persons are transported to a dedicated specified facility.

3. Medical Service Facilities

Because of the specialized nature of the diagnosis and treatment of radiation injuries, Corporate Emergency Preparedness maintains an agreement with REAC/TS. REAC/TS is a radiological emergency response team of physicians, nurses, health physicists and necessary support personnel on 24-hour call to provide consultative or direct medical or radiological assistance at the REAC/TS facility or at the accident site. Specifically, the team has expertise in and is equipped to conduct: medical and radiological triage; decontamination procedures and therapies for external contamination and internally deposited radionuclides, including chelation therapy; diagnostic and prognostic assessments or radiation-induced injuries; and radiation dose estimates by methods that include cytogenetic analysis, bioassay, and in vivo counting.

In addition to REAC/TS, the Station Annex may identify additional medical consultants, based on agreements with local hospitals, to support personnel training and medical response.

4. Medical Transportation

Arrangements are made by CRANE for prompt ambulance transport of persons with injuries involving radioactivity to designated hospitals. Such service is available on a 24-hour per day basis and is confirmed by letter of agreement. Radiation monitoring services shall be provided by CRANE whenever it becomes necessary to use the ambulance service for the transportation of contaminated persons.

A qualified Radiation Protection person shall accompany the ambulance to the hospital. Additional Radiation Protection personnel may be contacted and dispatched to local hospitals to assist in the monitoring and decontamination of the injured victim and hospital and ambulance facilities and personnel.

Section M: Reentry and Recovery Planning

This section describes the measures to be taken for reentry into the areas of CRANE which have been evacuated as a result of an accident. It also outlines the Constellation Nuclear Recovery Organization and its concepts of operation.

1. Reentry and Recovery

a. Evaluating Reentry Conditions

During an emergency, immediate actions are directed toward limiting the consequences of the accident to afford maximum protection to station personnel and the general public. Once corrective measures have been taken and effective control of the plant has been re-established, a more methodical approach to reentry is taken. This Emergency Plan divides reentry into two separate categories:

- Reentry *during the emergency phase of an accident* is performed to save a life, control a release of radioactive material, prevent further damage to plant equipment or restore plant equipment. If necessary, this category of reentry may be performed using emergency exposure limits. Briefings, rather than written radiation protection procedures, may be used when making these entries.

  All reentry activities conducted during the emergency are authorized by the Station Emergency Director and coordinated by the OSC Director and the Radiation Protection Manager.

- Reentry *during the recovery phase of an accident* is performed using normal exposure limits. Either normal procedures or procedures that consider existing as well as potential conditions inside affected areas are developed specifically for each reentry.

  Reentry activities during the recovery phase are authorized by the Recovery Director and coordinated by the recovery organization managers in charge of personnel making the reentry.

The following items are considered when planning for any reentry:

- Review of available radiation surveillance data to determine plant areas potentially affected by radiation and/or contamination.

- Review of radiation exposure history of personnel required to participate in the accident mitigation or recovery operations.

- Determination of the need for additional personnel and the sources of these additional personnel.

- Review of adequacy of radiation survey instrumentation and equipment (types, ranges number, calibration, etc.).

- Review of non-radiological hazards and required protective measures (e.g., fire, electrical, Hazmat).
- Pre-planning of activities and briefings for the reentry team that include the following:
  - Personnel knowledge requirements.
  - Methods and procedures that will be employed during the entry.
  - Specific tasks to be performed.
  - Anticipated radiation and contamination levels.
  - Radiation survey equipment and types and ranges of dosimetry required.
  - Shielding requirements and availability.
  - Appropriate communications.
  - Protective clothing and equipment requirements.
  - Access control procedures.
  - Decontamination requirements.
  - De-briefing requirements.
  - Respiratory protection.
- A review of security controls to prevent unauthorized or unintentional entry into hazardous areas.

b. Evaluating Entry into Recovery

The Recovery Phase is that period when major repairs are being performed to return the plant to an acceptable condition and the possibility of the emergency condition degrading no longer exists. Once the plant has been stabilized, contained and controlled, the Recovery Phase may be entered. It is the responsibility of the Station Emergency Director to classify Recovery after obtaining authorization from the Corporate Emergency Director.

Establishment of Recovery can be conducted from any emergency classification level. However, it is possible that the lower classifications of Unusual Event and Alert will conclude with the event being terminated. There may be cases where certain EAL initiating conditions remain exceeded, but the station is under control and no further danger of degradation exists. In such a case, it may be appropriate to enter Recovery. Site Area and General Emergencies will require a Recovery Phase to be established prior to event termination. Constellation Nuclear may consult with/notify cognizant governmental agencies prior to declaring Recovery or event termination.

Termination/Recovery considerations are contained in the implementing procedures to provide guidance for evaluating the risk of entering Recovery without alleviating the intent of the Initiating Condition. The purpose of Recovery is to provide the necessary personnel to handle the long-term activities and to return the plant to an acceptable condition.

The following conditions are guidelines for the determination of establishing Recovery (this is not intended to be a complete list and additional criteria may apply, depending on the specifics of the event):

- The risk to the health and safety of the public has been mitigated.
- Plant parameters and equipment status have been established and controlled.
- In-plant radiation levels are stable or decreasing, and acceptable, given the plant conditions.
- The potential for uncontrolled releases of radioactive material to the environment has been eliminated.
- Environmental monitoring has been established.
- The radioactive plume has dissipated and plume tracking is no longer required (the only environmental assessment activities in progress are those necessary to assess the extent of deposition resulting from passage of the plume).
- Constellation Nuclear workers have been protected.
- Any security threat has been neutralized, and/or plant security is under the direction of Constellation Nuclear personnel.
- Adequate plant safety systems are operable.
- The reactor is in a stable shutdown condition and long-term core cooling is available.

- The fuel pool damage has been mitigated, or spent fuel damage has been contained and controlled.
- Primary and/or secondary containment integrity has been established.
- Plant systems and equipment are restored and/or replaced such that plant conditions are stable highly unlikely to degrade further.
- Conditions that initiated the emergency have been contained, controlled, eliminated or stabilized such that the classification is no longer applicable.
- The operability and integrity of radioactive waste systems, decontamination facilities, power supplies, electrical equipment and of plant instrumentation including radiation monitoring equipment.
- Any fire, flood, earthquake or similar emergency condition or threat to security no longer exists.
- All required notifications have been made.
- Discussions have been held with federal, state and county agencies and agreement has been reached to terminate the emergency.
- At an Alert or higher classification, the ERO is in place and emergency facilities are activated.
- Any contaminated injured person has been treated and/or transported to a medical care facility.
- Offsite conditions do not unreasonably limit access of outside support to the station and qualified personnel and support services are available.

It is not necessary that all conditions listed above be met; however, all items must be considered prior to entering the recovery phase. For example, it is possible after a severe accident that some conditions remain that exceed an Emergency Action Level, but entry into the Recovery Phase is appropriate.

2. Recovery Organization

Once plant conditions have been stabilized and the Recovery Phase has been initiated, the Emergency Director may form a Recovery Organization for long-term operations. These types of alterations will be discussed with the NRC prior to implementation.

- For events of a minor nature, (i.e. for Unusual Event classifications) the normal on-shift organization is normally adequate to perform necessary recovery actions.

- For events where damage to the plant has been significant, but no offsite releases have occurred and/or protective actions were not performed, (i.e. for Alert classifications) the station Emergency Response Organization, or portions thereof, should be adequate to perform the recovery tasks prior to returning to the normal station organization.

- For events involving major damage to systems required to maintain safe shutdown of the plant and offsite radioactive releases have occurred, (i.e. for Site Area Emergency or General Emergency classifications) the station recovery organization is put in place.

The specific members of the station recovery organization are selected based on the sequence of events that preceded the recovery activities as well as the requirements of the recovery phase. The basic framework of the station recovery organization is as follows:

a. The Recovery Director: The Corporate Emergency Director is initially designated as the Recovery Director. The Recovery Director is charged with the responsibility for directing the activities of the station recovery organization. These responsibilities include:

    - Ensuring that sufficient personnel, equipment, or other resources from Constellation and other organizations are available to support recovery.

    - Directing the development of a recovery plan and procedures.

    - Deactivating any of the plant Emergency Response Organization which was retained to aid in recovery, in the appropriate manner. Depending upon the type of accident and the onsite and offsite effects of the accident, portions of the ERO may remain in place after initiation of the recovery phase.

    - Coordinating the integration of available federal and state assistance into onsite recovery activities.

    - Coordinating the integration of Constellation support with federal, state and county authorities into required offsite recovery activities.

    - Approving information released by the public information organization which pertains to the emergency or the recovery phase of the accident.

    - Determining when the recovery phase is terminated.

b. The Recovery Plant Manager: The Station Manager or a designated alternate will become the Recovery Plant Manager. The Recovery Plant Manager reports to the Recovery Director and is responsible for:

    - Coordinating the development and implementation of the recovery plan and procedures.

- Ensuring that adequate engineering activities to restore the plant, are properly reviewed and approved.
- Directing all onsite activities in support of the station recovery effort.
- Designating other Constellation recovery positions required in support of onsite recovery activities.

c. The Recovery Offsite Manager: A senior Corporate Emergency Preparedness or Regulatory Affairs individual, or a designated alternate, is the Recovery Offsite Manager. The Recovery Offsite Manager reports to the Recovery Director and is responsible for:

- Providing liaison with offsite agencies and coordinating Constellation assistance for offsite recovery activities.
- Coordinating Constellation ingestion exposure pathway EPZ sampling activities and the development of an offsite accident analysis report.
- Developing a radiological release report.
- Designating other Constellation recovery positions required in support of offsite recovery activities.

d. The Company Spokesperson: A senior Constellation management individual is designated as the Company Spokesperson. The Company Spokesperson reports to the Recovery Director and is responsible for:

- Functioning as the official spokesperson to the press for Constellation on all matters relating to the accident or recovery.
- Coordinating non-Constellation public information groups (federal, state, county, etc.).
- Coordinating media monitoring and rumor control.
- Determining what public information portions of the ERO will remain activated.

The remainder of the recovery organization is established and an initial recovery plan developed at the end of the emergency phase or just after entry into the recovery phase. Consideration is given to recovery activity needs and use of the normal station organizations. Individual recovery supervisors may be designated in any or all of the following areas:

- Training
- Radiation Protection
- Chemistry
- Technical/Engineering Support

- Nuclear Oversight
- Operations
- Security
- Maintenance
- Special Offsite Areas (Community Representatives, Environmental Samples, Investigations, etc.)

3. Recovery Phase Notifications

When the decision is made to enter the recovery phase, all members of the Constellation ERO are informed of the change. All Constellation personnel are instructed of the Recovery Organization and their responsibilities to the recovery effort.

4. Total Population Exposure

Total population exposure calculations are performed and periodically updated during the recovery phase of an accident. A method has been developed for estimating the total population exposure resulting from the accident from data collected in cooperation with the state and other federal agencies. Total population exposure is determined through a variety of procedures including:

- Examination of pre-positioned dosimeters.
- Bioassay.
- Estimates based on release rates and meteorology.
- Estimates based on environmental monitoring of food, water, and ambient dose rates.

The state will be the lead agency in the collection and analysis of environmental air, soil, foliage, food, and water samples and for the generation of radiation monitoring reports. Constellation Nuclear environmental sampling activities will be coordinated with state efforts, as requested, and results shared with cognizant agencies.

Section N: Drill and Exercise Program

This section describes the Drill and Exercise Program that Constellation Nuclear has implemented to:

- Verify the adequacy of the Emergency Preparedness Program.
- Develop, maintain, and evaluate the capabilities of the ERO to respond to emergency conditions and safeguard the health and safety of station personnel and the general public.
- Identify deficiencies in the Emergency Plan and the associated procedures, or in the training of response personnel, and ensure that they are promptly corrected.
- Ensure the continued adequacy of emergency facilities, supplies and equipment, including communications networks.

The Exercise Cycle is defined as an eight-year period of time. At each station, the eight-year cycle began in the same year that the first Hostile Action based exercise was performed. During each eight-calendar year exercise cycle, sites shall vary the content of scenarios during exercises to provide the opportunity for the ERO to demonstrate proficiency in the key skills necessary to respond to the following scenario elements:

- hostile action directed at the plant site,
- no radiological release or an unplanned minimal radiological release that does not require public protective actions,
- an initial classification of or rapid escalation to a Site Area Emergency or General Emergency,
- implementation of strategies, procedures, and guidance developed under § 50.155 and integration of offsite resources with onsite response.

Constellation uses drill and exercise scenarios that provide reasonable assurance that anticipatory responses do not result from preconditioning of participants. Such scenarios include a wide spectrum of radiological releases and events, including hostile action

1. Exercises

a. Biennial Exercises

Federally prescribed exercises are conducted at CRANE in order to test the adequacy of timing and content of implementing procedures and methods; to test emergency equipment and communication networks; and to ensure that emergency personnel are familiar with their duties. Exercises involving offsite agency participation, required under Section F.2.c & d to 10 CFR 50 Appendix E, are conducted based on the FEMA Radiological Emergency Preparedness Manual and the state and local emergency response plans.

Partial participation means appropriate offsite authorities shall actively take part in the exercise sufficient to test direction and control functions to include protective action decision making related to Emergency Action Levels and communication capabilities among affected state and local authorities and Constellation Nuclear.

Full participation exercises will include appropriate offsite local and state authorities and Constellation personnel physically and actively taking part in testing the integrated capability to adequately assess and respond to an accident at the plant. Additionally, full participation exercises will include testing the major observable portions of the onsite and offsite emergency plans and mobilization of state, local, and Constellation personnel and other resources in sufficient numbers to verify the capability to respond to the accident scenario.

Where partial or full participation by offsite agencies occurs, the sequence of events simulates an emergency that results in the release of radioactivity to the offsite environs, sufficient in magnitude to warrant a response by offsite authorities.

b. Off-Year Exercises

An Off-Year Exercise is conducted at each station during the calendar year when an NRC Evaluated Exercise is not scheduled. An Off-Year Exercise shall involve a combination of at least two facilities in order to demonstrate at least two of the functions of management and coordination of emergency response, accident assessment, protective action decision-making, or plant system repair and corrective actions. For Off-Year Exercises involving no or limited participation by offsite agencies, emphasis is placed on development and conduct of an exercise that is more mechanistically and operationally realistic. Players will be able, by implementing appropriate procedures and corrective actions, to determine the outcome of the scenario to a greater extent than when core damage and the release of radioactivity are prerequisites for demonstration of all objectives.

Exercises provide an opportunity to evaluate the ability of participating organizations to implement a coordinated response to postulated emergency conditions. Exercises are conducted to ensure that all major elements of the Emergency Plan and preparedness program are demonstrated at least once in each exercise cycle. Each station shall conduct at least one off-hours exercise between 6:00 p.m. and 4:00 a.m. every exercise cycle. Weekends and holidays are also considered off-hours periods. Provisions will be made for qualified personnel from Constellation, federal, state, or local governments to observe and critique each exercise as appropriate.

2. Drills

In addition to the exercises described above, Constellation conducts drills for the purpose of testing, developing, and maintaining the proficiency of emergency responders. Drills are scheduled on the Emergency Preparedness annual events plan, which contains provisions for the following drills:

a. Communication Drills

- Monthly - The capability of the Nuclear Accident Reporting System (NARS) to notify the state and local government warning points and EOCs within the plume exposure pathway EPZ are demonstrated. Also, the capability to notify the NRC Region is demonstrated using the Emergency Notification System (ENS) and the Health Physics Network (HPN) where available.

- Quarterly - The capability to notify the NRC Region, FEMA Region, American Nuclear Insurers (ANI) and federal emergency response organizations as listed in the Emergency Response Facilities (ERF) Telephone Directory are demonstrated from the EOF. Also, computer and critical communications equipment shall be functionally tested.

  Communications between states outside the 10 mile EPZ but within the 50-mile EPZ are tested by the host state.

- Annually - The emergency communications systems outlined in Section F are fully tested. This includes (1) communications between the plant and the state and local EOCs and Field Monitoring Teams, and (2) communications between the CR, the TSC, and the EOF.

Each of these drills includes provisions to ensure that all participants in the test are able to understand the content of the messages.

b. Fire Drills: Fire drills shall be conducted at CRANE in accordance with Station Technical Specifications and/or Station procedures.

c. Medical Emergency Drills: A medical emergency drill, involving a simulated contaminated individual, and containing provisions for participation by local support services organizations (i.e., ambulance and support hospital) are conducted annually. Local support service organizations, which support more than one station, shall only be required to participate once each calendar year. The offsite portions of the medical drill may be performed as part of the required biennial exercise.

d. Radiological Monitoring Drills: Plant environs and radiological monitoring drills (onsite and offsite) are conducted annually. These drills include collection and analysis of all sample media (such as, water, vegetation, soil, and air), and provisions for communications and record keeping.

e. Health Physics Drills: Health Physics Drills involving a response to, and analysis of, simulated airborne and liquid samples and direct radiation measurements within the plant are conducted semi-annually. At least annually, these drills shall include a demonstration of the sampling system capabilities, or the Core Damage Assessment Methodology (CDAM) objectives as applicable.

f. Augmentation Drills: Augmentation drills serve to demonstrate the capability of the process to augment the on-shift staff with a TSC, OSC and EOF in a short period after declaration of an emergency. These drills are conducted using the following methods:

- Quarterly, each station will initiate an unannounced off-hours ERO augmentation drill where no actual travel is required. Each region's Corporate ERO shall also perform an unannounced off-hours ERO augmentation drill that may be conducted independent of, or in conjunction with, a station drill.

- At least once per exercise cycle, an off-hours unannounced activation of the ERO Notification System with actual response to the emergency facilities is conducted by each station. Each region's Corporate ERO need only participate once per cycle.

g. Accountability Drills: Accountability drills are conducted annually. The drill includes identifying the locations of all individuals within the protected area.

3. Conduct of Drills and Exercises

Advance knowledge of the scenario will be kept to a minimum to allow "free-play" decision making and to ensure a realistic participation by those involved. Prior to the drill or exercise, a package will be distributed to the controllers and evaluators that will include the scenario, a list of performance objectives, and a description of the expected responses.

For each emergency preparedness exercise or drill conducted, a scenario package is developed that includes at least the following:

a. The basic objective(s) of the drill or exercise and the 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 scenario to include such things as simulated casualties, offsite fire department assistance, rescue of personnel, use of protective clothing, deployment of radiological monitoring teams, and public information activities.

f. A description of the arrangements for and advance materials to be provided to official observers.

Prior approval by the appropriate station management is obtained for all drills and exercises conducted in support of the Emergency Preparedness Program.

4. Critique and Evaluation

Drill and exercise performance objectives are evaluated against measurable demonstration criteria. As soon as possible following the conclusion of each drill or exercise, a critique is conducted to evaluate the ability of the ERO to implement the Emergency Plan and procedures.

A formal written critique report is prepared by Emergency Preparedness following a drill or exercise involving the evaluation of designated objectives or following the final simulator set with ERO participation. The report will evaluate the ability of the ERO to respond to a simulated emergency situation. The report will also contain corrective actions and recommendations.

Biennially, representatives from the NRC observe and evaluate the licensee's ability to conduct an adequate self-critical critique. For partial and full offsite participation exercises both the NRC and FEMA will observe, evaluate, and critique.

Critique comments identified by participants during a training drill where objectives are not formally being evaluated will be reviewed and dispositioned by Emergency Preparedness, but do not require a formal report.

5. Resolution of Drill and Exercise Findings

The critique and evaluation process is used to identify areas of the Emergency Preparedness Program that require improvement. The Emergency Preparedness Manager is responsible for evaluation of recommendations and comments to determine which items will be incorporated into the program or require corrective actions, and for the scheduling, tracking, and evaluation of the resolution to the items.

Whenever exercises and/or drills indicate deficiencies in the Emergency Plan or corresponding implementing procedures, such documents will be revised as necessary.

Remedial exercises will be required if the emergency plan is not satisfactorily tested during the Biennial Exercise, such that NRC, in consultations with FEMA, cannot find reasonable assurance that adequate protective measures can be taken in the event of a radiological emergency. The extent of State and local participation in remedial exercises must be sufficient to show that appropriate corrective measures have been taken regarding the elements of the plan not properly tested in the previous exercises.

Section O: Emergency Response Training

This section describes the emergency response training that is provided to those who may be called upon in an emergency. It outlines the training provided by Constellation Nuclear to both its employees and offsite support personnel requiring site access.

1. Assurance of Training

The Emergency Plan Training Program assures the training, qualification, and requalification of individuals who may be called on for assistance during an emergency. Specific emergency response task training, prepared for each Emergency Plan position, is described in lesson plans and study guides. The lesson plans, study guides, and written tests are contained in the ERO Training Program. Responsibilities for implementing the training program are contained in plant procedures. Constellation personnel who are assigned an Emergency Plan position will receive retraining at a frequency of once per calendar year not to exceed 18 months between training sessions.

Offsite training is provided to support organizations that may be called upon to provide assistance in the event of an emergency. The following outlines the training received by these organizations:

a. Emergency Preparedness shall annually train, or document an annual written offer to train, those non-Constellation Nuclear organizations referenced in the Station Annex that may provide specialized services during a nuclear plant emergency (e.g., local law enforcement, fire-fighting, medical services, transport of injured, etc.). The training made available is designed to acquaint the participants with the special problems potentially encountered during a nuclear plant emergency, notification procedures and their expected roles. Those organizations that must enter the site shall also receive site-specific emergency response training and be instructed as to the identity (by position and title) of those persons in the onsite organization who will control their support activities.

b. Training of offsite emergency response organizations is described in their respective radiological emergency plans, with support provided by Constellation Nuclear as requested.

2. Functional Training of the ERO

In addition to general and specialized classroom training, members of the CRANE ERO receive periodic performance based emergency response training. Performance based training is provided using one or more of the following methods:

- Familiarization Sessions: A familiarization session is an informal, organized tabletop discussion of predetermined objectives.

- Walk Throughs: Consists of a facility walk through to familiarize plant ERO personnel with procedures, communications equipment, and facility layout. Walk throughs also provide the opportunity to discuss facility activities, responsibilities and procedures with an instructor.

- Drills: A drill is a supervised instruction period aimed at testing, developing and maintaining skills in a particular operation. Drills described in Section N of this plan are a part of training. These drills allow each individual the opportunity to demonstrate the ability to perform their assigned emergency functions. During drills, on-the-spot correction of erroneous performance may be made and a demonstration of the proper performance offered by the Controller.

3. First Aid Response

Selected station personnel are trained in accordance with the Constellation Nuclear approved First Aid Program. First-Aid Teams will likely be augmented with additional personnel such as Fire Brigade Members and other personnel qualified to assist in the rescue.

4. Emergency Response Organization Training Program

CRANE ERO personnel who are responsible for implementing this plan receive specialized training. The training program for emergency response personnel is developed based on the requirements of 10 CFR 50, Appendix E and position specific responsibilities as defined in this document.

On-Shift emergency response personnel perform emergency response activities as an extension of their normal duties and are trained annually as part of their duty specific training. Additional Emergency Preparedness information is provided as part of the Station Nuclear General Employee Training.

New ERO personnel receive an initial overview course that familiarizes them with the Emergency Plan by providing basic information in the following areas as well as specific information as delineated in the sections below:

- Planning Basis
- Emergency Classifications
- Emergency Response Organization and Responsibilities
- Call-out of Emergency Organization
- Emergency Response Facilities
- Communications Protocol/Emergency Public Information
- Offsite Organizations

Emergency response personnel in the following categories receive knowledge and/or performance based training initially and retraining thereafter once per calendar year not to exceed 18 months between training sessions.

a. Directors, Managers and Coordinators within the station and corporate ERO: Personnel identified by the Emergency Response Organization Telephone Directory as Directors, Managers and Coordinators for the station and corporate EROs receive training appropriate to their position in accordance with the approved ERO Training Program. These personnel receive specialized training in the areas of:

   - Notifications
   - Emergency Classifications
   - Protective Action Recommendations
   - Emergency Action Levels
   - Emergency Exposure Control

   Selected Directors, Managers, Coordinators and Shift Emergency Directors receive training in accordance with the approved ERO Training Program. Training in accident assessment sufficient to classify an event and to mitigate the consequences of an event are also covered.

b. Personnel Responsible for Accident Assessment:

   The skills and knowledge required to perform plant stabilization and mitigation are a normal function of operations specific positions, as identified in Section B of this plan. Power changes and planned and unplanned reactor shutdowns are handled on a normal operation basis. Subsequent plant stabilization and restoration is pursued utilizing normal operating procedures. Licensed Operators receive routine classroom and simulator training to ensure proficiency in this area.

   1) Active Senior Licensed Control Room Personnel shall have training conducted in accordance with the approved ERO Training Program such that proficiency is maintained on the topics listed below. These subjects shall be covered as a minimum on an annual basis.

      - Event Classification.
      - Protective Action Recommendations.
      - Radioactive Release Rate Determination.
      - Notification form completion and use of the Nuclear Accident Reporting System (NARS).
      - Federal, state and local notification procedures as appropriate.

- Site specific procedures for activating the onsite and offsite ERO.

To remove peripheral duties from the Operations shift, the following group of positions responsible for accident assessment, corrective actions, protective actions, and related activities receive the training listed below:

2) Core Damage Assessment Personnel: During an emergency when core/cladding damage is suspected, a specialized group of trained individuals perform core damage assessment. At a minimum, personnel responsible for core damage assessment receive classroom and hands-on training in the following areas:

   - Available Instrumentation and Equipment
   - Isotopic Assessment and Interpretation
   - Computerized Core Damage Assessment Methodology (CDAM) and/or proceduralized assessment methods.

c. Radiological Monitoring Teams and Radiological Analysis Personnel

1) Offsite Radiological Monitoring: Offsite radiological monitoring is performed by trained individuals who provide samples and direct readings for dose assessment calculations and dose projection comparisons.

   Personnel identified as members of Field Monitoring Teams receive training in accordance with the approved training program. Field Monitoring Team members receive classroom and hands-on training in the following areas:

   - Equipment and Equipment Checks
   - Communications
   - Plume Tracking Techniques

2) Personnel Monitoring: Personnel monitoring is performed by trained individuals who monitor station personnel and their vehicles for contamination during an emergency. Personnel Monitoring Team members receive classroom and hands-on training in the following areas:

   - Personnel Monitoring Equipment and Techniques
   - Decontamination Techniques for Personnel
   - Decontamination Techniques for Vehicles

3) Dose Assessment: Dose Assessment training includes the skills and knowledge necessary for calculation and interpretation of an offsite release and its impact on the environment under varying meteorological conditions. Individuals responsible for performing dose assessment are trained in the following areas:

- Computerized Dose Assessment
- Protective Action Recommendations
- Field Monitoring Team Interface
- Protective Action Guidelines associated with offsite plume exposure doses
- Basic Meteorology

d. Police, Security, and Fire Fighting Personnel

1) Local Police and Fire Fighting Personnel: The local Police and Fire Departments are invited to receive training as outlined in Part 1.a of this section.

2) Security Personnel: Station security personnel are trained in accordance with training defined by the Nuclear General Employee Training (NGET) and Constellation Nuclear Security Program.

3) Fire Control Teams (fire brigades): Station fire brigades are trained in accordance with training defined by the Constellation Nuclear Fire Protection Program. Fire Brigade personnel are considered the primary members of rescue teams and will receive the appropriate EP training as part of their training program. Training also includes rescue of personnel from hazardous environments.

e. Repair and Damage Control Teams: Operations, Maintenance and Radiation Protection personnel are trained as part of their normal job specific duties to respond to both normal and abnormal plant operations.

Operations personnel are trained to: (1) recognize and to mitigate degrading conditions in the plant, (2) mechanically and electrically isolate damaged or malfunctioning equipment, (3) isolate fluid leaks, and (4) minimize transients.

Maintenance personnel are trained to troubleshoot and repair damaged or malfunctioning electrical, mechanical, or instrumentation systems as appropriate to their job classification.

Radiation Protection personnel are trained to assess the radiological hazards associated with equipment repair and instruct personnel as to the appropriate protective clothing requirements, respiratory protection requirements, stay times, and other protective actions specific to the conditions present.

At least 50% of personnel from those departments, who are potential responders to the OSC as Damage Control Team members, are required to be qualified in the use of respiratory protection equipment. This includes in-plant supervision and craft/technicians for the following departments:

- Operations
- Radiation Protection/Chemistry
- Maintenance (mechanical, electrical and I&C)

f. First Aid and Rescue Personnel: First aid and rescue team members receive training as outlined in Part 3 of this section.

g. Local Support Service Personnel: Local support service personnel providing assistance during an emergency are invited to receive training as outline in Parts 1.a and 1.b of this section.

h. Medical Support Personnel: Offsite medical personnel receive specialized training in the handling of contaminated victims and hospital interface. Offsite ambulance and hospital personnel are offered annual training in accordance with a program provided by Emergency Preparedness.

i. Public Information Personnel: Corporate and station personnel responsible for disseminating emergency public information and responding to media and public information requests receive specialized public information training.

j. Communications Personnel: ERO personnel receive training on communications protocol as a part of the initial Emergency Response Overview Course. Personnel using specialized communications equipment that is not part of their normal daily function receive initial and requalification training on the equipment. Personnel involved in notifications to offsite agencies receive specialized training in the notification process.

5. General, Initial, and Requalification Training Program Maintenance

a. Station Departments and Emergency Preparedness share the responsibility for ensuring that the ERO receives all necessary training and retraining. In order to carry this out, responsibilities are assigned as follows:

Corporate Responsibilities for Corporate ERO Personnel

- Scheduling and conducting initial, retraining, and make-up classes.
- Acting as the sole contact point for ensuring attendance.
- Record keeping for the training courses, including dates of scheduled classes and non-attendance information.
- Verifying that all emergency response personnel training records are current.

- Ensure instructional materials are prepared and reviewed every two years.

Station Responsibilities for Station ERO Personnel

- Station management shall ensure the attendance of onsite personnel for training, including required Emergency Plan courses.
- Each Station shall conduct onsite emergency personnel initial and retraining for station Emergency Response Personnel using approved lesson plans.
- The Station Training Department shall provide those shift personnel included in a continuing training program an annual review of the following items as a minimum:
  - Assembly Areas
  - Emergency Response Facility assignment
  - Potential Hazards (radiological and non-radiological)
  - Anticipated actions including assembly requirements, protective equipment requirements (clothing, masks, SCBA, etc.), the use of KI, emergency exposure limits and accountability requirements.

b. Initial and Requalification ERO Training: The proficiency of emergency response personnel (as defined in 10 CFR 50 Appendix E) is ensured by the following means:

- Assigning persons to emergency duties that are similar to those performed as a part of their regular work assignment or experience.
- Initial training and annual retraining on applicable generic and site-specific portions of the Emergency Plan and the corresponding implementing procedures. Individuals not demonstrating the required level of knowledge in initial or retraining classes receive additional training on the areas requiring improvement. Annual retraining is conducted **once** per calendar year not to exceed 18 months between training sessions.
- Training is required for changes to the Emergency Plan and Station Annexes that are not editorial or minor in nature including changes that impact the resources, capabilities, or methods associated with Planning Standards, Program Elements, or 10CFR50 Appendix E, and modify program requirements or commitments. Training on Emergency Plan changes shall be completed within one hundred twenty (120) days of implementation of the change.

- Participation in exercises and/or drills as developed or authorized by the Emergency Preparedness Department and designed to sharpen those skills that they are expected to use in the event of a nuclear emergency.

All personnel assigned position specific responsibilities in the ERO are documented by inclusion in the Emergency Response Organization Telephone directory listing of positions and personnel.

c. Nuclear General Employee Training (NGET): All personnel with unescorted station access are provided with initial orientation training on the notification and instruction methods used in the event of an emergency. Additionally, all badged individuals also receive initial orientation on the basic principles of radiological safety including the effects of radiation and the theory and use of radiation detection devices. Appropriate actions for escorted individuals shall be the responsibility of the escort. NGET provides initial and annual requalification training on the basic elements of the Emergency Plan for all personnel working at the plant. Specifically, these elements include:

- Station emergency alarms and their meaning
- Assembly areas
- Site and Exclusion Area Evacuation procedures
- Special precautions and limitations during an emergency
- Purpose of the Emergency Plan

Section P: Responsibility for the Maintenance of the Planning Effort

This section describes the responsibilities for development, review and distribution of the Emergency Plan and actions that must be performed to maintain the emergency preparedness program. It also outlines the criteria for insuring that personnel who perform the planning are properly trained.

1. Emergency Preparedness Staff Training

The Emergency Preparedness staff is involved in maintaining an adequate knowledge of state of the art planning techniques and the latest applications of emergency equipment and supplies. At least once each calendar year each member of the Emergency Preparedness staff is involved in one of the following activities:

- Training courses specific or related to emergency preparedness.
- Observation of or participation in drills and/or exercises at other stations.
- Participation in industry review and evaluation programs.
- Participation in regional or national emergency preparedness seminars, committees, workshops or forums.
- Specific training courses in related areas, such as systems, equipment, operations, radiological protection, or Problem Identification & Resolution (PI&R).

2. Authority for the Emergency Preparedness Effort

The Site Vice President is responsible for the safe and reliable operation of the generating station. The issuance and control of this plan and the activities associated with emergency preparedness at CRANE shall be the overall responsibility of the Vice President, Licensing and Regulated. This individual is assigned the responsibility for overall implementation of the Emergency Plan and Station Annexes.

3. Responsibility for Development and Maintenance of the Plan

The Corporate Emergency Preparedness Managers are responsible for the overall radiological emergency preparedness program associated with the operation of the nuclear power stations within their respective responsibility and to administer the program to ensure availability of resources in the event of an emergency. The Corporate Emergency Preparedness Managers report to an EP Functional Area Manager who in turn reports to the Vice President, Licensing and Regulated.

The Emergency Preparedness Managers are assisted by regional corporate and Station Emergency Preparedness staff. Specific responsibilities include the following:

Program Administration

- Develop and maintain the Emergency Plan, Station Annex, implementing procedures and administrative documents.
- Develop and maintain 50.54(q) evaluations for changes to EP documents.
- Coordinate and maintain the EP Activities Schedule.
- Develop and maintain working relationships and coordinate meetings with Federal, state and local agencies.
- Ensure integration of plans between Constellation and offsite agencies.
- Provide an opportunity to discuss Emergency Action Levels and the availability of Nuclear Oversight audit results relating to interface with governmental agencies.
- Coordinate, negotiate and maintain agreements and contracts with offsite agencies and support organizations.
- Obtain Letters of Agreement with medical facilities, and medical consultants specifically skilled in the medical aspects of radiation accidents and other medical consultants as might be necessary for the case of a person involved in a radiation incident.
- Coordinate the development and annual distribution of the station's public information publication.
- Coordinate and administer the Self Evaluation Program to monitor and evaluate the adequacy of the Emergency Preparedness Program.
- Coordinate and support EP Self-Assessments, Audits and Inspections.
- Ensure the documentation and resolution of adverse conditions in the emergency preparedness program discovered through drills, audits, etc. in accordance with the Constellation Nuclear Corrective Action Program.
- Coordinate and develop Operational Experience responses.
- Coordinate, document and review Performance Indicator data and reports.
- Provide oversight of Drill and Exercise Performance (DEP) evaluations during Operator Requalification Training.
- Coordinate and conduct EP Event reviews and reports.

- Maintain adequate documentation/files to support EP activities.
- Develop and manage the EP budget.
- Maintain the Emergency Response Facilities (ERF) Telephone Directory.

Drills and Exercises

- Coordinate and maintain the EP Drill and Exercise Schedule.
- Coordinate and conduct exercises and drills.
- Coordinate NRC, FEMA, state, and local exercise scheduling and development activities.
- Coordinate drill and exercise scenario development activities.
- Develop and publish drill and exercise scenario manuals.
- Coordinate and perform controller and evaluator functions for drills and exercises.
- Coordinate response cells for drills and exercises.
- Develop and issue drill and exercise reports.

Facilities and Equipment

- Provide maintenance and administration of the Alert and Notification System (ANS).
- Provide maintenance of the ERO call-out system.
- Ensure the Emergency Response Facilities are maintained in a constant state of readiness.
- Coordinate and review the EP equipment inventories.
- Coordinate and conduct maintenance and testing of the communications systems.
- Maintain the EP computer applications.

ERO Qualification and Administration

- Develop and maintain ERO Lesson Plans, Examinations, and Qualification Cards.
- Maintain EP NGET training content.

- Coordinate, schedule and conduct ERO qualification and requalification training.
- Oversee the maintenance of ERO training records.
- Maintain and coordinate publishing of the ERO Duty Rosters.
- Provide adequate oversight and support for the training of offsite response personnel.
- Coordinate conduct of Emergency Medical Assistance Program training.
- Coordinate annual training for the media.

The CRANE Plant Manager is responsible for implementation of the Emergency Plan at CRANE. The Plant Manager has the following responsibilities for maintenance of the Emergency Preparedness Program:

- Ensure the adequate staffing and training of station ERO members.
- Schedule and conduct drills and exercises to maintain the state of readiness of the Emergency Preparedness Program.
- Ensure the operational readiness of station facilities and communication systems for use during an emergency.
- Ensure the operational readiness of station emergency equipment and supplies is maintained.
- Ensure the emergency response procedures and the training and retraining of Station Emergency Response personnel are maintained.

4. Emergency Plan and Agreement Revisions

The Emergency Plan, its Annex, and supporting Agreements are reviewed on an annual basis. This review may also include applicable state and local emergency response agencies based on established agreements.

The annual Emergency Plan review/update includes required changes identified during audits, assessments, training, drills, and exercises. The Emergency Preparedness Director is responsible for determining which recommended changes are incorporated into a plan or emergency procedure revision. In those years when the review does not warrant a revision, a letter to that affect will be issued.

The Emergency Plan and its Annex shall be revised as needed and the most current approved revisions shall remain in effect so long as they are certified as current. Revisions to the Emergency Plan are reviewed by the Station's Plant Operational Review Committee (PORC) prior to approval. Changes to the plan are made without NRC approval only if such changes do not result in a reduction in effectiveness of the plan per 10 CFR 50.54(q), and the plan as changed continues to meet the standards of 10 CFR 50.47(b) and the requirements of 10 CFR 50, Appendix E. Proposed changes that reduce or have a potential to reduce the effectiveness of the approved plan are not implemented without prior approval by the NRC.

- Proposed revisions to the Emergency Plan and Station Annex shall be completed in accordance with the Constellation Nuclear review and approval processes.

- Emergency Plan and Station Annex changes shall be categorized as (1) minor/ administrative or (2) significant programmatic changes. Minor/administrative changes shall be implemented within 30 days of approval. Significant programmatic changes shall be implemented as soon as practical and within 60 days of final approval.

- After review and approval, the Emergency Plan and Station Annex shall be:

  a) Reviewed by the applicable Emergency Preparedness Manager(s) and EP Corporate Functional Area Manager, or designee(s), and

  b) Approved for use by the Vice President, Licensing and Regulated or designee.

- The Implementing Procedures shall be developed and revised concurrent with the Emergency Plan and Annex, and reviewed every two years.

Annually, each Letter of Agreement is reviewed and certified current in order to assure the availability of assistance from each supporting organization not already a party to the individual State Plan for Radiological Accidents.

5. Emergency Plan Distribution

Emergency Plan manuals, Station Annex, and implementing procedures are distributed on a controlled basis to the Emergency Response Facilities. All controlled documents holders are issued revision changes upon approval. Selected Federal, state, and local agencies, and other appropriate locations requiring them are also issued copies. Procedures are in place that control the revision of the Emergency Plan and require the use of revision bars and individual page identifications (i.e. section of plan, revision number, etc.).

6. Supporting Emergency Response Plans

Other plans that support this Emergency Plan are:

- MD 8.2, US Nuclear Regulatory Commission, "NRC Incident Response Program"

- National Response Framework (NRF), Nuclear/Radiological Incident Annex.

- Commonwealth of Pennsylvania Radiological Emergency Response Plan.
- Nuclear Station Security Plans - Note: The Station Security Plan contains industrial security information that must be withheld from public disclosure under provisions of 10 CFR 2.390(d).

7. Implementing and Supporting Procedures

Appendix 2 of this plan contains a listing, by number and title, of those procedures that implement this plan during an emergency. Additionally, administrative procedures that outline the steps taken to maintain the Constellation Emergency Preparedness Program have been developed and are listed in Appendix 2.

8. Cross Reference to Planning Criteria

The Plan is formatted in the same manner as 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." The use of this format lends itself to uncomplicated comparison of the criteria set forth in NUREG-0654, FEMA-REP-1.

9. Audit/Assessment of the Emergency Preparedness Program

To meet the requirements of 10 CFR 50.54(t), Constellation Nuclear Oversight shall coordinate an independent review the Emergency Preparedness Program to examine conformance with 10 CFR 50.47, 10 CFR 50.54, and 10 CFR 50 Appendix E. Included in the audit/assessment are the following:

- The Emergency Plan and associated implementing procedures.
- The Emergency Preparedness Training Program including drills and exercises.
- The readiness of the station Emergency Response Organization to perform its function.
- The readiness of facilities and equipment to perform as outlined in the plan and procedures.
- The interfaces between Constellation, the state, and county governmental agencies pertaining to the overall Emergency Preparedness Program.

Results of this audit are submitted for review to Corporate Management and the Station Vice President. The Emergency Preparedness Manager ensures that any findings that deal with offsite interfaces are reviewed with the appropriate agencies. Written notification will be provided to the state and counties of the performance of the audit and the availability of the audit records for review at Constellation facilities. Records of the audit are maintained for at least five years.

10. Maintenance of Emergency Organization Telephone Directory

Names and phone numbers of the Emergency Response Organization and support personnel shall be reviewed and updated at least quarterly.

Appendix 1: References

References consulted in the writing of this Emergency Plan are listed in this section. With exception of regulatory requirements, inclusion of material on this list does not imply adherence to all criteria or guidance stated in each individual reference.

1. 10 CFR 50.47, Emergency Plans

2. 10 CFR 50.72, Immediate Notification Requirements for Operating Nuclear Power Reactors

3. 10 CFR 50 Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants

4. 10 CFR 50 Appendix E, Emergency Planning and Preparedness for Production and Utilization Facilities

5. 10 CFR 20, Standards for Protection Against Radiation

6. 10 CFR 70, 73, and 100.

7. 33 CFR 153.

8. 40 CFR 110, 112, 116, 118, 265, 302, and 355.

9. 44 CFR 350.

10. 44 CFR 401.

11. 49 CFR 171 and 172.

12. NUREG-0654, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," Revision 1, November 1980 and Revision 2, December 2019.

13. NUREG-0654, Supplement 1, "Criteria for Utility Offsite Planning and Preparedness."

14. NUREG-0654, Supplement 3, "Criteria for Protective Action Recommendations for Severe Accidents."

15. NUREG-0396, "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants," Dec. 1978.

16. NUREG-0578, "TMI-2 Lessons Learned Task Force Status Report and Short-Term Recommendations."

17. NUREG-0696, Functional Criteria for Emergency Response Facilities

18. NUREG-0737, Clarification of TMI Action Plan Requirements, dated October 1980.

19. NUREG-0737, Supplement 1, Requirements for Emergency Response Capability, December 1982.

20. NUREG-0728, "Report to Congress: NRC Incident Response Plan."

21. US NRC Regulatory Guide 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors," revision 4, July, 2003.

22. U.S. NRC Response Technical Manual (RTM-96)

23. NEI 99-01, Methodology for Development of Emergency Action Levels.

24. EPA 400-R-92-001, May 1992, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents."

25. FEMA-REP-10, Guide for Evaluation of Alert and Notification Systems for Nuclear Power Plants

26. FEMA Radiological Emergency Preparedness Program Manual, December 2023

27. FEMA-Guidance Memorandum, MS-1 "Medical Services"

28. Constellation Nuclear Quality Assurance Topical Report (QATR), NO-AA-10

29. INPO Emergency Resources Manual

30. "Maintaining Emergency Preparedness Manual," dated December, 1996 INPO 96-009.

31. "Federal Bureau of Investigation and Nuclear Regulatory Commission Memorandum of Understanding for Cooperation Regarding Threat, Theft, or Sabotage in U.S. Nuclear Industry," Federal Register, Vol. 44, p. 75535, December 20, 1979.

32. "Voluntary Assistance Agreement By and Among Electric Utilities involved in Transportation of Nuclear Materials," dated November 1, 1980.

33. Comprehensive Environmental Response, Compensation and Liability Act of 1980.

34. Accidental Radioactive Contamination of Human Food and Animal Feeds; Recommendation for State and Local Agencies, Volume 47, No. 205, October 22, 1982.

35. American Nuclear Insurers Bulletin #5B (1981), "Accident Notification Procedures for Liability Insureds".

36. "Potassium Iodide as a Thyroid Blocking Agent in a Radiation Emergency: Final Recommendations on Use," Federal Register Vol. 47, No. 125, June 29, 1982.

37. Letter from William J. Dircks, Executive Director for Operations, NRC, to Dr. Donald F. Knuth, President KMC, Inc. dated October 26, 1981.

38. INPO Coordination agreement on emergency information among USCEA, EPRI, INPO, NUMARC and their member utilities, dated April (1988).

39. Babcock and Wilcox Company, Post Accident Sample Offsite Analysis Program (1982).

40. ANI/MAELU Engineering Inspection Criteria For Nuclear Liability Insurance, Section 6.0, Rev. 1, "Emergency Planning."

41. NRC RIS 2006-12, Endorsement of Nuclear Energy Institute Guidance "Enhancement to Emergency Preparedness Programs for Hostile Action."

42. NRC Bulletin 2005-02, "Emergency Preparedness and Response Actions for Security-Based Events."

43. NRC Information Notice 2009-01, National Response Framework

44. American Nuclear Insurers Bulletin #11-01 (Rev. 2) (2024), "Emergency Notification Procedures for ANI Policyholders"

Appendix 2: Procedure Cross-Reference to NUREG-0654

Criteria	Planning Standard	Procedure/Document
NUREG-0654.II.A	Assignment of Responsibility (Organization Control)	EP-AA-120, Emergency Plan Administration
		Letters of Agreement
NUREG-0654.II.B	Onsite Emergency Organization	EP-AA-112, Emergency Response Organization (ERO) / Emergency Response Facility (ERF) Activation and Operation
NUREG-0654.II.C	Emergency Response Support and Resources	EP-AA-112-400, Emergency Operations Facility Activation and Operations
NUREG-0654.II.D	Emergency Classification System	EP-AA-111, Emergency Classification and Protective Action Recommendations
NUREG-0654.II.E	Notification Methods and Procedures	EP-AA-114, Notifications EP-MA-121-1002, Alert and Notification System (ANS) Program
NUREG-0654.II.F	Emergency Communications	EP-AA-114, Notifications
		EP-AA-124, Inventories and Surveillances
NUREG-0654.II.G	Public Education and Information	EP-AA-120, Emergency Plan Administration
NUREG-0654.II.H	Emergency Facilities and Equipment	EP-AA-112, Emergency Response Organization (ERO) / Emergency Response Facility (ERF) Activation and Operation
		EP-AA-121, Emergency Response Facilities and Equipment Readiness
		EP-AA-120-1006, EP Reportability – Loss of Emergency Preparedness Capabilities
		EP-AA-123, Computer Programs
		EP-AA-124, Inventories and Surveillances
		EP-AA-125-1004, Emergency Response Facilities & Equipment Performance Indicators Guidance
NUREG-0654.II.I	Accident Assessment	EP-AA-110, Assessment of Emergencies
		EP-AA-123, Computer Programs
NUREG-0654.II.J	Protective Response	EP-AA-113, Personnel Protective Actions
		EP-AA-123, Computer Programs
NUREG-0654.II.K	Radiological Exposure Control	EP-AA-110, Assessment of Emergencies
		EP-AA-113, Personnel Protective Actions
NUREG-0654.II.L	Medical and Public Health Support	EP-AA-120, Emergency Plan Administration
UREG-0654.II.M	Recovery and Reentry Planning and Post-Accident Operations	EP-AA-115, Termination and Recovery
		EP-AA-120-1002, Offsite Readiness Evaluation
NUREG-0654.II.N	Exercises and Drills	EP-AA-122, Drills & Exercises Program

Criteria	Planning Standard	Procedure/Document
		EP-AA-125-1001, EP Performance Indicator Guidance
		EP-AA-125-1002, ERO Performance – Performance Indicators Guidance
		EP-AA-125-1003, ERO Readiness - Performance Indicators Guidance
NUREG-0654.II.O	Radiological Emergency Response Training	TQ-AA-113, ERO Training And Qualification
NUREG-0654.II.P	Responsibility for the Planning Effort: Development, Periodic Review and Distribution of Emergency Plans	EP-AA-1, Emergency Preparedness
		EP-AA-10, Emergency Preparedness Program Description
		EP-AA-11, Operating Stations Emergency Preparedness Process Description
		EP-AA-1101, EP Fundamentals
		EP-AA-1102, ERO Fundamentals
		EP-AA-120, Emergency Plan Administration
		EP-AA-125, Emergency Preparedness Self Evaluation Process
		Emergency Response Facilities Telephone Directory

Appendix 3: List of Corporate Letters of Agreements

Organization/Agreement Type

Department Of Energy (DOE) Radiation Emergency
Assistance Center/Training Site, REAC/TS (Letter on File)
Medical Consultant

Environmental, Inc. (P.O.)
Radiological Environmental Monitoring

Landauer, Inc. (P.O.)
Emergency Dosimetry

INPO (Letter on File)
Emergency Event Support

Murray & Trettel, Inc. (P.O.)
Meteorological Support

Teledyne Brown Engineering (P.O.)
Bioassay Analysis/Radiochemical Analysis

Red Alert Service (P.O.)
Fire Foam Supply

Appendix 4: Glossary of Terms and Acronyms

Accident Assessment	Accident assessment consists of a variety of actions taken to determine the nature, effects and severity of an accident and includes evaluation of reactor operator status reports, damage assessment reports, meteorological observations, seismic observations, fire reports, radiological dose projections, in plant radiological monitoring, and environmental monitoring.
Activation	(1) "ERO Activation" is the process of initiating actions to notify and mobilize Emergency Response Organization (ERO) personnel following an event classification under the emergency plan. (2) "Facility Activation" refers to the decision to consider a facility fully operational based on the minimum staffing required in ERO staffing tables contained within the station specific Annex and the ability of facility staffing and equipment to perform its designed function(s).
Annual	Frequency of occurrence equal to once per calendar year, January 1 to December 31.
Assembly/Accountability	A procedural or discretionary protective action taken for all persons within the security "Protected Area", which involves the gathering of personnel into pre-designated areas, and the subsequent verification that the location of these personnel is known.
Assessment Actions	Those actions taken during or after an emergency to obtain and process information that is necessary to make decisions to implement specific emergency measures.
Biennial	Frequency of occurrence equal to once per two calendar year periods.
Biennial Exercise	An event that tests the integrated capability and a major portion of the basic elements existing within an emergency plan. An exercise usually involves participation of personnel from state and local governments, utility personnel, and may involve participation of Federal government personnel.

Classification	The classification of emergencies is divided into FIVE (5) categories or conditions, covering the postulated spectrum of emergency situations. The first four (4) emergency classifications are characterized by Emergency Action Levels (EALs) or event initiating conditions and address emergencies of increasing severity. The fifth, the Recovery classification, is unique in that it may be viewed as a phase of the emergency, requiring specific criteria to be met and/or considered prior to its declaration.
Command and Control	When in Command and Control, the designated Emergency Director (Shift, Station or Corporate) has overall responsibility for Constellation Nuclear's emergency response efforts, including the nondelegable responsibilities of Command and Control.
Committed Dose Equivalent (CDE)	The Dose Equivalent to organs or tissues of reference that will be received from an intake of radioactive material by an individual during the 50-year period following the intake.
Corrective Action	Those emergency measures taken to lessen or terminate an emergency situation at or near the source of the problem, to prevent an uncontrolled release of radioactive material, or to reduce the magnitude of a release. Corrective actions include, equipment repair or shutdown, installation of emergency structures, firefighting, repair, and damage control.
Damage Assessment	Estimates and descriptions of the nature and extent of damages resulting from an emergency or disaster; of actions that can be taken to prevent or mitigate further damage; and of assistance required in response and recovery efforts based on actual observations by qualified engineers and inspectors.
Damage Control	The process of preventing further damage from occurring and preventing the increase in severity of the accident.
Decontamination	The reduction or removal of contaminated radioactive material from a structure, area, material, object, or person. Decontamination may be accomplished by (1) treating the surface so as to remove or decrease the contamination; (2) letting the material stand so that the radioactivity is decreased as a result of natural decay; and (3) covering the contamination.

Dedicated Communications	A communications link between two or more locations, access to which is limited to designated locations, and used only for the purpose intended. The communications link may be either telephone or radio.
Deep Dose Equivalent (DDE)	The dose equivalent at a tissue depth of 1 cm (1000 mg/cm^2); applies to external whole body exposure.
Dose	A generic term that means absorbed dose, dose equivalent, effective dose equivalent, deep dose equivalent, committed dose equivalent, committed effective dose equivalent, or total effective dose equivalent.
Dose Equivalent (DE)	The product of the absorbed dose in tissue, quality factor, and all other necessary modifying factors at the location of interest. The unit of dose equivalent is the Rem.
Dose Projection	The calculated estimate of a radiation dose to individuals at a given location (normally off-site), determined from the source term/quantity of radioactive material (Q) released, and the appropriate meteorological dispersion parameters (X/Q).
Dose Rate	The amount of ionizing (or nuclear) radiation to which an individual would be exposed per unit of time. As it would apply to dose rate to a person, it is usually expressed as rems per hour or in submultiples of this unit, such as millirems per hour. The dose rate is commonly used to indicate the level of radioactivity in a contaminated area.
Dosimeter	An instrument such as a Dosimeter of Legal Record (DLR), self-reading pocket dosimeter (SRPD), or electronic dosimeter (ED) for measuring, registering, or evaluating total accumulated dose or exposure to ionizing radiation.
Dosimeter of Legal Record (DLR)	Specific station type dosimeters used for monitoring personnel and the environment.
Drill	A supervised instruction period aimed at testing, developing and maintaining skills in a particular operation.
Early Phase	The period at the beginning of a nuclear incident when immediate decisions for effective use of protective actions are required and must be based primarily on predictions of radiological conditions in the environment. This phase may last from hours to days. For the purposes of dose projections it is assumed to last four days.

Emergency Action Levels (EALs)	A pre-determined, site-specific, observable threshold for a plant Initiating Condition that places the plant in a given emergency class. An EAL can be an instrument reading; an equipment status indicator; a measurable parameter (onsite or offsite); a discrete, observable event; or another phenomenon which, if it occurs, indicates entry into a particular emergency class.
Emergency Alert System (EAS)	A network of broadcast stations and interconnecting facilities which have been authorized by the Federal Communications Commission to operate in a controlled manner during a war, state of public peril or disaster, or other national or local emergency. In the event of a nuclear reactor accident, instructions/notifications to the public on conditions or protective actions would be broadcast by state or local government authorities on the EAS.
Emergency Director	Individual in Command and Control. One of the following: the Shift Emergency Director (Control Room), Station Emergency Director (TSC) or the Corporate Emergency Director (EOF).
Emergency Notification System (ENS)	The NRC Emergency Notification System hot line is a dedicated telephone system that connects the plant with NRC headquarters in White Flint, Maryland. It is directly used for reporting emergency conditions to NRC personnel.
Emergency Operations Facility (EOF)	Designated location from which the Licensee Emergency Response Organization conducts the company's overall emergency response in coordination with Federal, State and designated emergency response organizations.
Emergency Operating Procedures (EOPs)	EOPs are step-by-step procedures for direct actions taken by qualified operators to mitigate and/or correct an off normal plant condition through the control of plant systems.
Emergency Operations Center (EOC)	A facility designed and equipped for effective coordination and control of emergency operations carried out within an organization's jurisdiction. The site from which civil government officials (municipal, county, state, and Federal) exercise direction and control in a civil defense emergency.
Emergency Personnel	Those organizational groups that perform a functional role during an emergency condition. Within Constellation Nuclear, emergency personnel include the Managers and Directors of the Emergency Response Organization, accident assessment personnel, radiological monitoring teams, fire brigades, first aid teams and security personnel.

Emergency Planning Zones (EPZ)	That area surrounding a nuclear station in which emergency planning is conducted for the protection of the public. With respect to protecting the public from the plume exposure resulting from an incident, the EPZ is usually an area with a radius of about 10 miles surrounding the facility. With respect to the ingestion exposure pathway, the EPZ is usually an area with a radius of about 50 miles.
Emergency Preparedness	A state of readiness that provides reasonable assurance that adequate protective measures can and will be taken upon implementation of the Emergency Plan in the event of a radiological emergency.
Emergency Response Data System (ERDS)	ERDS is a continuous direct near real-time electronic data link between the licensee's onsite computer system and the NRC Operations Center that provides for the automated transmission of a limited data set of selected parameters.
Environmental Monitoring	The use of radiological instruments or sample collecting devices to measure and assess background radiation levels and/or the extent and magnitude of radiological contamination in the environment around the plant. This may be done in various stages such as pre-operational, operational, emergency, and post operational.
Essential Personnel	Essential personnel are those needed to achieve the goals and tasks as deemed necessary by the Station Emergency Director.
Evacuation	The urgent removal of people from an area to avoid or reduce high level, short-term exposure usually from the plume or from deposited activity.
Exclusion Area	An Exclusion Area is an area specified for the purpose of reactor site evaluation in accordance with 10 CFR 100. It is an area of such size that an individual located at any point on its boundary for two hours immediately following onset of the postulated release would not receive a total radiation dose to the whole body in excess of 25 rem or a total radiation dose of 300 rem to the thyroid from iodine exposure.
Exercise	An event that tests the integrated capability of a major portion of the basic elements existing within emergency preparedness plans and organizations.
Exercise Cycle	An eight-year period.

Fission Product Barrier	The fuel cladding, reactor coolant system boundary, or the containment boundary.
Hazardous Material	A substance or material which has been determined by the United States Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated in 49 CFR 172.
Health Physics Network (HPN) Line	In the event of a Site Area Emergency, the NRC HPN line will be activated by the NRC Operations center in White Flint, Maryland. This phone is part of a network that includes the NRC Regional Office and the NRC Operations Headquarters in White Flint, Maryland. This system is dedicated to the transmittal of radiological information by plant personnel to NRC Operations Center and the Regional office. HPN phones are located in the TSC and EOF.
High Radiation Sampling System	Post-accident sampling capability to obtain and perform radioisotopic and chemical analyses of reactor coolant and containment atmosphere samples.
Imminent	Mitigation actions have been ineffective and trended information indicates that the event or condition will occur within 2 hours.
Ingestion Exposure Pathway	The potential pathway of radioactive materials to the public through consumption of radiologically contaminated water and foods such as milk or fresh vegetables. Around a nuclear power plant this is usually described in connection with the 50-mile radius Emergency Planning Zone (50 mile EPZ).
Initiating Condition	A predetermined UNIT condition where either the potential exists for a radiological emergency or such an emergency has occurred.
Integrated Drill	A drill conducted in the year that a Biennial Exercise is not scheduled including at least two Emergency Response Facilities in order to demonstrate at least two of the functions of management and control of emergency response, accident assessment, protective action decision-making, or plant system repair and corrective action.
Intermediate Phase	The period beginning after the source and releases have been brought under control and reliable environmental measurements are available for use as a basis for decisions on additional protective actions.

Joint Information Center	A Corporate Emergency Facility activated by Constellation and staffed by Constellation, state, and Federal Public Information personnel. This facility serves as the single point of contact for the media and public to obtain information about an emergency.
Late Phase	The period beginning when recovery action designed to reduce radiation levels in the environment to acceptable levels for unrestricted use are commenced and ending when all recovery actions have been completed. This period may extend from months to years (also referred to as the recovery phase).
Local Evacuation	The evacuation of personnel from a particular area, such as a room or building.
Low Population Zone (LPZ)	As defined in 10 CFR 100.3, the area immediately surrounding the exclusion area which contains residents, the total number and density of which are such that there is a reasonable probability that appropriate protective measures could be taken in their behalf in the event of a serious accident.
Main Control Room	The operations center of a nuclear power plant from which the plant can be monitored and controlled.
Monthly	Frequency of occurrence equal to once per calendar month.
Non-Essential Site Personnel	Those personnel not needed for the continuing existence or functioning of the ERO. They are personnel not required to fill certain positions in the ERO. Identification of non-essential personnel is circumstance-oriented as determined by the Station Emergency Director.
Notification, Public	Public notification means to communicate instructions on the nature of an incident that prompted the public alerting/warning and on protective or precautionary actions that should be taken by the recipients of the alert. A state and local government process for providing information promptly to the public over radio and TV at the time of activating the alerting (warning) signal (ANS). Initial notifications of the public might include instructions to stay inside, close windows, and doors, and listen to radio and TV for further instructions. Commercial broadcast messages are the primary means for advising the general public of the conditions of any nuclear accident. (See Emergency Alert System.)

Off-Site	The area around a nuclear generating station that lies outside the station's "site boundary".
Offsite Dose Calculation Manual (ODCM)	The ODCM presents a discussion of the following: 1. The ways in which nuclear power stations can affect their environment radiologically 2. The regulations which limit radiological effluents from the nuclear power stations; and 3. The methodology used by the nuclear power stations to assess radiological impact on the environment and compliance with regulations.
On-Site	The area around a nuclear generating station that lies within the station's "site boundary".
Owner Controlled Area	Company owned property on which a Nuclear Station is located and may include Constellation Nuclear leased lands adjacent to that Nuclear Station.
Operations Support Center (OSC)	An emergency response facility at the Plant to which support personnel report and stand by for deployment in an emergency situation.
Personnel Monitoring	The determination of the degree of radioactive contamination on individuals, using standard survey meters, and/or the determination of dosage received by means of dosimetry devices.
Plume Exposure Pathway	The potential pathway of radioactive materials to the public through: (a) whole body external exposure from the plume and from deposited materials, and (b) inhalation of radioactive materials.
Population-at-Risk	Those persons for whom protective actions are being or would be taken. In the 10-mile EPZ the population-at-risk consists of resident population, transient population, special facility population, and industrial population.
Potassium Iodide	(Symbol KI) A chemical compound that readily enters the thyroid gland when ingested. If taken in a sufficient quantity prior to exposure to radioactive iodine, it can prevent the thyroid from absorbing any of the potentially harmful radioactive iodine-131.

Potential	Mitigation actions are not effective and trended information indicates that the parameters are outside desirable bands and not stable or improving.
Projected Dose	That calculated dose that some individuals in the population group may receive if no protective actions are implemented. Projected doses are calculated to establish an upper limit boundary.
Protected Area	That onsite area within the security boundary as defined in each station's Security Plan.
Protection Factor (PF)	The relation between the amount of radiation that would be received by a completely unprotected person compared to the amount that would be received by a protected person such as a person in a shielded area. PF = Shielded dose rate / Unshielded dose rate.
Protective Action	Those emergency measures taken for the purpose of preventing or minimizing radiological exposures to affected population groups.
Protective Action Guide (PAG)	Projected radiological dose values to individuals in the general population that warrant protective action. Protective Action Guides are criteria used to determine if the general population needs protective action regarding projected radiological doses, or from actual committed (measured) dose values.
Protective Action Recommendations (PARs)	Recommended actions to the States for the protection of the offsite public from whole body external gamma radiation, and inhalation and ingestion of radioactive materials. Access control and other recommendations concerning the safeguards of affected food chain processes may be issued by the States as PARs.
Public Alerting/Warning	The Alert and Notification System (ANS) for Crane relies on the Integrated Public Alert Warning System (IPAWS)-WEA (Wireless Emergency Alerts) and IPAWS-EAS (Emergency Alert System) as the primary means of alerting and notifying the public, respectively, and an independent electronic Mass Notification System (MNS) as the backup means.

Puff Release	A controlled containment vent that will be terminated prior to exceeding 60 minutes in duration and is less than the limit as defined in the Station Annex.
Quarterly	Frequency of occurrence equal to once in each of the following four periods: January 1 through March 31; April 1 through June 30; July 1 through September 30; October 1 through December 31.
Recovery	The process of reducing radiation exposure rates and concentrations of radioactive material in the environment to levels acceptable for unconditional occupancy or use.
Release	A '*Release in Progress*' is defined as ANY radioactive release that is a result of, or caused by, the emergency event.
Restricted Area	Any area, access to which is controlled by Constellation for purposes of protection of individuals from exposure to radiation and radioactive materials.
Restricted Area Boundary	For classification and dose projection purposes, the boundary is a 400-meter (1/4-mile) radius around the plant. The actual boundary is specified in the ODCM.
Safety Analysis Report, Updated Final (UFSAR)	The UFSAR is a comprehensive report that a utility is required to submit to the NRC as a prerequisite and as part of the application for an operating license for a nuclear power plant. The multi-volume report contains detailed information on the plant's design and operation, with emphasis on safety-related matters.
Semi-Annual	Frequency of occurrence equal to once in each of the following periods: January 1 through June 30; July 1 through December 31.
Shall, Should, and May	The word "shall" is used to denote a requirement, the word "should" to denote a recommendation and the word "may" to denote permission, neither a requirement nor a recommendation.
Shielding	Any material or barrier that attenuates (stops or reduces the intensity of) radiation.
Site Boundary	The Site Boundary is described in detail in the ODCM.
Site Evacuation	The evacuation of non-essential personnel from the plant site.

Source Term	Radioisotope inventory or amount of radioisotope released to the environment, often as a function of time.
Technical Support Center (TSC)	A center outside of the Control Room in which information is supplied on the status of the plant to those individuals who are knowledgeable or responsible for engineering and management support of site operations in the event of an emergency, and to those persons who are responsible for management of the on-site emergency response.
Threshold Value	Measurable, observable detailed conditions which must be satisfied to determine an EAL applicability.
Thyroid Blocking Agent	An agent which when properly administered to an individual will result in sufficient accumulation of stable iodine in the thyroid to prevent significant uptake of radioiodine. Potassium Iodide is such an agent.
Total Effective Dose Equivalent (TEDE)	The sum of the deep dose equivalent (for external exposure) and the committed effective dose equivalent (for internal exposure) and 4 days of deposition exposure.
Unrestricted Area	Any area to which access is not controlled by the licensee for protecting individuals from exposure to radiation and radioactive materials, and any area used for residential quarters.
Vital Areas	Areas within the station security fence which contain vital equipment. Examples include Control Rooms, Reactor Buildings, Turbine Buildings and Electrical Equipment Rooms.
Vital Equipment	Any equipment, system, device or material, the failure, destruction, or release of which could directly or indirectly endanger the public health and safety by exposure to radiation. Equipment or systems which would be required to function to protect public health and safety following such failure, destruction, or release are also considered to be vital.
Weekly	Frequency occurrence equal to once per calendar week: Monday through Sunday.

Any abbreviation followed by a lower case 's' denotes the plural form of the term.

ACRONYMS

ac ..... alternating current

ALARA ..... as low as reasonably achievable

ANI ..... American Nuclear Insurers

ANS ..... Alert and Notification System

ANSI ..... American National Standards Institute

ARM ..... Area Radiation Monitor

ASLB ..... Atomic Safety Licensing Board

CB ..... citizen band

cc ..... cubic centimeter

CDE ..... Committed Dose Equivalent

CEOC ..... County Emergency Operation Center

CFR ..... Code of Federal Regulations

CHRMS ..... Containment High Range Monitoring System

CHRRMS ..... Containment High Range Radiation Monitoring System

cm2 ..... square centimeter

CNO ..... Chief Nuclear Officer

cpm ..... count per minute

CR ..... Control Room

CRO ..... Control Room Operator

CRT ..... Cathode Ray Tube

Cs ..... Cesium

dc ..... direct current

DEP ..... Drill and Exercise Performance

DEQ ..... Department of Environmental Quality

DER/BRP ..... Dept of Environmental Resources, Bureau of Radiation Protection (PA)

DFO..... Disaster Field Office

DGI..... Digital Graphics Incorporated

DHFS ..... Department of Health and Family Services

DLR .....Dosimeter of Legal Record

DOE ..... U. S. Department of Energy

DOT.....U. S. Department of Transportation

DPH.....Department of Public Health

dpm ..... disintegration per minute

EAL .....Emergency Action Level

EAS ..... Emergency Alerting System

EMA ..... Emergency Management Agency

ENC.....Emergency News Center

ENS..... Emergency Notification System (NRC)

EOC .....Emergency Operations (or Operating) Center

EOF.....Emergency Operations Facility

EOP..... Emergency Operating Procedure

EPA..... U. S. Environmental Protection Agency

EPDS .....Emergency Preparedness Data System

EPZ ..... Emergency Planning Zone

ERF ..... Emergency Response Facility

ESF .....Engineered Safety Feature

FEMA ..... Federal Emergency Management Agency

FRMAC .....Federal Radiological Monitoring and Assessment Center

FRMAP..... Federal Radiological Monitoring and Assessment Plan

FRPCC.....Federal Radiological Preparedness Coordinating Committee

FSAR..... Final Safety Analysis Report

Ge .....Germanium

GET.....General Employee Training

GM ..... Geiger Mueller (radiation detection tube)

HEPA ..... high efficiency particulate air

HPN..... Health Physics Network (NRC)

hr ..... hour

I ..... Iodine

INPO .....Institute of Nuclear Power Operations

JIC..... Joint Information Center

LGEOC.....Local Government Emergency Operations Center

Li .....Lithium

LOCA .....Loss of Coolant Accident

LPZ.....Low Population Zone

MAELU..... Mutual Atomic Energy Liability Underwriters

MCP .....Municipal Command Post

mR..... milliroentgen

NARS .....Nuclear Accident Reporting System

NCRP ..... National Council on Radiation Protection

NOP ..... Nuclear Organization Procedure

NRC ..... U. S. Nuclear Regulatory Commission

NRF..... National Response Framework

NRR ..... Nuclear Reactor Regulation (NRC)

NWS.....National Weather Service

NSRAC.....Nuclear Safety Review and Audit Committee

OSC .....Operations Support Center

PAG.....Protective Action Guide

PANS ..... Prompt Alert and Notification System

PAR ..... Protective Action Recommendation

PASS ..... Post Accident Sampling System

PEMA ..... Pennsylvania Emergency Management Agency

QATR ..... Quality Assurance Topical Report

R ..... roentgen

RAA ..... Remote Assembly Area (off-site)

RAC ..... Regional Advisory Committee (FEMA)

REP ..... Radiological Emergency Preparedness

RERP ..... Radiological Emergency Response Plan

RMS ..... Radiation Monitoring System

SCBA ..... Self Contained Breathing Apparatus

SEOC ..... State Emergency Operations Center

SFCP ..... State Forward Command Post

SGTS ..... Standby Gas Treatment System

SPCC ..... Spill Prevention Control and Countermeasure

SPDS ..... Safety Parameter Display System

Sr ..... Strontium

SRC ..... State Radiological Coordinator

SSC ..... State Staging Center

STA ..... Shift Technical Advisor

TDD ..... Telecommunications Device for the Deaf

TEDE ..... Total Effective Dose Equivalent

TSC ..... Technical Support Center

µCi ..... microcurie

UFSAR ..... Updated Final Safety Analysis Report

Appendix 5

Table 5-1: Emergency Response Organization (ERO) Staffing and Augmentation Plan

Emergency Preparedness (EP) Functions	On-Shift	TSC / OSC		EOF - Alert or Greater
		Alert or Greater Augment w/in 60 min.	Alert or Greater Augment w/in 90 min.	Augment w/in 60 min.
Command and Control • Provide overall ERO command and control, until relieved. • Approve emergency action level (EAL) and/ or protective action recommendation (PAR) classifications, until relieved. • Authorize personnel dose extensions, until relieved.	(1) Shift Emergency Director	(1) Station Emergency Director	Not applicable	(1) Corporate Emergency Director
Communications[3] • Communicate EAL and PAR classifications to offsite response organizations (OROs), including the NRC, until relieved.	Shift Communicator[1]	(1) ENS Communicator (TSC)	Not applicable	(1) State / Local Communicator
Radiation Protection[4] • Provide qualified radiation protection coverage for responders accessing potentially unknown radiological environments during emergency conditions. • Provide in-plant surveys. • Control dosimetry and radiologically controlled area access.	(2) Shift Radiation Protection Technician	(3) Additional Radiation Protection Personnel *[In addition to personnel on-shift]* (OSC)	(3) Additional Radiation Protection Personnel *[In addition to personnel on-shift and those responding within 60 min.]* (OSC)	Not applicable

Emergency Preparedness (EP) Functions	On-Shift	TSC / OSC		EOF - Alert or Greater
		Alert or Greater Augment w/in 60 min.	Alert or Greater Augment w/in 90 min.	Augment w/in 60 min.
Supervision of Radiation Protection Staff and Site Radiation Protection • Evaluate and assess plant and offsite radiological data in the development of onsite protective actions and offsite PARs, until relieved. • Recommend onsite protective actions and offsite PARs to the applicable decision- maker, until relieved. • Direct all radiation protection activities, including field monitoring team (FMT) direction, until relieved. • Provide relevant information to applicable communicators who are communicating offsite PARs to OROs, until relieved.	(1) Shift Emergency Director	(1) TSC Radiation Protection Manager (RPM) (TSC)	Not applicable	(1) EOF Radiation Protection Manager (EOF)
Dose Assessments/ Projections • Perform dose assessments/projections and provide input to applicable PAR decision- maker, until relieved.	(1) Shift Dose Assessor [1],	Not applicable	Not applicable	(1) Dose Assessment Coordinator (EOF)

Emergency Preparedness (EP) Functions	On-Shift	TSC / OSC		EOF - Alert or Greater
		Alert or Greater Augment w/in 60 min.	Alert or Greater Augment w/in 90 min.	Augment w/in 60 min.
Emergency Classifications • Evaluate plant conditions and recommend emergency classifications, until relieved.	Emergency Classification Advisor[1]	(1) Operations Manager (TSC)	Not applicable	Not applicable
Engineering • Provide engineering coverage related to the specific discipline of the assigned engineer, until relieved.	(1) **Core/ Thermal Hydraulics Engineer - STA**[1] • Evaluate reactor conditions.	**TSC Engineering Staff** • (1) Electrical/ Instrumentation and Control (I&C): Provide engineering coverage for the ERO related to electrical or I&C equipment. • (1) Mechanical: Provide engineering coverage for the ERO related to mechanical equipment. • (1) Core/Thermal Hydraulics: Evaluate reactor conditions.	As needed	Not applicable
Security	Security staffing per the site-specific security plan.	(1) **Security Coordinator (TSC)** • Coordinate security- related activities and information with the Emergency Coordinator.	Not applicable	Not applicable

Emergency Preparedness (EP) Functions	On-Shift	TSC / OSC		EOF - Alert or Greater
		Alert or Greater Augment w/in 60 min.	Alert or Greater Augment w/in 90 min.	Augment w/in 60 min.
Repair Team Activities	Not applicable	**Maintenance Personnel (OSC)** • (1) Electrical Maintenance Technician: Provide electrical support for ECCS equipment, event mitigation, and equipment repair. • (1) Mechanical Maintenance Technician: Provide mechanical support for ECCS equipment, event mitigation, and equipment repair.	**Maintenance Personnel (OSC)** • (1) I&C Technician: Provide assistance with logic manipulation, support for event mitigation and equipment repair, and support of digital I&C if applicable. Additional I&C staff may be called out if needed. • Electrical Maintenance Technicians – As needed. • Mechanical Maintenance Technicians – As needed.	Not applicable

Emergency Preparedness (EP) Functions	On-Shift	TSC / OSC		EOF - Alert or Greater
		Alert or Greater Augment w/in 60 min.	Alert or Greater Augment w/in 90 min.	Augment w/in 60 min.
Supervision of Repair Team Activities	Not applicable	(1) **OSC Director/Repair Team Lead** • Supervise OSC activities as directed by Emergency Coordinator.	**OSC Supervisors** • (1) Electrical Maintenance Supervisor /Lead: Supervise OSC activities related to electrical equipment. • (1) Mechanical Maintenance Supervisor / Lead: Supervise OSC activities related to mechanical equipment. • (1) I&C Supervisor / Lead: Supervise OSC activities related to I&C equipment. May be combined with Electrical Supervisor. • (1) Radiation Protection Supervisor / Lead: Supervise OSC activities related to radiation protection.	Not applicable

Emergency Preparedness (EP) Functions	On-Shift	TSC / OSC		EOF - Alert or Greater
		Alert or Greater Augment w/in 60 min.	Alert or Greater Augment w/in 90 min.	Augment w/in 60 min.
Field Monitoring Teams (FMTs)	Not applicable	**Onsite FM Individual** • (1) Qualified individual to assess the protected area for radiation and contamination and provide input to the TSC RPM. Responsible for radiation protection coverage for the FMT as directed by TSC RPM or EOF RPM. . **Offsite FMT A** • (1) Qualified individual to assess the area(s) outside the protected area for radiation and contamination, and for radioactive plume tracking, as directed by, and under the control of, the EOF DAC or RPM. Responsible for the radiation protection coverage of the FMT as directed by EOF RPM. • (1) Driver to provide transportation.	**Offsite FMT B** • (1) Qualified individual to assess the area(s) outside the protected area for radiation and contamination, and for radioactive plume tracking, as directed by, and under the control of, the EOF DAC or RPM. Responsible for the radiation protection coverage of the FMT as directed by EOF RPM. • (1) Driver to provide transportation.	Not applicable

Emergency Preparedness (EP) Functions	On-Shift	TSC / OSC		EOF/JIC - Alert or Greater[2]
		Alert or Greater Augment w/in 60 min.	Alert or Greater Augment w/in 90 min.	Augment w/in 90 min.
Media Information • Manage and coordinate media information related to the event.	Not applicable	Not applicable	Not applicable	(1) Corporate Spokesperson (1) JIC Director (1) Public Information Director

Emergency Preparedness (EP) Functions	On-Shift	TSC / OSC		EOF/JIC - Alert or Greater[2] Augment w/in 90 Min
		Alert or Greater Augment w/in 60 min.	Alert or Greater Augment w/in 90 min.	
JIC/EOF Information Technology (IT)	Not applicable	Not applicable	Not applicable	(1) EOF/JIC Computer Specialist (@ 90 min from Alert or higher)[1]

Notes:

1. Other personnel may be assigned this function if no collateral duties are assigned to an individual that are beyond the capability of that individual to perform at any given time. For the Shift Dose Assessor, it is performed by one of the two Radiation Protection Technicians assigned to the shift.
2. Constellation's Communication Department will perform necessary JIC functions at the Unusual Event declaration and initially upon a higher initial EAL declaration. The JIC facility will be activated within 90 minutes of an Alert declaration; however, some functions may continue to be performed by the Constellation Communications Department. Some JIC functions such as Public Information Director, News Writer, Media Monitor, Rumor Control may be performed remotely.
3. Additional Communications will be staffed at the EOF or TSC if needed.
4. Note for the purposes of this table, RP Personnel consists of Shift RP Technicians and qualified RP personnel. This is consistent with the guidance provided in the NRC's Technical Basis for the Proposed Guidance in NUREG-0654/FEMA-REP-1, Section II.B, "Emergency Response Organization".

ENCLOSURE 1B

Markup Version of EP-AA-1009

Crane Clean Energy Center
Renewed Facility License No. DPR-50

CONSTELLATION NUCLEAR

RADIOLOGICAL EMERGENCY PLAN ANNEX

FOR CRANE CLEAN ENERGY CENTER (CRANE)

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REVISION HISTORY

REVISION	REVISION DATE
0	February 2002
1	May 2003
2	September 2003
3	December 2004
4	November 2005
5	January 2006
6	February 2006
7	June 2006
8	May 2007
9	July 2007
10	January 2008
11	June 2008
12	August 2008
13	March 2009
14	March 2010
15	May 2010
17	March 2011
18	July 2012
19	November 2012
20	December 2012
21	June 2013
22	June 2014
23	December 2014
24	March 2015
25	July 2017
26	August 2017
27	November 2017
28	March 2018
29	December 2018
30	September 2019
31	September 2020
32	TBD
33	TBD

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Revision History Summary:

In 2017, Constellation (at the time Exelon) announced the intent to permanently shut down the operating Unit-1 reactor at Three Mile Island Station by the fall of 2019. Constellation revised the station Emergency Plan to establish the Three Mile Island Station Emergency Plan as an independent Emergency Plan separated and de-linked from the fleet Standardized Radiological Emergency Plan (Standard Plan). This allowed decommissioning changes to be made to the Station Emergency Plan without impacting the Standard Plan.

A new Emergency Plan procedure was created for Three Mile Island. It contained regulatory commitments applicable to Three Mile Island which were in the fleet Standardized Radiological Emergency Plan. The new procedure was EP-TM-1000, *Three Mile Island (TMI) Station Radiological Emergency Plan*. The 10CFR.54(q) evaluation #17-122 evaluated the changes between the Standard Plan, the Station Annex, and EP-TM-1000.

Upon implementation, the revised Three Mile Island Emergency Plan was independent of the fleet Emergency Plan. The new Three Mile Island Emergency Plan formed the regulatory basis for developing and submitting License Amendment Requests to the NRC to support decommissioning.

In 2024 Constellation announced the intent to restart Three Mile Island Station Unit 1 as the Crane Clean Energy Center, pending NRC approval. Constellation is revising the station Emergency Plan to support restart. The Emergency Plan in place at the time operations were halted was EP-TM-1000 Revision 0. EP-TM-1000 Revision 1 updated the List of Corporate LOAs and update the definition of the Exercise Cycle to eight years. Subsequent revisions to EP-TM-1000 implemented approved regulatory exemptions as the station progressed through the stages of decommissioning. EP-AA-1009, TMI Radiological Emergency Plan Annex, Revision 29 was in effect at the time. As with EP-TM-1000, subsequent revisions to EP-AA-1009 reflected the station's progression through the stages of decommissioning.

The Emergency Plan document was renumbered and revised to reflect the transition from EP-TM-1000 Rev. 1 to EP-CR-1000 Rev. 0. The station annex was revised to reflect the transition from EP-AA-1009 Rev. 29 to EP-AA-1009 Rev. 32.

Section 1: Introduction

As required in the conditions set forth by the Nuclear Regulatory Commission (NRC) for the operating licenses for the Constellation Nuclear Stations, the management of Constellation recognizes its responsibility and authority to operate and maintain the nuclear power stations in such a manner as to provide for the safety of the general public.

The Constellation Emergency Preparedness Program consists of the Constellation Nuclear Standardized Radiological Emergency Plan ("Standard Plan"), Station Annexes, emergency plan implementing procedures, and associated program administrative procedures. The Standard Plan outlines the basis for response actions that would be implemented in an emergency. Planning efforts common to all Constellation Nuclear stations are encompassed within the Standard Plan.

This document serves as the Crane Clean Energy Center (CRANE) Annex and contains information and guidance that is unique to the station. The Station Annex is subject to the same review and audit requirements as the Radiological Emergency Plan.

1.1 Facility Description

Crane Clean Energy Center is operated by Constellation Nuclear. CRANE Unit #1 is an 870 Mwe, pressurized water-type, nuclear steam supply system supplied by Babcock & Wilcox Company.

TMI Unit 2 is owned by Energy Solutions. The TMI Unit 2 reactor was damaged during an accident in 1979 and is currently de-fueled and the plant maintained in long-term monitored storage. The arrangement of the major CRANE and TMI-2 facilities is shown in Figures CRANE 1-1 and CRANE 1-2. The Crane Emergency Preparedness Program includes both CRANE and TMI-2.

CRANE is located in an area of low population density about 12 miles southeast of Harrisburg, Pennsylvania.

The area is in Londonderry Township, Dauphin County, about 2.5 miles from the southern tip of Dauphin County, where the county is coterminous with York and Lancaster Counties.

The CRANE site is part of an 814-acre tract consisting of CRANE and several adjacent islands, which were purchased by a predecessor. The island, which is situated about 900 feet from the east bank and approximately one mile from the west bank of the Susquehanna River, is elongated parallel to the flow of the river with its longest axis oriented approximately due north and south. The north and south ends of the island have access bridges, which connect the island to State Highway Route 441. The north access bridge is used daily. Route 441 is a two-lane highway, which runs parallel to CRANE on the east bank of the Susquehanna River and is more than 2,000 feet from the CRANE reactors at the closest point.

A Norfolk Southern one-track line runs adjacent and parallel to Route 441 on the east bank of the river. On the west bank of the river, there is a multi-track Norfolk Southern line at the river's edge about 1.25 miles west of the site and a black top, two lane road that runs parallel to it. There is a one-track railroad spur across the bridge on the north end of the island, which is used for site-related activities. A general area map showing the relative location of the CRANE sites is shown as Figure CRANE 1-2.

In addition to the information listed above, specific details concerning the CRANE Site are included in the Updated Final Safety Analysis Report (UFSAR).

1.2 Emergency Planning Zones

CRANE has taken into consideration the information and data presented above, guidance provided by the Environmental Protection Agency (EPA), NRC and the Pennsylvania Emergency Management Agency (PEMA), as well as other important factors such as organizational capabilities, availability of emergency facilities and equipment, and the methods for implementing the Emergency Plan in defining the Emergency Planning Zones (EPZs) for the CRANE. As a result, an EPZ having an approximate radial distance of 10 miles from the site has been defined as the “Plume Exposure Pathway”. An EPZ having a radial distance of 50 miles from the site has been defined as the “Ingestion Exposure Pathway”.

Figure CRANE 1-4 illustrates the respective boundaries of for the Plume Exposure and Ingestion Pathways.

1.2.1 Owner Controlled Area, Exclusion Area and Low Population Zone

1. The Owner Controlled Area for the CRANE site includes all areas within the perimeter security fence. The minimum distance to the owner controlled area boundary is measured from the centerline of the Fuel Handling Building to the western shoreline of the island, which is approximately 675 feet.

2. The Exclusion Area for the CRANE site is a 2,000 foot radius that includes a portion of CRANE, the river surface around it, and a portion of Shelly Island. The minimum distance of 2,000 feet occurs on the shore of the mainland in a due easterly direction. The CRANE licensee retains complete authority to determine and maintain sufficient control of all activities including the authority to exclude or remove personnel and property for all land areas within the exclusion area. A map showing the exclusion area boundary is included as Figure CRANE 1-3. For the purposes of Emergency Planning, the exclusion area boundary and the site boundary are considered the same.

3. The Low Population Zone (LPZ) has a minimum distance of 2 miles to its outer boundary. The area of the Low Population Zone is also shown in Figure CRANE 1-3.

1.2.2 Population and Population Distribution

As previously discussed, LPZ has been defined with a minimum distance of 2 miles from its outer boundary to the CRANE site. The nearest major population center is Harrisburg, Pennsylvania which is located approximately 12 miles northwest of CRANE. This distance satisfies the requirements of 10 CFR 100 with respect to population center distance. The population of residential areas, typical enrollment in various schools, and the hospital patient capacity in the surrounding area can be found in the CRANE Evacuation Time Estimate (ETE) Study.

Within the two-mile LPZ, there are no schools. There are several recreational areas (Falmouth Fish Commission Access Area, Tri-County Boat Club and Canal Lock Boat Launch Area). There is some seasonal shift in population within a 5-mile radius of CRANE since there are over 100 summer cabins on the islands within the area. Additional transients participate in boating activities in the vicinity of CRANE.

1.2.3 Local Industrial and Military Facilities

The CRANE site is currently surrounded by farmlands within a 10-mile radius. Lands are used for dairy cattle, tobacco, poultry, vegetables, fruit, corn, wheat, and other products. A summary of land use for the risk counties is provided in Table 1 and the FSAR. The Susquehanna River is used for sport fishing and boating but is not used for commercial fishing. Manufacturing industries in the region produce clothing, wood products, shoes, electrical wiring devices, steel products, packed meat and other food. These activities, within a 10-mile radius of the site, are confined chiefly to the communities of Harrisburg, New Cumberland, Steelton, and Middletown. A listing of typical industries within 10 miles of CRANE can be found in the site Updated Final Safety Analysis Report (UFSAR). There are gas and oil transmission lines located at a minimum distance of approximately 2 miles from CRANE.

Approximately 3 miles downstream from the site is the York Haven hydro-electric project. The York Haven Station is operated on a "run-of-the-river" basis, and its power output is dependent primarily upon the water available. The reservoir is used for peaking operation during periods of low river flow. Brunner Island Station, a large steam-electric generating plant owned by the Pennsylvania Power & Light Company is located on the Susquehanna River approximately one mile downstream from the York Haven project. This station uses water from the river on a "once-through" basis for cooling water. Three other hydroelectric generating stations are also located downstream from CRANE, with each project having a dam and reservoir on the Susquehanna River. The three stations are Safe Harbor, Holtwood, and Conowingo Hydroelectric Projects, located approximately 25, 31, and 47 miles south of CRANE, respectively. There is also a coal fired, steam electric plant at Holtwood, and the Muddy Run Pumped Storage Project is associated with Conowingo Station. The Peach Bottom Atomic Power Station (PBAPS) is located along the west bank of the Susquehanna River, about 41 miles downstream of CRANE, just north of the Maryland-Pennsylvania border and is the only nuclear plant within a 50-mile radius of CRANE.

There are two airports within 10 miles of the CRANE sites. Harrisburg International Airport (formerly Olmsted Air Force Base) is located on the east bank of the Susquehanna River approximately 2.5 miles northwest of the site. The Capital City Airport is located approximately 8 miles west-northwest of CRANE. The vital areas of the CRANE sites are designed to withstand a hypothetical aircraft accident.

Norfolk Southern lines are located on both sides of the Susquehanna River, the closest being the east bank, approximately 2,000 feet from the CRANE Reactor Buildings. Routine traffic in liquified petroleum gas was identified on the railroad line, which passes along the east shore of the river. Analyses indicate that any missiles generated by this traffic would be less damaging than the postulated aircraft strike against which the plant is protected and that flammable gases would dissipate before reaching the CRANE Nuclear Units.

The closest military installation to the site is the Air National Guard facility at Harrisburg International Airport. There are no military firing ranges or missile facilities within a 10-mile radius of CRANE. Other military facilities, however, are Army and Navy depots located at New Cumberland and Mechanicsburg, Pennsylvania, respectively.

1.3 Participating Governmental Agencies

The Constellation Nuclear Radiological Emergency Plan (REP) Annex for CRANE was developed in coordination with the Commonwealth of Pennsylvania Emergency plan. In addition, specific State requirements for reporting of emergencies, providing information and data, and recommending protective actions, have been integrated directly into the Emergency Plan Implementing Procedures. In considering the Plume Exposure Pathway, there are also county plans that have been considered in the development of the REP Annex for CRANE. The State Plan designates PEMA

as the lead state agency for radiological emergency response planning and the state agency through which the Governor will exercise coordination and control during emergency. The State Plan is an integrated document setting forth the resources and responsibilities of all relevant state agencies. Significant plans from the State Departments of Agriculture, Environmental Resources, Bureau of Radiation Protection (BRP) are included in the State Plan.

1.3.1 Federal Agencies

A summary of Federal response agencies, responsibilities and activities, as described under the National Response Framework (NRF), is contained in the Standard Plan. Specifics related to support for CRANE Station are listed below.

1. **The Department of the Army (local Ordinance Detachment)** will provide an Explosive Ordinance Disposal capability in response to requests for assistance in the event of a bomb threat.

2. **The Federal Aviation Administration (FAA)** will ensure air traffic is diverted in the event of an emergency situation with a potential for radioactive release.

3. **National Weather Service (NWS)** will provide backup meteorological information upon request.

1.3.2 State Agencies

The planning for and response to a radiological emergency at the CRANE site is the joint responsibility of CRANE and the state/county/local governmental agencies. CRANE is responsible for onsite emergency response. In order to fulfill this responsibility, CRANE relies on various offsite agencies, both governmental and private, to provide assistance beyond that available onsite. The Commonwealth of Pennsylvania, through the various state, county and local agencies, is responsible for offsite emergency response. In order to fulfill this responsibility, the state relies on CRANE to provide necessary information on plant status and radiation releases. Recognizing the joint nature of their responsibilities, CRANE and the relevant governmental agencies have coordinated their emergency planning and have provided for adequate and redundant communication systems to coordinate their response during an emergency event.

1. **Pennsylvania Emergency Management Agency (PEMA)**

   PEMA is responsible to coordinate emergency services in the Commonwealth of Pennsylvania. Should a radiological emergency occur at the CRANE site that requires the implementation of state, county, and local government radiological emergency response plans, the state agency through which the Governor will exercise coordination/control will be PEMA. However, as in all emergencies, the Governor retains directional control.

   PEMA exercises authority over all non-licensee offsite organizations, who are a part of the emergency response team in the CRANE Plume Exposure and Ingestion Pathways. This authority is based on the provisions of Section 7313 of the State of Pennsylvania Emergency Management Services Code 35 PA (C.S.A. Sections 7101-7707) also referred to as Pamphlet Law 1332. By law, PEMA is authorized to:

   - Provide emergency direction and control of Commonwealth of Pennsylvania and local disaster emergency operations.

   - Accept aid and coordinate assistance provided by Federal Agencies under provisions of the Federal Disaster Relief Act of 1974.

2. **Department of Environmental Protection**

   The Department of Environmental Protection (DEP), under the administration and technical direction of the Secretary, is responsible for gathering and evaluating technical information and for supplying such information and technical advice and recommendations to PEMA and the Pennsylvania Emergency Management Council.

   Within the DEP, the Bureau of Radiation Protection (BRP) has been delegated responsibility for radiological emergencies. Specific responsibilities assigned to the DEP/BRP that are appropriate to radiological emergencies are defined in the State Plan. To provide for emergency response capability, the BRP has made provisions for 24 hour per day interface with PEMA.

1.3.3 County Agencies

Pamphlet Law 1332 states that, "each political subdivision of this Commonwealth is directed and authorized to establish a local emergency management organization in accordance with the plan and program of the PEMA. Each local organization shall have responsibility for emergency management, response and recovery within the territorial limits of the political subdivision within which it is organized and, in addition, shall conduct such services outside of its jurisdictional limits as may be required under this part." Therefore, each County and Local Emergency Management Coordinator in the State is responsible for establishing an emergency management organization within their respective jurisdiction, developing plans and preparing for emergency operations.

With respect to the CRANE Plume Exposure Pathway, Dauphin, York, Cumberland, Lancaster and Lebanon Counties have prepared Radiological Emergency Response Plans that are coordinated with both the State's Disaster Operations Plan and the REP Annex for CRANE Station. Local government plans are either included directly within the respective County plan or are maintained as separate but coordinated documents. The county Emergency Operations Centers (EOCs) are the location of the County dispatcher for police, fire, rescue and emergency medical services and is manned by dispatchers on a 24-hour basis. In the event of a PEMA communications breakdown, Dauphin County will act as the primary Communicator with PEMA, BRP, and the other four risk counties.

1.3.4 Additional Support Agencies

The nature of an emergency may require augmenting the emergency organizations with assistance from additional personnel and organizations. In order to ensure that support from local law enforcement, fire departments, hospitals, ambulance services and other organizations will be available on relatively short notice, agreements have been established with personnel and organizations. Agreements from offsite individuals, groups and agencies that support CRANE may take one of the following forms:

- Contracts
- Letters of Agreement
- Memoranda of Understanding
- Formal Emergency Plans

Refer to Appendix 2 for a listing of offsite support organizations.

FIGURE CRANE 1-1: CRANE Site Arrangement

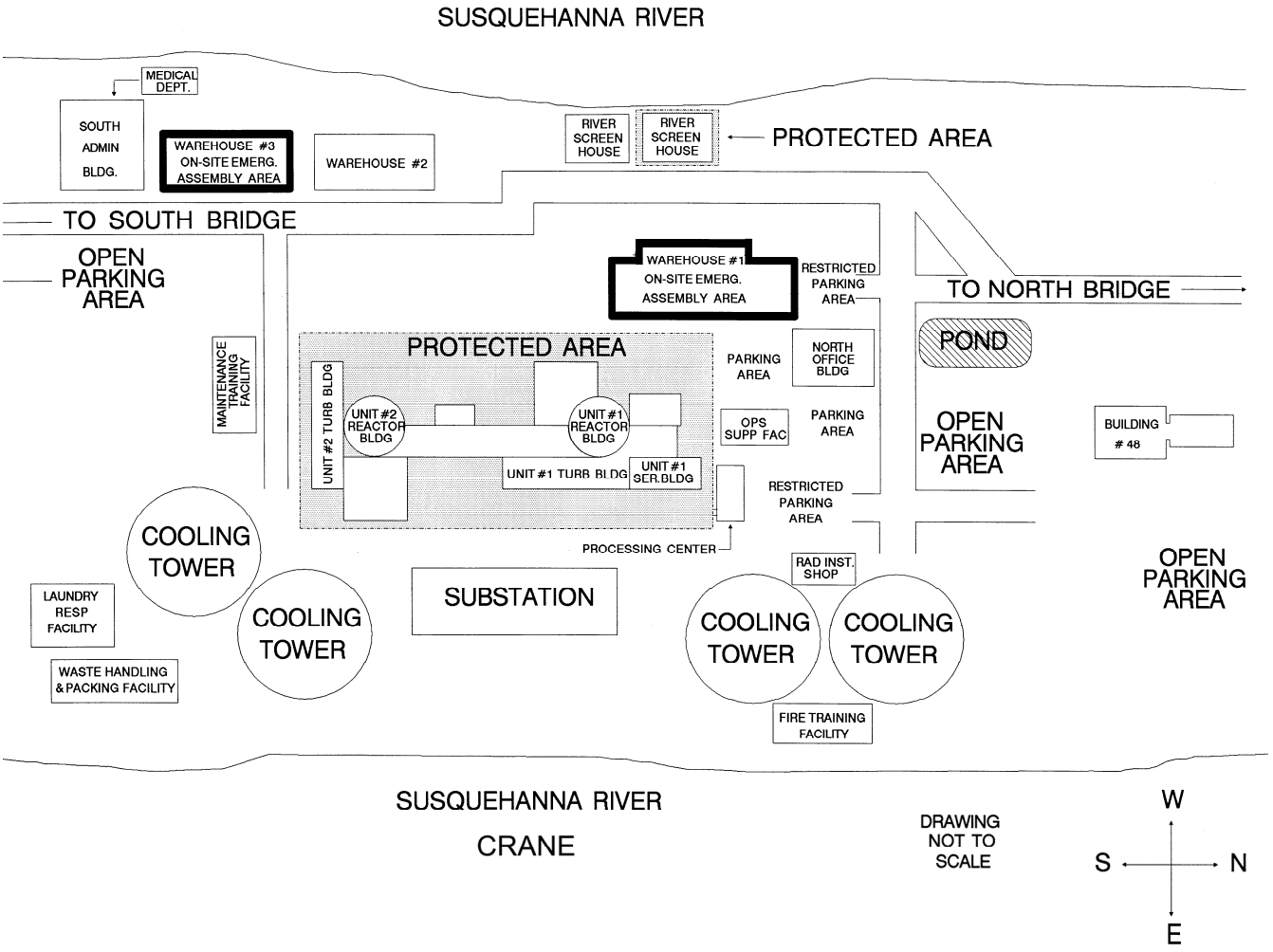


FIGURE CRANE 1-2: Relative Location of the CRANE Site

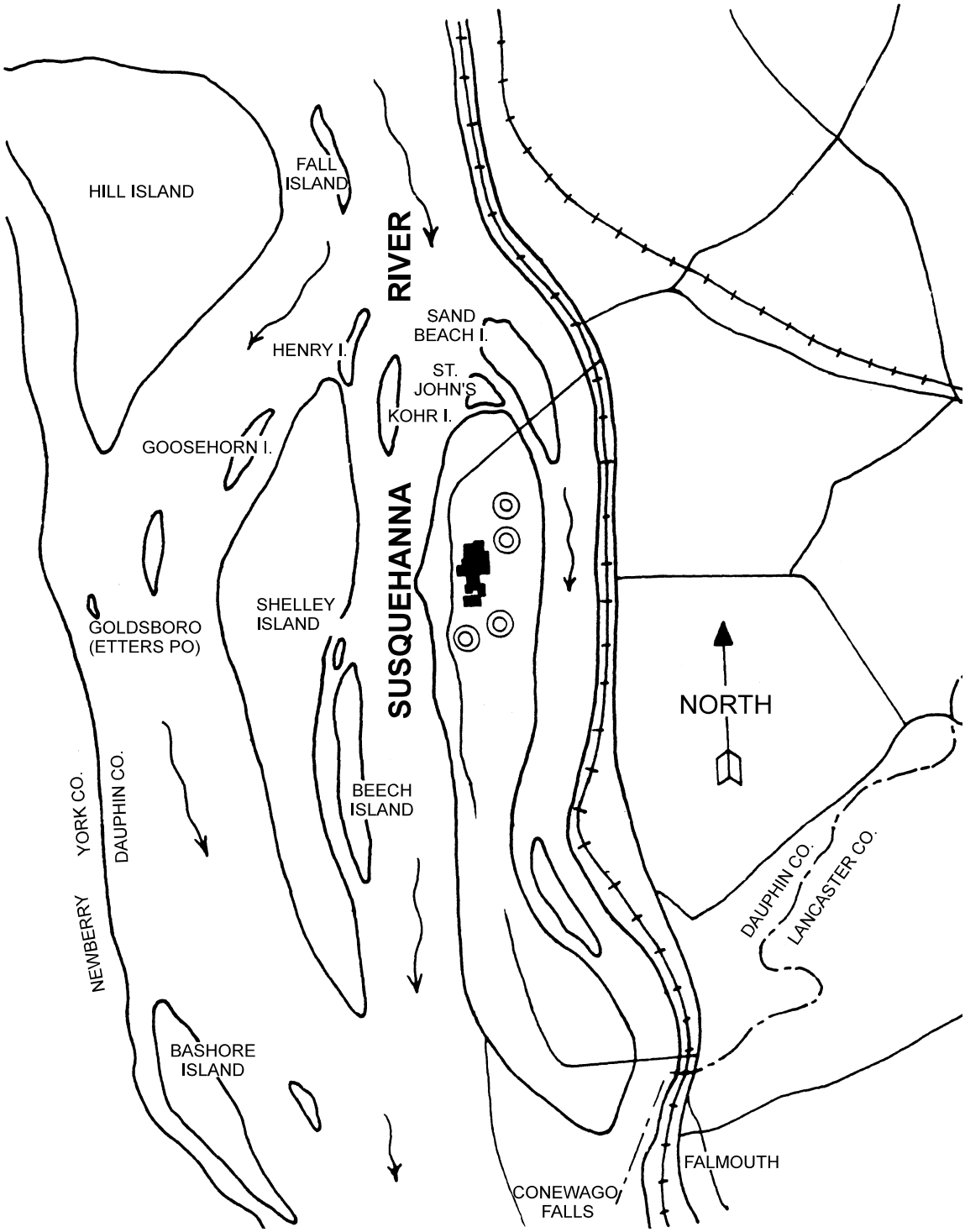


FIGURE CRANE 1-3: CRANE Site Exclusion Area and Low Population Zone

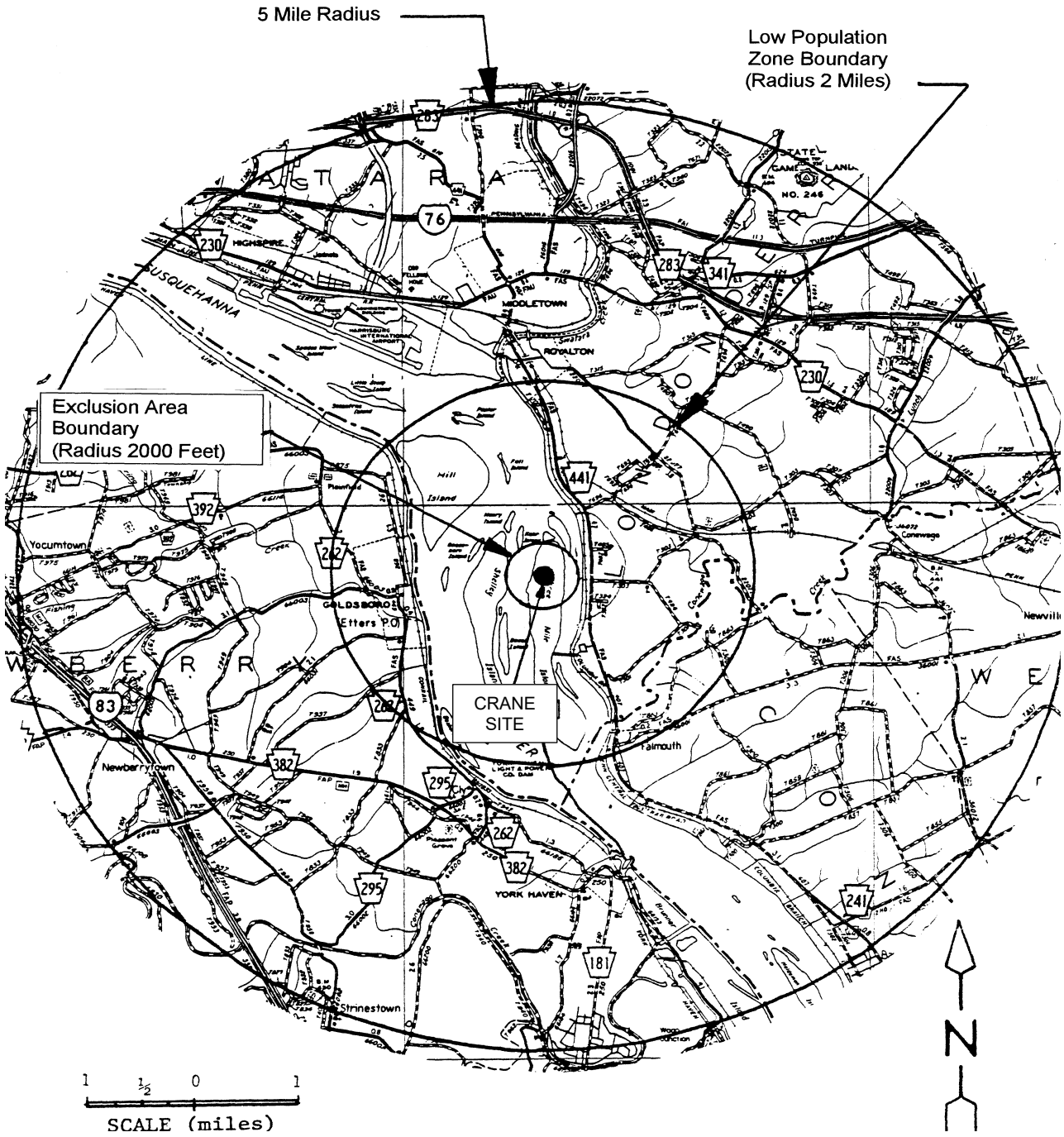
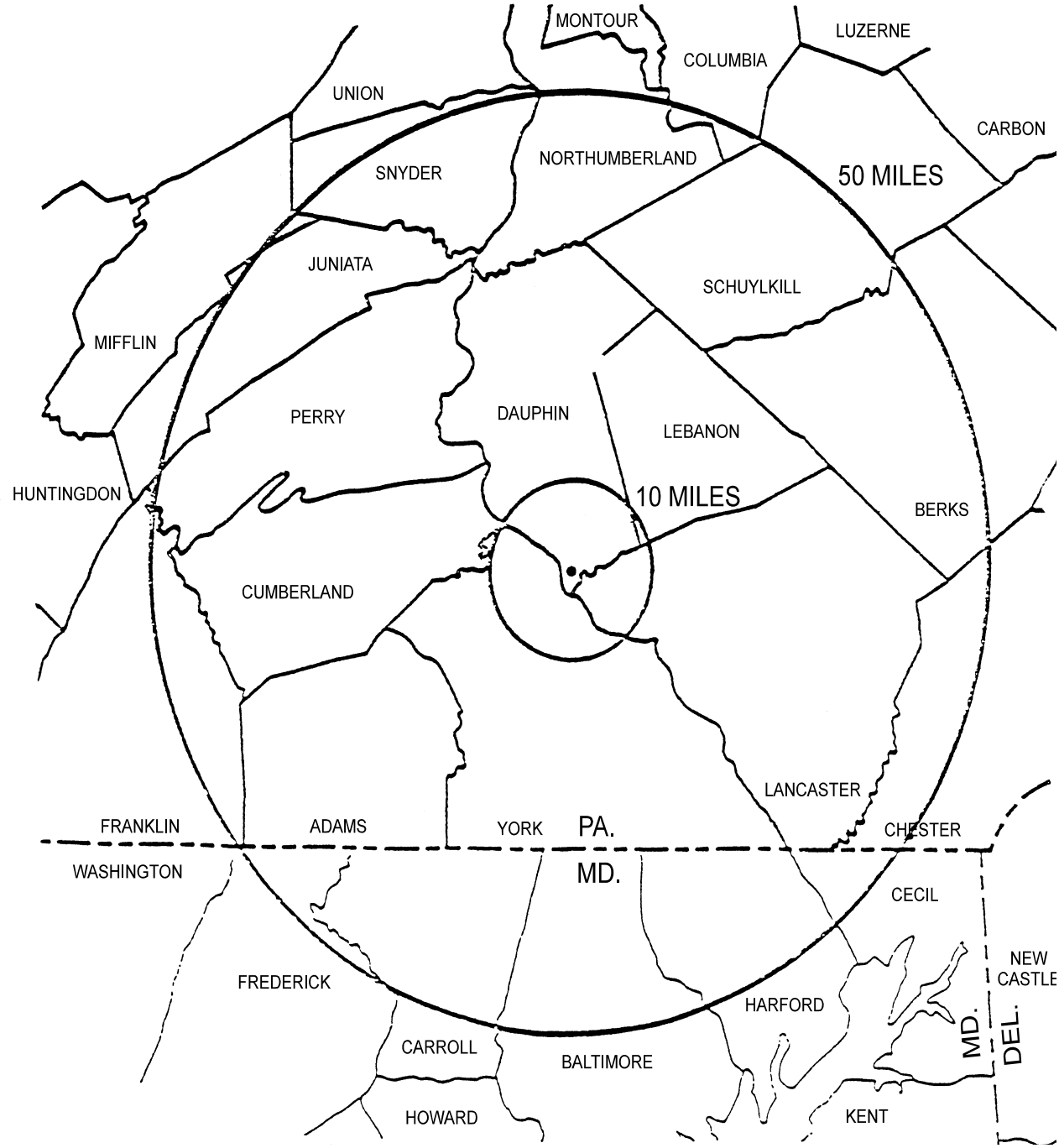


FIGURE CRANE 1-4: Plume Exposure and Ingestion Pathway EPZs

Risk Counties: Cumberland, Dauphin, Lancaster, Lebanon, York



Section 2: Organizational Control of Emergencies

Crane's Emergency Response Organization (ERO) and its key positions are described in the Constellation Radiological Emergency Plan for Crane (EP-CR-1000). This section describes interfaces among Constellation Nuclear emergency response personnel and specifies the offsite support available to respond to the nuclear generating stations.

2.1 Shift Technical Advisor (STA) / Incident Assessor

The responsibilities of the STA are delineated on OP-AA-101-111, "Roles and Responsibilities of On-Shift Personnel." If the STA is the Shift Manager or Unit Supervisor, then another Senior Reactor Operator (SRO) shall assist as Incident Assessor during unexpected conditions and transients. 2.2 Emergency Response Organization (ERO) Staffing

2.2 Emergency Response Organization (ERO) Staffing

Refer to Table CRANE B-1, Minimum Staffing Requirements for CRANE, in the Crane Radiological Emergency Plan for a description of 60-minute and full augmentation commitments. An illustration of the overall Constellation ERO command structure is provided in the Crane Radiological Emergency Plan, Figure CRANE B-1a.

2.2.1 Emergency Onsite Organization (Figure CRANE B-1b)

2.2.2 Emergency Offsite Organization (Figure CRANE B-1c)

2.2.3 Emergency Public Information Organization (Figure CRANE B-1d)

2.3 Emergency Response Organization (ERO) Training

Training is conducted in accordance with TQ-AA-113, "ERO Training and Qualification." Retraining is performed on an annual basis, which is defined as once per calendar year not to exceed 18 months between training sessions.

CRANE will offer training for hospital personnel, and ambulance and rescue, police and fire departments required to support implementation of the CRANE Emergency Plan. This training shall include the procedures for notification, basic radiation protection and their expected roles. For those support organizations that must enter the site, training shall also include site access procedures and the identity (by title) of the individual in the site emergency organization who will control the organization's support activities.

2.4 Non-Constellation Nuclear Support Groups

The nature of an emergency may require augmenting the emergency organizations with assistance from additional personnel and organizations. In order to ensure that support from local law enforcement, fire departments, hospitals, ambulance services and other organizations will be available on relatively short notice, agreements have been established with personnel and organizations. Agreements from offsite individuals, groups and agencies that support CRANE may take one of the following forms:

- Contracts
- Letters of Agreement
- Memoranda of Understanding
- Formal Emergency Plans

Refer to Appendix 2 for a listing of these support organizations.

2.4.1 Miscellaneous Organizations

- Other utilities
- Institute for Nuclear Power Operations (INPO)
- American Nuclear Insurers (ANI)
- Framatome
- Aviation services

2.4.2 Norfolk Southern Railroad Company

The Norfolk Southern Railway track crosses the access to the facility, and impeding site access could impact the implementation of time sensitive emergency actions. Theses emergency actions include augmentation of the Emergency Response Organization, use of off-site assistance, and evacuation of non-essential personnel. Therefore, a Memorandum Of Understanding (MOU) has been established with Norfolk Southern Railway Company. The purpose of the MOU is to ensure that stopped or disabled train traffic does not impede access to the island across the North Bridge for the duration of the emergency. This will provide reasonable assurances that there is sufficient time to allow implementation of emergency actions at CRANE in the event of a declared emergency. The MOU with Norfolk Southern Railway Company will be reviewed every five years.

The CRANE Staffing Tables and supporting information are re-located in EP-CR-1000.

Section 3: Classification of Emergencies

The CRANE Emergency Action Levels and supporting information are re-located in EP-AA-1009, Addendum 3.

Section 4: Emergency Measures

4.1 Notification of the Emergency Organization

Notifications for the Crane Clean Energy Center are in accordance with Section E.3 of the Crane Radiological Emergency Plan. For initial notification/escalation of Unusual Event, Alert and Site Area and General Emergencies, CRANE will notify the following offsite agencies within 15 minutes of event declaration:

- Pennsylvania Emergency Management Agency (PEMA)
- Dauphin County
- York County
- Lancaster County
- Lebanon County
- Cumberland County

Within one hour of event classification but immediately following notification of PEMA and the risk counties, CRANE will also notify the Nuclear Regulatory Commission.

Upon notification of an emergency at Crane Clean Energy Center, the Pennsylvania Bureau of Radiation Protection (BRP) will contact the appropriate station to verify that an emergency exists and to obtain technical information and then makes recommendations to PEMA regarding protective actions for the public. The BRP Support Plan For Fixed Nuclear Facility Incidents utilizes the Protective Action Guidelines in the U.S. Environmental Protection Agency (EPA) 400-R-92-001, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents".

In addition to the initial notification and verification, communication channels will be maintained between the facility and offsite emergency response organizations to allow for any further dissemination and update of information concerning the emergency.

The Commonwealth of Pennsylvania, in accordance with the State Radiological Emergency Response Plan, will coordinate offsite emergency support from Federal, State and local agencies

Constellation will provide follow-up information to the BRP or other off-site authorities. The follow-up information will keep these authorities apprised of existing or potential radiological releases, meteorological conditions, projected doses and contamination levels, licensee actions, recommend protective actions and other information pertinent to the authorities' responsibilities. The information may be provided over open communication paths or in person to BRP personnel.

4.1.1 Offsite Agency Response

1. **Risk Counties (Within Plume Exposure Pathway)**

   - The dispatcher at the Risk Counties shall notify their County Emergency Management Coordinator or his designated alternate.
   - The County Office of Emergency Management shall notify county and municipal personnel, as appropriate.
   - Dauphin County - Act as central communications agency in the event of a PEMA/CRANE communication breakdown.

2. **Pennsylvania Emergency Management Agency (PEMA)**

   Upon receiving notification of an emergency from the site, the PEMA Duty Officer Agency shall immediately notify the State Bureau of Radiation Protection (BRP).

   PEMA will also notify the following personnel, organizations, and agencies as appropriate in accordance with their standard operating procedures:

   a. Other affected County Emergency Management Agencies
   c. Other affected states
   d. Selected State agencies
   e. Selected Federal agencies

3. **Department of Environmental Protection / Bureau of Radiation Protection (DEP/BRP)**

   The Incident Manager, who receives the notification from PEMA, shall:

   - Contact the licensee to: (1) Verify actual origin of the emergency message; (2) Determine the classification of the emergency; and (3) Obtain and assess information and data pertaining to the emergency.
   - Initiate activation of the BRP emergency response organization, if appropriate.
   - Advise the PEMA Duty Officer or Operations Officer of the BRP initial assessment of the emergency.
   - Notify selected Federal agencies, as appropriate.

4.2 Assessment Actions

The effluent radiation monitoring system provides indications of gross releases of gaseous and liquid radioactivity. By applying calibration factors, meteorological data, or river flow, the gross indications are used to calculate approximate release rates in μCi/sec and dose rates at specific distances along the release pathways. Particulate and iodine analysis depends on collecting installed filter papers and charcoal cartridges for analysis in the counting room. Similar calculation procedures are applied to approximate release rates and dose rates due to iodine.

Detectors are strategically located throughout the plant. These detectors indicate and alarm locally and in the Control Room. They serve the purpose of indicating current dose rates in those areas and are used for local evacuation action levels and re-entry operations.

Certain plant operating systems contain radiation monitors. These systems are described in the CRANE UFSAR.

Portable monitoring instruments and sampling equipment consist of such items that are utilized and maintained on-site for normal day-to-day plant operations and are thus available for emergency use.

Refer to Section 5.2 for a listing of assessment resources.

4.2.1 Radiological Assessment and Offsite Monitoring

For the emergency assessment of gaseous releases, refer to the description of the dose projection model contained in Part II, Section I.4 of the Standard Plan.

For liquid releases, the radionuclide concentration at any downstream location is determined by taking liquid effluent concentrations and applying the effluent flow rate and volumetric flow rate of the receiving water. Downstream users will be notified to curtail intake if the projected concentration is above the level specified in the procedures.

4.2.2 Source Term Determination

Should the effluent radiation monitors be off-scale or otherwise inoperable, assessment of releases and off-site exposure would be made using the containment monitor readings, point of release grab samples, and pathway samples.

A detailed core damage assessment methodology has been established under Section 6.0 of the CRANE Technical Support Center Calculation Guides. The process used is based on measured physical and chemical parameters that occur in the plant when the core is damaged. Three (3) methods have been developed under Section 6.0 of the CRANE Technical Support Center Calculation Guides (per TDR 431) to determine core damage estimates:

1. In-core thermocouple temperature correlations to fuel conditions;

2. Radiation monitor and hydrogen production correlations based on fuel and plant system conditions; and

3. Chemical measurement correlations based on radionuclide inventory released into reactor coolant during core damage.

Throughout each emergency situation, continuing assessment will occur. Assessment actions at Crane Clean Energy Center may include an evaluation of plant conditions; in-plant, onsite, and initial offsite radiological measurements; and initial estimates of offsite doses. Core damage information is used to refine dose assessments and confirm or extend initial protective action recommendations. Crane Clean Energy Center utilizes EP-AA-110-302, Core Damage Assessment (PWR) as the basis methodology of post-accident core damage assessment. This methodology utilizes real-time plant indications. In addition, Crane Clean Energy Center may use samples of plant fluids and atmospheres as inputs to the CDAM (Core Damage Assessment Methodology) program for core damage estimation.

4.3 Protective Actions for the Offsite Public

The responsibility for actions to protect persons in offsite areas rests with the State and is described in detail in the State Emergency Plan and implemented in conjunction with the county emergency plans.

DEP/BRP is the specific agency responsible for evaluating information from the CRANE staff and all other sources and recommending to PEMA that protective actions be taken. The BRP has sheltering and evacuation as protective action options. The most appropriate protective action for a particular situation will depend on the magnitude of the release, duration of the release, wind speed, wind direction, time of day and transportation constraints. In the case of a General Emergency, circumstances may indicate the immediate need to initiate some precautionary protective action. This judgment is the responsibility of the BRP and should be based on an evaluation of the current plant conditions, dose projections relative to the PAG's and expected subsequent plant operations/evaluations.

Off-site it is the responsibility of the State Department of Agriculture, in conjunction with the Department of Environmental Protection, to issue guidance and coordinate actions to control contaminated agricultural products.

The means to warn or advise involved persons is a responsibility of the risk county. The risk county, in coordination with the State, is also responsible for the preparation and dissemination of information material for the general public on protective actions including necessary information (evacuation routes, maps, etc.) for the implementation of protective measures in the Plume Exposure Pathway.

The population within the 10-Mile Emergency Planning Zone (Plume Exposure Pathway) will be provided, on a periodic basis, information describing the methods by which they will be notified of an emergency and specific instructions that should be followed upon receipt of such notification.

4.3.1 Alert and Notification System (ANS)

The capability exists for the prompt notification of the general public within the Plume Exposure Pathway Emergency Planning Zone (EPZ) for CRANE.

The Alert and Notification System (ANS) for Crane relies on the Integrated Public Alert Warning System (IPAWS)-WEA (Wireless Emergency Alerts) and IPAWS-EAS (Emergency Alert System) as the primary means of alerting and notifying the public, respectively, and an independent electronic Mass Notification System (MNS) as the backup means.

The Integrated Public Alert Warning System (IPAWS) is operated by local governmental agencies and maintained by FEMA. A more specific description of the various prompt public notification systems is presented in the FEMA ANS Design Report for Crane.

4.3.2 Evacuation Time Estimates

The ETE study uses population data from the decennial census which includes parts of five Pennsylvania counties: Cumberland, Dauphin, Lancaster, Lebanon and York. The evacuation times are based on a detailed consideration of the EPZ roadway network and population distribution. The ETE Study, contained in EP-AA-1009 Addendum 2, Evacuation Time Estimates for the Exposure Pathway Emergency Planning Zone, presents evacuation times for daytime and nighttime scenarios under various weather conditions for the evacuation of various areas around the CRANE Station, once a decision has been made to evacuate.

4.3.3 Potassium Iodide (KI)

The Department of Health, Commonwealth of Pennsylvania, is responsible for providing advice to PEMA on the planning for the use, stockpiling and distribution of Potassium Iodide (KI) or other thyroid blocking agents and such other radiological health materials as may be required for the protection of the general public. Their decision shall also be based on U.S. FDA guidance.

Based on the criteria established under the Commonwealth of Pennsylvania Operations Plan, the CRANE Station will recommend to government officials that the general public be notified to take KI at a General Emergency classification in those areas were an evacuation or shelter has been recommended. This notification will be approved by the Emergency Director in Command and Control of PAR decision-making and off-site notifications and performed as part of the State / local notifications described under Sections II.B.4 and II.E.3 of the Crane Radiological Emergency Plan.

4.3.4 Public Information

a. Publications

Public information on protective actions is prepared and disseminated annually to provide clear instructions to the population-at -risk. Constellation Nuclear assists PEMA and risk counties in the preparation and distribution of their respective public information.

Pamphlets outlining public education response actions are readily available for transients in the 10-Mile EPZ. In addition, emergency information is provided to the operators of other recreational areas in the 10-Mile EPZ, as defined by the Commonwealth of Pennsylvania and risk counties.

These public information publications instruct the public to follow the wireless emergency alerts. These publications also identify the local radio stations to which the public should tune in for information related to the emergency. Additional materials (e.g., such as rumor control numbers, evacuation routes, etc) may also be included in these publications based on agreements with responsible State and risk county agencies.

b. News Media Education

Information kits are available to news media personnel. These kits include information on a variety of nuclear power plant related subjects.

4.3.5 Protective Action Recommendations (PARs) for the General Public

To aid the Emergency Response Organization during a developing emergency situation, EP-AA-111, "Emergency Classification and Protective Action Recommendations" has been developed.

4.4 Protective Actions for Onsite Personnel

During an emergency, personnel may be required to temporarily relocate to prevent or minimize exposure to radiation and radioactive materials. The following subsections discuss the policies applying to sheltering, evacuation and personnel accountability during emergencies at the CRANE site.

At the time an emergency is declared, an announcement is made on the site public *address* system to all personnel within the Owner Controlled area. The announcement will include the classifications of the event, a brief description of the event, and actions taken by site personnel. Shift personnel will proceed to their emergency assignments.

The CRANE licensee retains complete authority to determine and maintain sufficient control of all activities including the authority to exclude or remove personnel and property for land areas within the exclusion area and contamination will, thereby, be controlled. In addition, there are no areas for producing agricultural products within the exclusion area. In-plant contamination control will be in accordance with approved Radiological Controls procedures.

The primary protective measures for onsite personnel during an emergency is prompt evacuation from areas, which are affected by significant radiation, contamination, airborne radioactivity or other personnel hazards. All persons onsite at the time an emergency is declared shall be notified by means of the plant page supplemented by designated personnel providing notification in areas that the page does not cover.

4.4.1 Emergency Personnel Exposure

Exposure to personnel remaining onsite as or in support of ERO activities will be monitored. This may be accomplished through continuous monitoring for habitability at designated emergency and support facilities. Dosimetry will be issued to personnel leaving or working outside a monitored facility and will be available to ERO personnel located inside a site emergency facility, in the event of a radiological release or elevated plant radiation levels, as applicable, per approved procedures. Additional provisions have been made for dosimetry issue at the site entrance gates or other locations, if required. Dosimetry will be periodically read and recorded in accordance with approved RP procedures.

Emergency personnel, including those involved in the removal of injured persons, undertaking corrective actions, performing assessment or personnel decontamination, and providing first aid and support to ambulance services will have their radiation dose controlled in accordance with approved procedures and normal Radiation Protection (RP) practices.

When offsite emergency personnel are called to respond to CRANE, station RP support is provided to support these activities, which include the monitoring and control of radiation exposure and evaluation of radiological hazards.

4.4.2 Radiological Monitoring and Decontamination

Personnel and equipment decontamination will be initially accomplished at the Radiation Protection Access Control Point where specialized equipment and supplies are available. Procedures are written with specific details for decontamination. For personnel within the Protected Area, emergency situations, which require decontamination will be handled in accordance with these procedures.

All personnel leaving a Radiological Controlled Area (RCA) will be monitored for contamination. Any individual found to have contamination levels in excess of thresholds established in RP procedures will be considered contaminated.

Personnel found to be contaminated will undergo decontamination by radiological controls personnel (or other designated personnel as specified in Radiation Protection Procedures). Measures will be taken to prevent the spread of contamination. Such measures may include isolating affected areas, placing contaminated personnel in "clean" protective clothing before moving, and decontaminating affected personnel, their clothing and equipment prior to release, in accordance with applicable station Radiation Protection Procedures.

In the event that a release of contaminants has occurred or is occurring, in-plant potable water systems will be secured to prevent possible contamination. If food and water supplies are brought in for emergency personnel who remain on-site these supplies will be packaged in sealed containers and will be monitored by Radiation Protection personnel (using standard Rad Con practices and procedures) prior to use or consumption and on a normal routine basis. Any food or water supplies discovered as contaminated will immediately be disposed of as waste and will not be used.

Upon receipt of information that the emergency has entered recovery phase, in-plant facilities and areas will be surveyed, sampled, and cleared for use, or controlled as necessary, in accordance with applicable Radiation Protection practices.

4.4.3 Personnel Accountability / Site Evacuation

Upon declaration of a Site Area Emergency, General Emergency and/or at the discretion of the Station Emergency Director, essential personnel within the Protected Area will be accounted for at the Control Room, TSC and OSC unless other factors (e.g., security events) advise against it.

Non-essential personnel will be directed to proceed to their vehicles directly and to evacuate to designated Remote Assembly Areas or dismissed to their homes. The Station Emergency Director based on the prevailing radiological conditions will determine evacuation routes. This evacuation will be accomplished using private vehicles.

In support of these operations, a sweep of buildings, trailers, and other areas of the Owner Controlled area will commence to ensure that all persons have assembled and/or evacuated the site.

Refer to Section J of the Crane Radiological Emergency Plan for specific requirements for the initiation and completion of personnel accountability and the evacuation of non-essential personnel from the site. Search and rescue operations will be implemented to locate any missing persons.

4.4.4 Monitoring of Evacuees

At the Remote Assembly Areas (Figures CRANE 4-1 and CRANE 4-2), personnel and vehicles from the CRANE site will be monitored for radioactive contamination, if necessary. Individuals found to be contaminated will be decontaminated in accordance with applicable Radiation Protection Procedures. Vehicles found to be contaminated will be impounded until they can be decontaminated. Inclement weather will not affect the direction of the traffic flow but may increase evacuation times.

If anyone is found to be contaminated, showers, sinks and decontaminating supplies are available in close proximity to the plant. Equipment for decontamination personnel will be stored in Emergency Supply Lockers. Portable survey instruments are available and routinely calibrated for use in decontamination operations. All skin contamination problems will be treated using accepted Radiation Protection practices.

For contaminated personnel inside the Protected Area, the preferred decontamination facility will be those onsite at the CRANE Site Laboratory, if accessible; otherwise, offsite facilities will be used.

The registering and monitoring of the general public evacuating from the Plume Exposure Pathway EPZ, as described in Section II.J.12 of the Crane Radiological Emergency Plan, will occur at designated facilities per the respective State and County Radiological Emergency Response Plans.

4.5 Severe Accident Management

Accident management consists of those actions taken during the course of an accident, by the Emergency response Organization (ERO), specifically: plant operations, technical support, and plant management staff in order to:

- Prevent the accident from progressing to core damage;
- Terminate core damage once it begins;
- Maintain the capability of the containment as long as possible; and
- Minimize on-site and off-site releases and their effects.

The later three actions constitute a subset of accident management, referred to as Severe Accident Management (SAM) or severe accident mitigation. The Severe Accident Management Plan Procedures (SAMPs) provide sound technical strategies for maximizing the effectiveness of equipment and personnel in preventing, mitigating and terminating severe accidents.

Implementation of SAMPs is a collaborative effort between the Shift Manager and the Station Emergency Director in the TSC (once activated). The Station Emergency Director maintains ultimate responsibility for direction of mitigating strategies. Designated TSC personnel are also trained to assist in evaluating plant conditions using the SAM Technical Support Guidelines (TSG).

FIGURE CRANE 4-1: Remote Assembly Area – CRANE Training Center

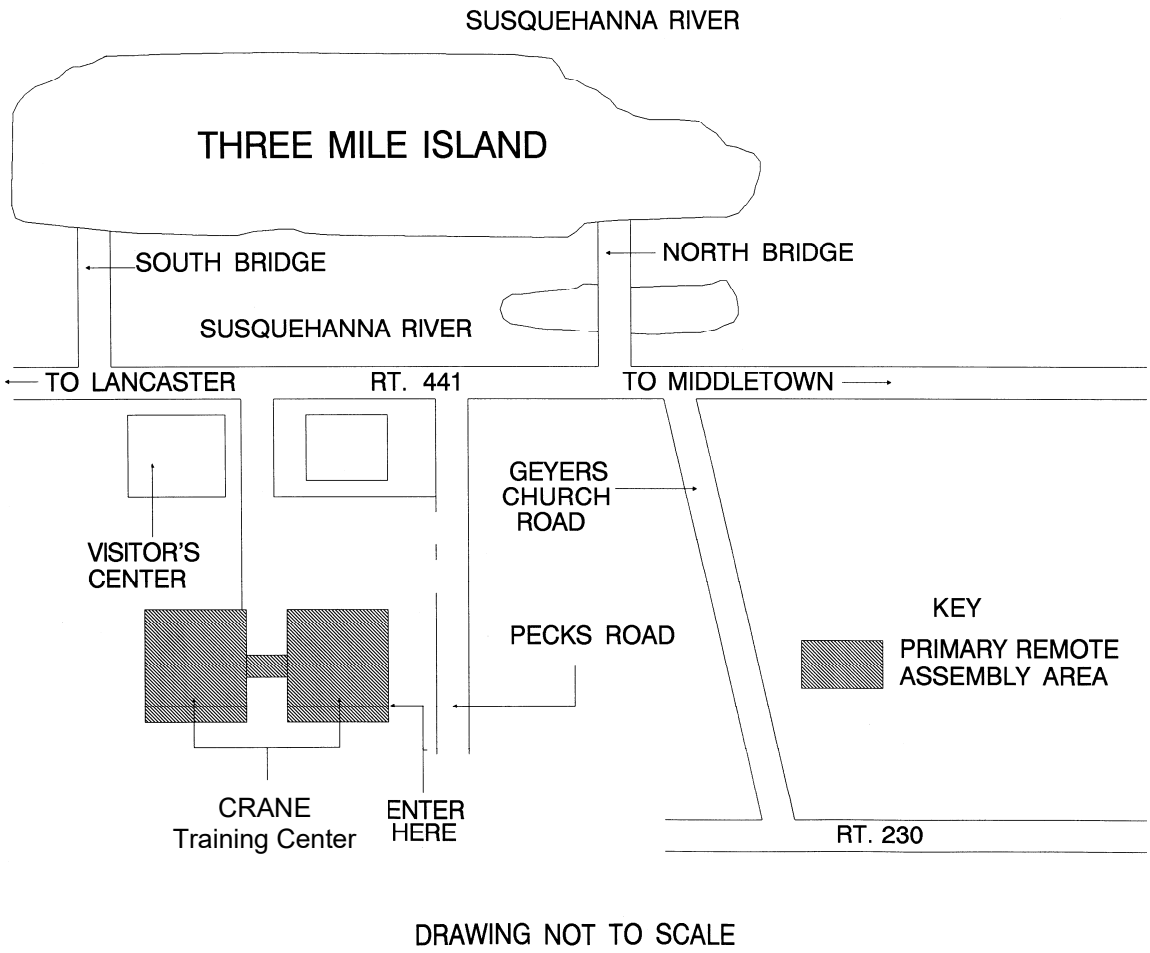
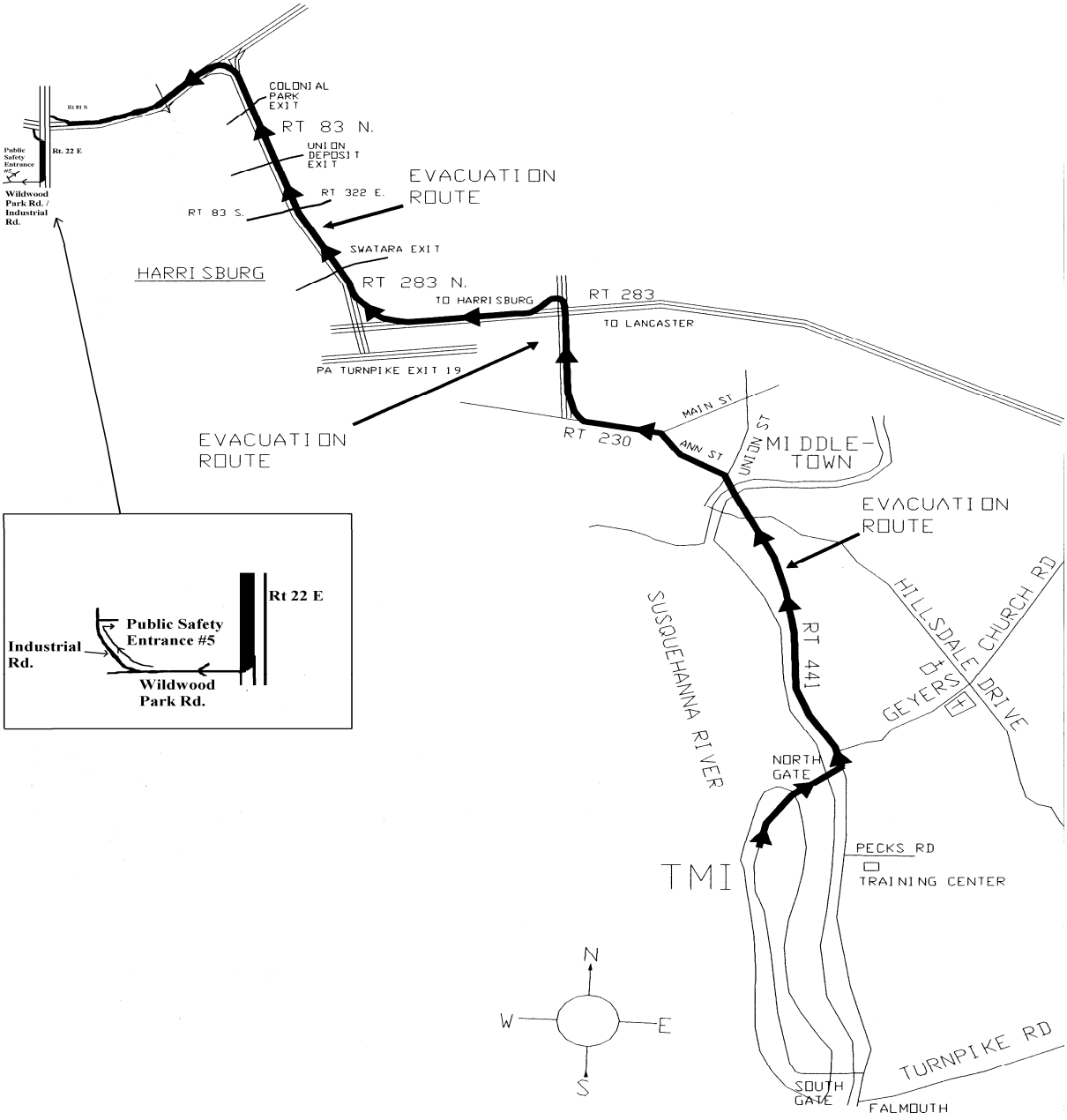


FIGURE CRANE 4-2: Remote Assembly Area – Harrisburg Area Community College



Section 5: Emergency Facilities and Equipment

5.1 Emergency Response Facilities

5.1.1 Station Control Room

The Control Room and Shift Manager's Office are designed to be habitable under accident conditions. These areas are located in seismically-rated structures and have adequate shielding to permit safe occupation for extended periods of time. The CRANE Control Room ventilation system has redundant fans and chillers and is provided with radiation and smoke detectors with appropriate alarms and interlocks. Provisions have been made for air from the control rooms to be recirculated through high efficiency particulate air (HEPA) and activated charcoal filters. Fresh air is drawn through underground ventilation tunnels which have been provided with protection against combustible vapors, incipient explosions or fires. The tunnels are Seismic Class I rated and also designed for a hypothetical aircraft incident.

Emergency lighting, power, ventilation system, and shielding walls enable operators to remain in the Control Room to ensure that the reactor will be maintained in a safe condition. In addition, the operators will be able to evaluate plant conditions and relay pertinent information to appropriate onsite and offsite personnel, organizations, and agencies during emergencies. To ensure the operations shift and other personnel assembled at the location can remain self-sufficient, emergency equipment and supplies will be stored in or near the Control Room. The location, type and quantity of emergency equipment and supplies available is specified in the Emergency Plan Administrative Procedures.

5.1.2 Technical Support Center (TSC)

The TSC is located on the 1st floor of the Operations Support Facility (OSF), which is outside but adjacent to the Protected Area. The TSC meets the requirements of NUREG-0696 for size and habitability, including a filtered HVAC system that can be isolated in the event of a radiological accident.

A backup electrical power source is designated in the event of a loss of the normal power supply. Uninterruptible power supply (UPS) capability is provided to designated electrical outlets to ensure that a transient loss of power does not occur to significant communications, dose projection, and data acquisition and display systems.

A room is provided for use by NRC response team members and the Resident Inspector during a declared emergency event. This conference room provides a workspace and telephone communications for a minimum of five (5) people.

Records and drawings, which describe conditions and layout of structures, systems, and components, are contained in filing cabinets inside the TSC.

5.1.3 Operational Support Center (OSC)

The OSC is located on the 305' Elevation of the Service Building. The OSC conforms to the requirements of Section H.1.c of the Crane Radiological Emergency Plan.

The OSC serves as a muster area for shift personnel and as a location to organize and dispatch emergency response teams (i.e., onsite radiological monitoring, fire brigade, rescue operations, damage control, and maintenance). Emergency equipment and supplies, including portable radios, portable lighting, protective clothing, and respirators, are maintained in emergency lockers located or adjacent to in the OSC. Additional emergency equipment, such as gamma and air monitoring equipment can be made promptly available to the OSC if needed.

In the event the OSC is not habitable, personnel report to backup facilities that can be designated based upon specific event conditions.

5.1.4 Emergency Operations Facility (EOF)

The dedicated Emergency Operations Facility (EOF) is located at 175 North Caln Road, Coatesville, PA, approximately 50 miles from the CRANE Site.

Primary staffing of the Coatesville facility will be from the Constellation Energy Mid-Atlantic Region Office located in Kennett Square, PA, which is approximately 18 miles drive (11 miles straight line distance) from the Coatesville facility.

Plant Monitoring System data is available through the Emergency Preparedness Data System (EPDS) at the EOF. The Coatesville facility has a designated diesel generator and UPS as a backup power source in the event of a loss of normal power.

The EOF equipment includes:

- Supplies and equipment for EOF personnel, and
- Sanitary and food preparation facilities.

Separate offices are provided for Constellation Energy, NRC, State representatives and other emergency personnel.

5.1.5 Joint Information Center (JIC)

The Joint Information Center (JIC) is the facility in which media personnel gather to receive information related to the emergency event. The JIC is co-located with the EOF at 175 North Caln Road, Coatesville, Pennsylvania.

5.1.6 Alternative Facility

The Alternative Facility maintains the capability for staging the TSC/OSC emergency response organization personnel in the event of a hostile action. This alternative facility has the capability for communications with the emergency operations facility, control room, and plant security and the capability for engineering assessment activities, including damage control team planning and preparation. Consistent with NRC EPFAQ No. 2013-005, the EOF will satisfy the offsite notification responsibilities for the Alternative Facility. The Alternative Facility is located at the Londonderry Fire Hall 2655 Foxianna Road, Middletown, Pennsylvania. **(CM-1, ref. AR 1362747.44)**

5.2 Assessment Resources

5.2.1 Radiation Monitoring System

The onsite Radiation Monitoring System contributes to personnel protection, equipment monitoring, data gathering, and accident assessment by measuring and recording radiation levels and concentrations of radioactive material at selected locations within the plant. The Radiation Monitoring System alarms and initiates required emergency actions when radiation levels or radionuclide concentrations exceed predetermined levels. Area, liquid, and atmospheric monitoring subsystems are required to perform these functions. Specific details regarding radiation monitoring and effluent monitoring systems can be found in system design descriptions (SDDs), site Final Safety Analysis Reports, and the CRANE Radiation Monitoring Setpoint Procedures.

The data from these subsystems are displayed by readout in the Control Room. Selected channels are recorded by recorders and/or the plant process computer, which are also located in the Control Room.

In general the radiation monitoring equipment is designed in accordance with the following:

- Each monitoring station has adjustable alarm, alert, and power supply failure alarms.
- Solid-state circuitry is used except for primary detectors.
- Most AC operated radiation monitoring equipment, except for the pump assemblies, is provided with power from the battery-backed, inverter-fed vital power supply bus.
- Each radiation monitor is capable of being checked periodically with solenoid actuated check sources.
- A pulse generator or solid sources are used for electrically checking each monitor or subsystem.
- The modules are designed so that an alarm and/or indication is initiated when failure occurs anywhere in the channel.

1. **Area Radiation Monitoring**

   The CRANE area radiation monitoring subsystem is comprised of channels, which utilize an ion chamber detector housed in a weatherproof container.

2. **Containment Radiation Monitors**

   Post accident radiation levels in containment are monitored by two channels of fully qualified high range area monitors. These monitors are ion chamber detectors and are designed to withstand a LOCA. Readout modules are located for these detectors on the radiation monitoring panel in the control room.

   The set points on this monitor could be used to indicate to the operator that the Emergency Action Levels (EALs) were reached under the Fission Product Barrier loss matrix provided in Section 3.

3. **Atmospheric Radiation Monitoring**

   Each installed atmospheric monitor (except the condenser off-gas, ESF ventilation exhaust and waste gas monitor) is comprised of a particulate measuring channel, iodine measuring channel, and a gaseous measuring channel. The atmospheric radiation monitor subsystem is comprised of monitors with fixed and movable particulate filters, and fixed radioiodine filters. Representative samples are obtained by means of a sampling head placed in a ventilation duct.

   Movable airborne monitors are typically used in the spent fuel handling area during refueling operations and in the radiochemical laboratory during laboratory sample preparation operations. These monitors are supplemented with various other portable radiation monitors. Each monitor contains three channels for particulate, iodine, and gaseous monitoring, respectively.

4. **Liquid Radiation Monitoring**

   The liquid radiation monitoring subsystem is comprised of monitors, each of which has a sampler, detector, and Control Room ratemeter module (exceptions are the IWTS/IWFS discharge monitor, waste treatment system discharge monitor and the turbine building sump pump). The monitors provide visual indications in the Control Room. The CRANE Primary Coolant Letdown monitor also contains a high range channel.

5. **Post Accident Sampling System (PASS)**

   Liquid Reactor Coolant System Post Accident Sample System (PASS) samples may be taken from the pressurizer and decay heat and reactor coolant letdown systems. Liquid samples may be analyzed for isotopic concentration, boron concentration, chloride concentration and dissolved gases.

The Containment Atmosphere Post Accident Sampling System (CATPASS) is used to sampling isotopic concentration in the containment atmosphere. MAP-5 microprocessor stations sample iodine and particulates in condenser off-gas and auxiliary and reactor building exhausts.

5.2.2 Fire Protection Devices

CRANE has implemented and maintains a Fire Protection Program as described in the updated FSAR for CRANE. The Fire Protection Program is controlled under CRANE license conditions.

5.2.3 Seismic Monitoring

Strong motion recording systems at CRANE measures ground motion and structural vibrating response caused by an earthquake occurring in the vicinity of the site. Cassette magnetic tape recorders located in the CRANE Control Room receive information supplied by triaxial sensor units which are firmly mounted on the Reactor Building. One triaxial sensor unit is attached immediately outside of the containment wall at the base of the Reactor Building. A second triaxial sensor is situated along the same Reactor Building axis but is attached to the Reactor Building ring girder. The triaxial sensor units begin to supply seismic data to the magnetic tape recorder after a signal is sent to the sensors by a remote starter unit. A remote starter unit attached to the base of the Reactor Building provides a signal for its systems sensor units when the starter unit detects a ground acceleration greater than a present threshold level. The remote starter also actuates an annunciator in the CRANE control room labeled "Threshold Seismic Condition". If the ground acceleration exceeds the horizontal or vertical setpoints, a seismic trigger, also mounted on the base of the Reactor Building, will cause a CRANE annunciator labeled "Operating Basis Earthquake" to actuate.

The time history of a ground motion and resulting vibrating response can be displayed by using magnetic tape cassettes containing the recorded data, and the magnetic tape playback system in the control rooms. The magnetic tape playback system produces visual playouts of selected magnetically recorded data. This is accomplished with a strip chart recorder built into the playback system. A visual playout allows quick analysis of the earthquake. The magnetic tapes are available also for detailed analysis.

Peak reading accelerographs are anchored to Class 1 selected items. These accelerographs will produce a permanent record of the peak amplitude of the low frequency accelerations caused by seismic disturbances.

This record is in the form of magnetic erasure clips which must be developed using the magnetic developer kit. After developing, these clips can be examined to verify seismic response which had been determined analytically.

5.2.4 Onsite Meteorological Monitors

At CRANE, basic meteorological information is obtained from a weather tower maintained at the north end of the Island. Real time information can be obtained from the plant process computer.

The meteorological measurement system is deployed on a 150 ft. tower. It measures wind speed and wind direction at 98 ft. and 145 ft. above grade. There are redundant speed and direction sensors at the 98 ft. level. Temperature is measured at both 31 ft. and 145 ft. from two sets of platinum sensors. Temperature difference (ΔT) is also derived and recorded. A recorder located inside the meteorological building adjacent to the weather tower records all of the above information. The Control Room also has a recorder with wind speed, direction, temperature, and differential temperature which is an indication of atmospheric stability.

Meteorological data can be remotely interrogated by telephone by NRC and Commonwealth of Pennsylvania.

Protective Measures personnel are capable of making real-time offsite estimates of atmospheric effluent transport and diffusion following an accidental airborne radioactive release from the plant. Real time meteorological information is obtained from the plant process computer. The recorder at the meteorological building located at the north end of CRANE has a storage capacity of several months of data. Beyond that time period the meteorological data is permanently stored in a history file. Back-up meteorological information is available from the National Weather Service directly and indirectly from other sources that collect National Weather Service information.

5.2.5 Process Monitors

Process monitors measure appropriate parameters that are indicative of the status of various plant systems and the reactors. These parameters are displayed and recorded in the Control Room, or at local panels in the plant

5.2.6 Laboratory Facilities

The CRANE laboratory facility is equipped to provide the water chemistry and radiochemical analysis support required during normal plant operations and emergencies.

5.3 Protective Facilities and Equipment

Personnel protective action is a function of the nature of the hazard (e.g., preparing for a hurricane is somewhat different from preparing for radiological hazards). Preplanned responses to basic hazards, high wind, flooding, earthquakes, and radiation exposure, are an integral part of the Emergency Plan. A fundamental concept in personnel protection is the evacuation of all individuals not essential to the operation, safety, security, and damage control of the plant. Obviously some hazards can occur before significant protective action can be applied (e.g., earthquake). When the situation permits positive action, the appropriate alarms are sounded and all personnel on the site either assume assigned emergency responsibilities or prepare for evacuation.

Provision has been made for adequate supplies and protective equipment for all personnel who may be required to perform emergency activities. Specific quantities of each type are detailed in station procedures and include equipment for personnel monitoring, determining the magnitude and continuously assessing the impact of the release of radioactive material, decontaminating personnel and providing emergency first aid. Additionally, a current prescription and adequate supplies of potassium iodide are maintained for issue to personnel exposed or suspected of exposure to radioactive iodine.

Onsite locations have been designated as emergency assembly points or areas where emergency teams will be assembled in accordance with the Emergency Plan Implementing Procedures or as directed by the Station Emergency Director. Major locations for onsite protective equipment and supplies are the Control Room, access control point, and processing center. Additional information regarding protective facilities can be obtained by consulting the UFSAR.

5.3.1 First Aid and Medical Equipment

A first aid facility is designed to support a wide range of immediate care requirements ranging from simple first aid to procedures requiring a physician.

Small kits placed throughout the plant provide the most readily available first aid. These kits contain items typically needed to care for minor injuries. Typical contents can be referenced in Table CRANE 5-1. The next level of first aid equipment is found at first aid stations. The medical staff can also provide Advanced Life Support and routine trauma care.

5.3.2 Damage Control Equipment

The CRANE plant site is extensively equipped to conduct preventive maintenance and repairs on mechanical, structural, electrical, and instrumentation and controls equipment found in the plant.

In addition to the equipment and materials required for normal maintenance, other items are available to handle extraordinary maintenance jobs that might arise in damage control. Selection of damage control equipment inventory is based upon (a) mitigating the consequences of flooding, (b) personnel rescue, (c) checking the uncontrolled flow of fluids from process systems, and (d) elimination of electrical hazards. Typical equipment available for damage control can be found in Table CRANE 5-1.

5.3.3 Radiation Protection Equipment

The CRANE plant site maintains an inventory of protective clothing, respiratory equipment, survey instruments and supplies to provide adequate contamination control for all personnel expected to be onsite who might be affected in the event of an emergency.

The supplies are maintained, updated, inventoried and calibrated, as appropriate, on a regular basis in accordance with applicable procedures. Storage locations of emergency supplies can be found in the site implementing documents. Typical equipment available can be found in Table CRANE 5-1.

5.3.4 Emergency Equipment Readiness

Designated emergency equipment and supplies and their storage locations will be listed in the Emergency Plan Implementing Documents. Such equipment and supplies will be maintained, inventoried, inspected and calibrated in accordance with approved site procedures. Equipment, supplies, and parts having shelf-lives will be checked and replaced as necessary.

To insure that the necessary emergency equipment is maintained and available for use during emergency situations, readiness checklists have been developed and incorporated in Administrative Procedures. These checklists facilitate detailed inventory and calibration/functional checks of equipment contained in the emergency kits/lockers. The inventory checklists will be performed on a quarterly basis and to insure interim readiness, all kits/lockers are sealed or locked as appropriate.

Any deficiencies found during the inventory and inspection will be either cleared immediately or documented for corrective action. A report of each inventory and inspection, including documented deficiencies, will be prepared and submitted to the Emergency Preparedness Manager. He will ensure that cognizant department heads assign personnel to correct deficiencies and shall ensure that identified deficiencies are corrected in a reasonable period of time.

5.4 First Aid and Medical Facilities

5.4.1 Decontamination and Medical Response

Emergency first aid and medical treatment will be given to injured personnel who may or may not be contaminated. Provisions have been made, through agreements, to ensure contaminated and injured personnel will receive specialized medical treatment, if necessary. Local hospitals in the vicinity of the CRANE site have agreed to accept contaminated patients for emergency medical and surgical treatment and/or observation.

A comprehensive program of radiological control for injured/contaminated personnel has been developed and will be instituted when necessary during an emergency. The primary emphasis will be to initially address traumatic or life-threatening injuries since radiation injuries may not be immediately life threatening. Detailed instructions for treatment and transportation of contaminated and injured individuals are specified in appropriate procedures.

5.4.2 Medical Transportation

Agreements have been made with local medical support organizations to provide ambulance services to the site. Ambulance personnel will be certified in accordance with State regulations. CRANE will offer training to the squad members in the treatment and transportation of contaminated injured individuals. CRANE will provide radiological control technicians if available to assist the squads enroute to the hospital. CRANE or local first aid squads provide ambulance service for the facility.

When affected personnel must be transported, measures will be taken to prevent the spread of contamination. Such measures will include placing affected personnel in "clean" protective clothing or wrapping them in blankets. The Emergency Director will insure that these organizations, which provide the transportation and treatment, are alerted.

Detailed instructions for treatment and transportation of contaminated and injured individuals are specified in appropriate procedures.

A Letter of Agreement is established with the local Emergency Medical Services agencies to provide Emergency Medical Services in response to a Radiological Event including a Hostile Action Based Event. This includes transportation of patients from CRANE, including those who may have been exposed to radiation or may have injuries complicated by radioactive contamination, to the Penn State Milton S. Hershey Medical Center (HMC) or UPMC Pinnacle Harrisburg Hospital upon dispatch by the Dauphin County Emergency Dispatch.

5.4.3 Medical Treatment

Arrangements for hospital and medical services for injured or contaminated / overexposed personnel are provided for by letters of agreement.

The first level of treatment can be given on-site by personnel trained in first aid. If the severity of the injury requires more extensive or prolonged treatment, the patient will be transported for the second level of assistance. For conventional injuries (that is, non-radiation injuries), the patient will be transported to any of the local hospitals.

Arrangements for hospital and medical services for injured and/or contaminated/overexposed personnel are provided by UPMC Pinnacle Harrisburg Hospital and Penn State Milton S. Hershey Medical Center. These hospitals have agreed to accept contaminated patients for emergency medical and surgical treatment or observation. Detailed plans and procedures are in place for decontamination and treatment of contaminated patients.

A Letter of Agreement is established for UPMC Pinnacle Harrisburg Hospital and Penn State Milton S. Hershey Medical Center to provide assistance in support of the Radiological Emergency Plan at Crane Clean Energy Center to the extent of their capabilities should an emergency situation, including hostile action based event, occur at the Crane Clean Energy Center.

5.5 Communications

5.5.1 Emergency Communications

The provisions utilized for prompt communications among principal emergency response organizations, communications with the ERO and communications with the general public are described in Part II, Section F: Emergency Communications, of the Crane Radiological Emergency Plan.

5.5.2 Radio Communications

Radio communication equipment used during normal plant operations will be used in an emergency to communicate with mobile units and to provide backup to the telephone system.

At CRANE, radio capabilities include the following frequencies from Control Room, OSC, TSC, CAS/SAS and mobile vehicle / potable units, as applicable:

- CRANE Operations Frequencies
- CRANE Security Frequency
- Environmental and Radiological System Frequency
- Maintenance and Rad Con Frequency

Dedicated channels on the redundant T-1 lines to the CRANE radio bay station in the TSC Radiological Assessment Room will allow access from the existing Coatesville multi-channel, fixed base radio system used under the common Emergency Plan for LGS & PBAPS. At the TSC bay station, the T-1 lines will tie into the Station Radio System, thus allowing the use of the existing Environmental and Radiological Frequency for communications with field survey team within the CRANE 10-mile Emergency Planning Zone (EPZ).

The fixed base radio repeaters, antenna system and radio consoles for the Coatesville EOF are powered from a variety of emergency AC sources (diesel backup and alternate battery supplies).

5.5.3 Station Warning System

1. **Alarms**

   Audible alarms are a quick and effective means of communicating emergency warnings on the site. Alarms currently installed at CRANE include:

   - Station Emergency Alarm
   - Fire Alarm
   - Reactor Building Evacuation Alarm

   Each alarm provides a distinctive sound that all site personnel and contractors are trained to recognize and respond to. The Station Emergency Alarm will be followed by an announcement that provides emergency information such as class of emergency declared, accountability directions, radiological precautions, etc. At CRANE, the Reactor Building evacuation alarm is supplemented with flashing lights at specific locations in the Reactor Building to provide both audible and visual warnings.

   The Control Room alarm systems consist of overhead annunciators, panel annunciators and computer alarms. The overhead and panel annunciators consist of flashing translucent tiles and audible indicators (i.e., buzzer or horn). The computer alarms use annunciators and also provide specific data using the alarm printer. At CRANE, alarm data is also provided by CRTs.

2. **Plant Paging System**

The Plant Paging System provides plant-wide paging from the Control Room and all remote stations plus private communications during normal operating conditions.

The plant paging system provides immediate warning and instructions to onsite personnel in the event of an emergency. Phone stations and speakers of this subsystem are located in vital plant areas.

5.6 Law Enforcement Agencies

A Letter of Agreement is established for Local Law Enforcement to support Crane Clean Energy Center to respond to a Radiological Event including a Hostile Action Based Event, in conjunction with the National Incident Management System in accordance with the established communications protocol.

5.7 Fire Fighting Organizations

A Letter of Agreement is established for the Local Fire Departments to respond to a Radiological Event including a Hostile Action Based Event, in conjunction with the Mutual Aid System, upon dispatch by the Dauphin and/or Lancaster County Emergency Dispatch Service

TABLE CRANE 5-1: Inventory of Emergency Kits By General Category

The following is a list of typical equipment available for use during emergencies. While specific equipment designations and items may be subject to change, equivalent emergency activity capabilities will be maintained. Procedures define the specific locations, types, and amounts of equipment for emergency use and define requirements for applicable surveillance, testing, maintenance, and inventory activities to ensure that the equipment is in a state of readiness.

I. RADIATION MONITORING

A. Typical Contents

1. Full Face Respirators with Canisters
2. Survey Instruments - Radiation Survey Meters, Countrate Meters
3. Dosimetry Equipment - Dosimeters/Chargers
4. Protective Clothing
5. Air Sampler and Cartridges
6. Support Materials - Paper, Pencils, Envelopes, Maps, Procedures, Etc.

II. FIRST AID

A. Minor Injury

1. Contain items typically needed for minor injuries.
2. Placed throughout Plant

B. Employee Kits

1. Contain sufficient quantities to serve expected needs of approximately 100 employees.

   NOTE: Locations as determined by Medical Department.

   a. Stretchers

   b. Employee size first aid kits

C. First Aid and Medical Facility

1. Equipment inventory to support professional medical treatment.
2. Contains equipment necessary for examination of patients.

III. DAMAGE CONTROL

A. Typical Equipment Available

1. Hand tools
2. Cutting/Welding equipment
3. Patching materials
4. Portable blowers
5. Submersible pumps
6. Electrical equipment

APPENDIX 1: NUREG-0654 CROSS-REFERENCE

Annex Section	NUREG-0654
1.0	Part I, Section A
1.1	Part I, Section B
1.2	Part I, Section D
1.3	Part I, Section D
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Figure CRANE 1-2	Part II, Section J.10
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2.1	Part II, Section B.5
2.2	Part II, Section A.3
2.3	Part II, Section C.3
2.4	Part II, Section B.1 & 2
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Figure CRANE 2-3	Part II, Section B.5 & 7
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3.1	Part II, Section D.1 & 2
3.2	Part II, Section D.1 & 2
3.3	Part II, Section D.1 & 2
3.4	Not Applicable
3.5	Part II, Section D.3
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4.4.2	Part II, Section J.5
4.4.3	Part II, Section J.3
4.5	Not Applicable
EP-AA-111	Part II, Section I.2 & 3
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5.1.4	Part II, Section H.2 & G.3.b
5.1.5	Part II, Section G.3.a
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5.2.2	Part II, Section H.5.d

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5.2.4	Part II, Section H.5.a & 8
5.2.5	Part II, Section H.5.c
5.2.6	Part II, Section H.6.c
5.2.7	Not Applicable
5.2.8	Part II, Section H.6.b & 7, I.9-10
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Table CRANE 5-1	Part II, Section H.11
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APPENDIX 2: SITE-SPECIFIC LETTERS OF AGREEMENT

The following is a listing of letters of agreement, memorandum of understanding, and contracts specific to emergency response activities in support of the CRANE Station. Letters of agreement, memorandum of understanding, and contracts common to multiple Constellation Nuclear stations are listed under Appendix 3 to the Constellation Nuclear Standardized Radiological Emergency Plan.

Medical Support Organizations

- Penn State Health Milton S. Hershey Medical Center
- South Central Emergency Medical Services (EMS)
- Penn State Health Lancaster Medical Center

Firefighting Organizations

- Londonderry Fire CompanyLaw Enforcement Agencies
  - Pennsylvania State Police

Other Agencies

- Londonderry Fire Department (Staging Area)
- Pennsylvania Emergency Management Agency (PEMA)
- Harrisburg Area Community College
- Norfolk Southern Railway Company

ENCLOSURE 2B

Clean Version of EP-AA-1009

Crane Clean Energy Center
Renewed Facility License No. DPR-50

CONSTELLATION NUCLEAR

RADIOLOGICAL EMERGENCY PLAN ANNEX

FOR CRANE CLEAN ENERGY CENTER (CRANE)

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REVISION HISTORY

REVISION	REVISION DATE
0	February 2002
1	May 2003
2	September 2003
3	December 2004
4	November 2005
5	January 2006
6	February 2006
7	June 2006
8	May 2007
9	July 2007
10	January 2008
11	June 2008
12	August 2008
13	March 2009
14	March 2010
15	May 2010
17	March 2011
18	July 2012
19	November 2012
20	December 2012
21	June 2013
22	June 2014
23	December 2014
24	March 2015
25	July 2017
26	August 2017
27	November 2017
28	March 2018
29	December 2018
30	September 2019
31	September 2020
32	TBD
33	TBD

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Revision History Summary:

In 2017, Constellation (at the time Exelon) announced the intent to permanently shut down the operating Unit-1 reactor at Three Mile Island Station by the fall of 2019. Constellation revised the station Emergency Plan to establish the Three Mile Island Station Emergency Plan as an independent Emergency Plan separated and de-linked from the fleet Standardized Radiological Emergency Plan (Standard Plan). This allowed decommissioning changes to be made to the Station Emergency Plan without impacting the Standard Plan.

A new Emergency Plan procedure was created for Three Mile Island. It contained regulatory commitments applicable to Three Mile Island which were in the fleet Standardized Radiological Emergency Plan. The new procedure was EP-TM-1000, *Three Mile Island (TMI) Station Radiological Emergency Plan*. The 10CFR.54(q) evaluation #17-122 evaluated the changes between the Standard Plan, the Station Annex, and EP-TM-1000.

Upon implementation, the revised Three Mile Island Emergency Plan was independent of the fleet Emergency Plan. The new Three Mile Island Emergency Plan formed the regulatory basis for developing and submitting License Amendment Requests to the NRC to support decommissioning.

In 2024 Constellation announced the intent to restart Three Mile Island Station Unit 1 as the Crane Clean Energy Center, pending NRC approval. Constellation is revising the station Emergency Plan to support restart. The Emergency Plan in place at the time operations were halted was EP-TM-1000 Revision 0. EP-TM-1000 Revision 1 updated the List of Corporate LOAs and update the definition of the Exercise Cycle to eight years. Subsequent revisions to EP-TM-1000 implemented approved regulatory exemptions as the station progressed through the stages of decommissioning. EP-AA-1009, TMI Radiological Emergency Plan Annex, Revision 29 was in effect at the time. As with EP-TM-1000, subsequent revisions to EP-AA-1009 reflected the station's progression through the stages of decommissioning.

The Emergency Plan document was renumbered and revised to reflect the transition from EP-TM-1000 Rev. 1 to EP-CR-1000 Rev. 0. The station annex was revised to reflect the transition from EP-AA-1009 Rev. 29 to EP-AA-1009 Rev. 32.

Section 1: Introduction

As required in the conditions set forth by the Nuclear Regulatory Commission (NRC) for the operating licenses for the Constellation Nuclear Stations, the management of Constellation recognizes its responsibility and authority to operate and maintain the nuclear power stations in such a manner as to provide for the safety of the general public.

The Constellation Emergency Preparedness Program consists of the Constellation Nuclear Standardized Radiological Emergency Plan ("Standard Plan"), Station Annexes, emergency plan implementing procedures, and associated program administrative procedures. The Standard Plan outlines the basis for response actions that would be implemented in an emergency. Planning efforts common to all Constellation Nuclear stations are encompassed within the Standard Plan.

This document serves as the Crane Clean Energy Center (CRANE) Annex and contains information and guidance that is unique to the station. The Station Annex is subject to the same review and audit requirements as the Radiological Emergency Plan.

1.1 Facility Description

Crane Clean Energy Center is operated by Constellation Nuclear. CRANE Unit #1 is an 870 Mwe, pressurized water-type, nuclear steam supply system supplied by Babcock & Wilcox Company.

TMI Unit 2 is owned by Energy Solutions. The TMI Unit 2 reactor was damaged during an accident in 1979 and is currently de-fueled and the plant maintained in long-term monitored storage. The arrangement of the major CRANE and TMI-2 facilities is shown in Figures CRANE 1-1 and CRANE 1-2. The Crane Emergency Preparedness Program includes both CRANE and TMI-2.

CRANE is located in an area of low population density about 12 miles southeast of Harrisburg, Pennsylvania.

The area is in Londonderry Township, Dauphin County, about 2.5 miles from the southern tip of Dauphin County, where the county is coterminous with York and Lancaster Counties.

The CRANE site is part of an 814-acre tract consisting of CRANE and several adjacent islands, which were purchased by a predecessor. The island, which is situated about 900 feet from the east bank and approximately one mile from the west bank of the Susquehanna River, is elongated parallel to the flow of the river with its longest axis oriented approximately due north and south. The north and south ends of the island have access bridges, which connect the island to State Highway Route 441. The north access bridge is used daily. Route 441 is a two-lane highway, which runs parallel to CRANE on the east bank of the Susquehanna River and is more than 2,000 feet from the CRANE reactors at the closest point.

A Norfolk Southern one-track line runs adjacent and parallel to Route 441 on the east bank of the river. On the west bank of the river, there is a multi-track Norfolk Southern line at the river's edge about 1.25 miles west of the site and a black top, two lane road that runs parallel to it. There is a one-track railroad spur across the bridge on the north end of the island, which is used for site-related activities. A general area map showing the relative location of the CRANE sites is shown as Figure CRANE 1-2.

In addition to the information listed above, specific details concerning the CRANE Site are included in the Updated Final Safety Analysis Report (UFSAR).

1.2 Emergency Planning Zones

CRANE has taken into consideration the information and data presented above, guidance provided by the Environmental Protection Agency (EPA), NRC and the Pennsylvania Emergency Management Agency (PEMA), as well as other important factors such as organizational capabilities, availability of emergency facilities and equipment, and the methods for implementing the Emergency Plan in defining the Emergency Planning Zones (EPZs) for the CRANE. As a result, an EPZ having an approximate radial distance of 10 miles from the site has been defined as the “Plume Exposure Pathway”. An EPZ having a radial distance of 50 miles from the site has been defined as the “Ingestion Exposure Pathway”.

Figure CRANE 1-4 illustrates the respective boundaries of for the Plume Exposure and Ingestion Pathways.

1.2.1 Owner Controlled Area, Exclusion Area and Low Population Zone

1. The Owner Controlled Area for the CRANE site includes all areas within the perimeter security fence. The minimum distance to the owner controlled area boundary is measured from the centerline of the Fuel Handling Building to the western shoreline of the island, which is approximately 675 feet.

2. The Exclusion Area for the CRANE site is a 2,000 foot radius that includes a portion of CRANE, the river surface around it, and a portion of Shelly Island. The minimum distance of 2,000 feet occurs on the shore of the mainland in a due easterly direction. The CRANE licensee retains complete authority to determine and maintain sufficient control of all activities including the authority to exclude or remove personnel and property for all land areas within the exclusion area. A map showing the exclusion area boundary is included as Figure CRANE 1-3. For the purposes of Emergency Planning, the exclusion area boundary and the site boundary are considered the same.

3. The Low Population Zone (LPZ) has a minimum distance of 2 miles to its outer boundary. The area of the Low Population Zone is also shown in Figure CRANE 1-3.

1.2.2 Population and Population Distribution

As previously discussed, LPZ has been defined with a minimum distance of 2 miles from its outer boundary to the CRANE site. The nearest major population center is Harrisburg, Pennsylvania which is located approximately 12 miles northwest of CRANE. This distance satisfies the requirements of 10 CFR 100 with respect to population center distance. The population of residential areas, typical enrollment in various schools, and the hospital patient capacity in the surrounding area can be found in the CRANE Evacuation Time Estimate (ETE) Study.

Within the two-mile LPZ, there are no schools. There are several recreational areas (Falmouth Fish Commission Access Area, Tri-County Boat Club and Canal Lock Boat Launch Area). There is some seasonal shift in population within a 5-mile radius of CRANE since there are over 100 summer cabins on the islands within the area. Additional transients participate in boating activities in the vicinity of CRANE.

1.2.3 Local Industrial and Military Facilities

The CRANE site is currently surrounded by farmlands within a 10-mile radius. Lands are used for dairy cattle, tobacco, poultry, vegetables, fruit, corn, wheat, and other products. A summary of land use for the risk counties is provided in Table 1 and the FSAR. The Susquehanna River is used for sport fishing and boating but is not used for commercial fishing. Manufacturing industries in the region produce clothing, wood products, shoes, electrical wiring devices, steel products, packed meat and other food. These activities, within a 10-mile radius of the site, are confined chiefly to the communities of Harrisburg, New Cumberland, Steelton, and Middletown. A listing of typical industries within 10 miles of CRANE can be found in the site Updated Final Safety Analysis Report (UFSAR). There are gas and oil transmission lines located at a minimum distance of approximately 2 miles from CRANE.

Approximately 3 miles downstream from the site is the York Haven hydro-electric project. The York Haven Station is operated on a "run-of-the-river" basis, and its power output is dependent primarily upon the water available. The reservoir is used for peaking operation during periods of low river flow. Brunner Island Station, a large steam-electric generating plant owned by the Pennsylvania Power & Light Company is located on the Susquehanna River approximately one mile downstream from the York Haven project. This station uses water from the river on a "once-through" basis for cooling water. Three other hydroelectric generating stations are also located downstream from CRANE, with each project having a dam and reservoir on the Susquehanna River. The three stations are Safe Harbor, Holtwood, and Conowingo Hydroelectric Projects, located approximately 25, 31, and 47 miles south of CRANE, respectively. There is also a coal fired, steam electric plant at Holtwood, and the Muddy Run Pumped Storage Project is associated with Conowingo Station. The Peach Bottom Atomic Power Station (PBAPS) is located along the west bank of the Susquehanna River, about 41 miles downstream of CRANE, just north of the Maryland-Pennsylvania border and is the only nuclear plant within a 50-mile radius of CRANE.

There are two airports within 10 miles of the CRANE sites. Harrisburg International Airport (formerly Olmsted Air Force Base) is located on the east bank of the Susquehanna River approximately 2.5 miles northwest of the site. The Capital City Airport is located approximately 8 miles west-northwest of CRANE. The vital areas of the CRANE sites are designed to withstand a hypothetical aircraft accident.

Norfolk Southern lines are located on both sides of the Susquehanna River, the closest being the east bank, approximately 2,000 feet from the CRANE Reactor Buildings. Routine traffic in liquified petroleum gas was identified on the railroad line, which passes along the east shore of the river. Analyses indicate that any missiles generated by this traffic would be less damaging than the postulated aircraft strike against which the plant is protected and that flammable gases would dissipate before reaching the CRANE Nuclear Units.

The closest military installation to the site is the Air National Guard facility at Harrisburg International Airport. There are no military firing ranges or missile facilities within a 10-mile radius of CRANE. Other military facilities, however, are Army and Navy depots located at New Cumberland and Mechanicsburg, Pennsylvania, respectively.

1.3 Participating Governmental Agencies

The Constellation Nuclear Radiological Emergency Plan (REP) Annex for CRANE was developed in coordination with the Commonwealth of Pennsylvania Emergency plan. In addition, specific State requirements for reporting of emergencies, providing information and data, and recommending protective actions, have been integrated directly into the Emergency Plan Implementing Procedures. In considering the Plume Exposure Pathway, there are also county plans that have been considered in the development of the REP Annex for CRANE. The State Plan designates PEMA

as the lead state agency for radiological emergency response planning and the state agency through which the Governor will exercise coordination and control during emergency. The State Plan is an integrated document setting forth the resources and responsibilities of all relevant state agencies. Significant plans from the State Departments of Agriculture, Environmental Resources, Bureau of Radiation Protection (BRP) are included in the State Plan.

1.3.1 Federal Agencies

A summary of Federal response agencies, responsibilities and activities, as described under the National Response Framework (NRF), is contained in the Standard Plan. Specifics related to support for CRANE Station are listed below.

1. **The Department of the Army (local Ordinance Detachment)** will provide an Explosive Ordinance Disposal capability in response to requests for assistance in the event of a bomb threat.

2. **The Federal Aviation Administration (FAA)** will ensure air traffic is diverted in the event of an emergency situation with a potential for radioactive release.

3. **National Weather Service (NWS)** will provide backup meteorological information upon request.

1.3.2 State Agencies

The planning for and response to a radiological emergency at the CRANE site is the joint responsibility of CRANE and the state/county/local governmental agencies. CRANE is responsible for onsite emergency response. In order to fulfill this responsibility, CRANE relies on various offsite agencies, both governmental and private, to provide assistance beyond that available onsite. The Commonwealth of Pennsylvania, through the various state, county and local agencies, is responsible for offsite emergency response. In order to fulfill this responsibility, the state relies on CRANE to provide necessary information on plant status and radiation releases. Recognizing the joint nature of their responsibilities, CRANE and the relevant governmental agencies have coordinated their emergency planning and have provided for adequate and redundant communication systems to coordinate their response during an emergency event.

1. **Pennsylvania Emergency Management Agency (PEMA)**

   PEMA is responsible to coordinate emergency services in the Commonwealth of Pennsylvania. Should a radiological emergency occur at the CRANE site that requires the implementation of state, county, and local government radiological emergency response plans, the state agency through which the Governor will exercise coordination/control will be PEMA. However, as in all emergencies, the Governor retains directional control.

   PEMA exercises authority over all non-licensee offsite organizations, who are a part of the emergency response team in the CRANE Plume Exposure and Ingestion Pathways. This authority is based on the provisions of Section 7313 of the State of Pennsylvania Emergency Management Services Code 35 PA (C.S.A. Sections 7101-7707) also referred to as Pamphlet Law 1332. By law, PEMA is authorized to:

   - Provide emergency direction and control of Commonwealth of Pennsylvania and local disaster emergency operations.

   - Accept aid and coordinate assistance provided by Federal Agencies under provisions of the Federal Disaster Relief Act of 1974.

2. **Department of Environmental Protection**

   The Department of Environmental Protection (DEP), under the administration and technical direction of the Secretary, is responsible for gathering and evaluating technical information and for supplying such information and technical advice and recommendations to PEMA and the Pennsylvania Emergency Management Council.

   Within the DEP, the Bureau of Radiation Protection (BRP) has been delegated responsibility for radiological emergencies. Specific responsibilities assigned to the DEP/BRP that are appropriate to radiological emergencies are defined in the State Plan. To provide for emergency response capability, the BRP has made provisions for 24 hour per day interface with PEMA.

1.3.3 County Agencies

Pamphlet Law 1332 states that, "each political subdivision of this Commonwealth is directed and authorized to establish a local emergency management organization in accordance with the plan and program of the PEMA. Each local organization shall have responsibility for emergency management, response and recovery within the territorial limits of the political subdivision within which it is organized and, in addition, shall conduct such services outside of its jurisdictional limits as may be required under this part." Therefore, each County and Local Emergency Management Coordinator in the State is responsible for establishing an emergency management organization within their respective jurisdiction, developing plans and preparing for emergency operations.

With respect to the CRANE Plume Exposure Pathway, Dauphin, York, Cumberland, Lancaster and Lebanon Counties have prepared Radiological Emergency Response Plans that are coordinated with both the State's Disaster Operations Plan and the REP Annex for CRANE Station. Local government plans are either included directly within the respective County plan or are maintained as separate but coordinated documents. The county Emergency Operations Centers (EOCs) are the location of the County dispatcher for police, fire, rescue and emergency medical services and is manned by dispatchers on a 24-hour basis. In the event of a PEMA communications breakdown, Dauphin County will act as the primary Communicator with PEMA, BRP, and the other four risk counties.

1.3.4 Additional Support Agencies

The nature of an emergency may require augmenting the emergency organizations with assistance from additional personnel and organizations. In order to ensure that support from local law enforcement, fire departments, hospitals, ambulance services and other organizations will be available on relatively short notice, agreements have been established with personnel and organizations. Agreements from offsite individuals, groups and agencies that support CRANE may take one of the following forms:

- Contracts
- Letters of Agreement
- Memoranda of Understanding
- Formal Emergency Plans

Refer to Appendix 2 for a listing of offsite support organizations.

FIGURE CRANE 1-1: CRANE Site Arrangement

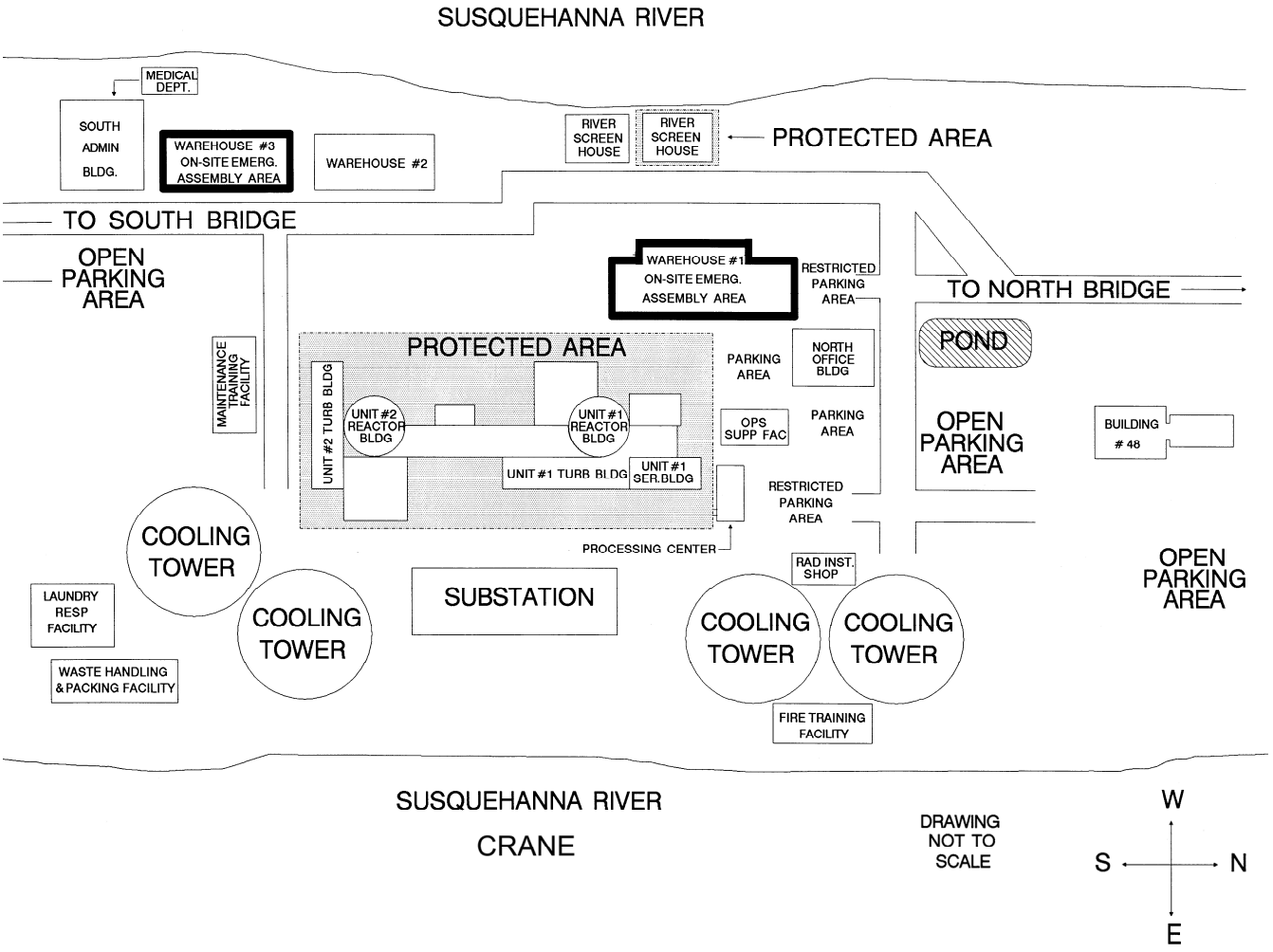


FIGURE CRANE 1-2: Relative Location of the CRANE Site

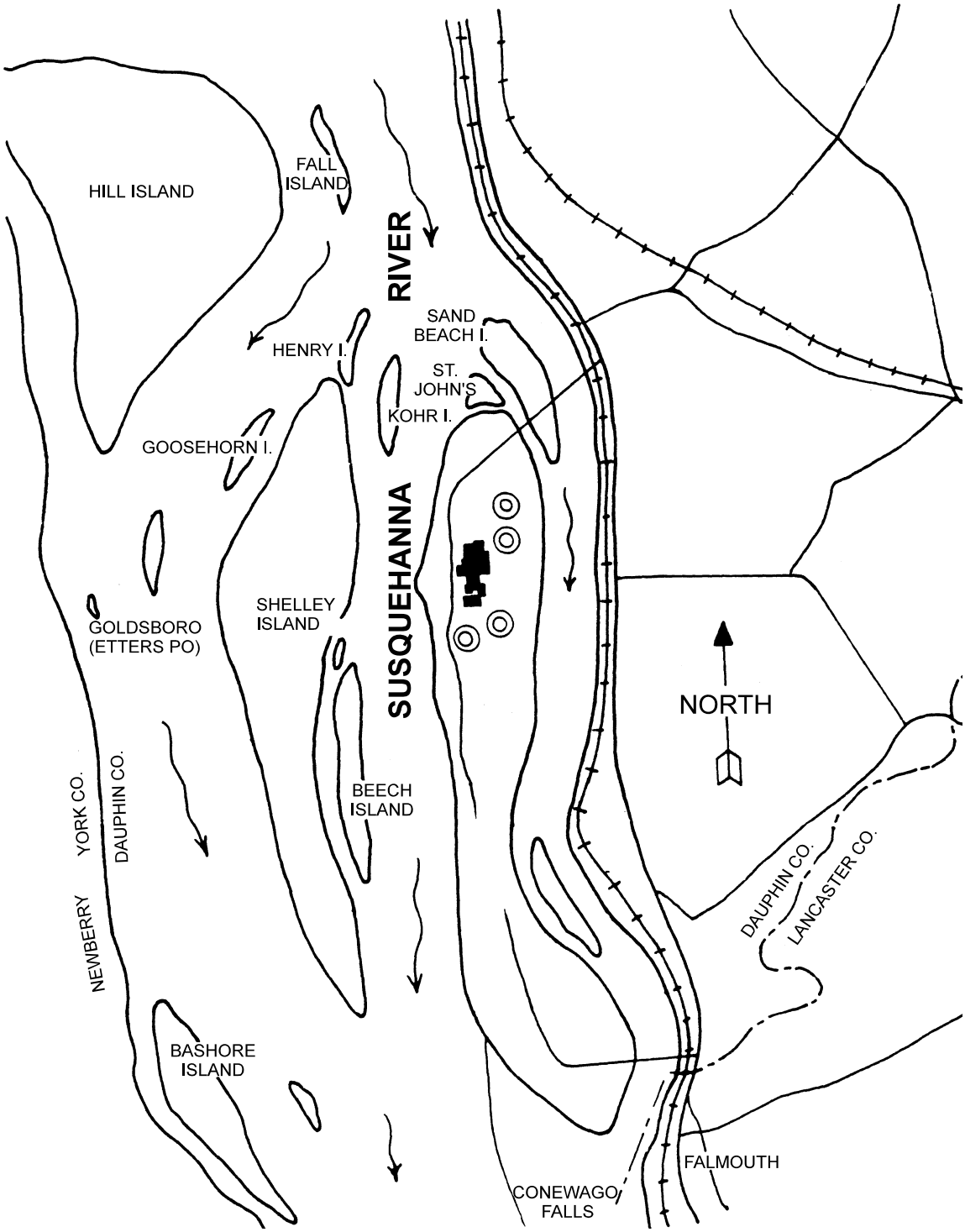


FIGURE CRANE 1-3: CRANE Site Exclusion Area and Low Population Zone

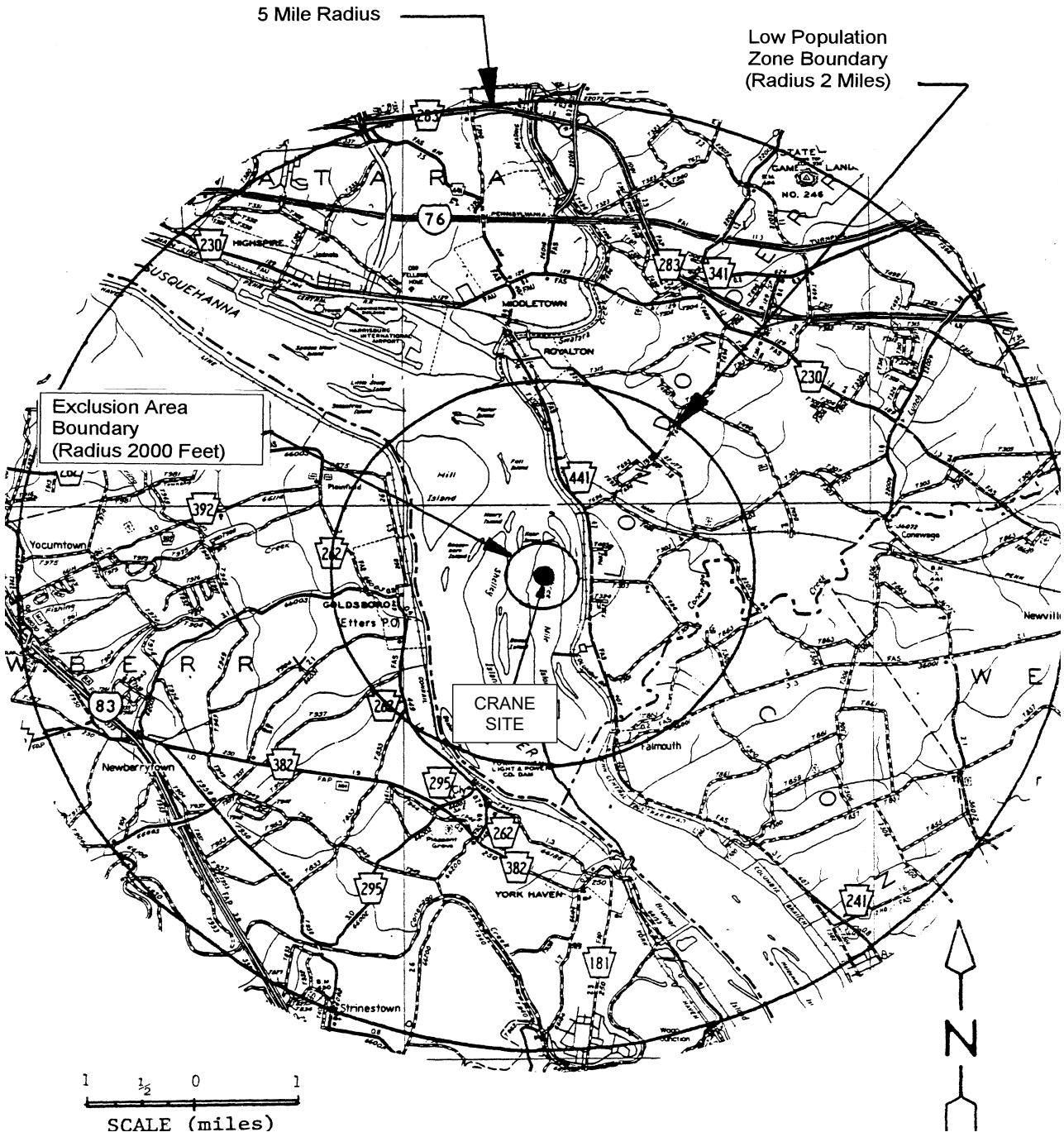
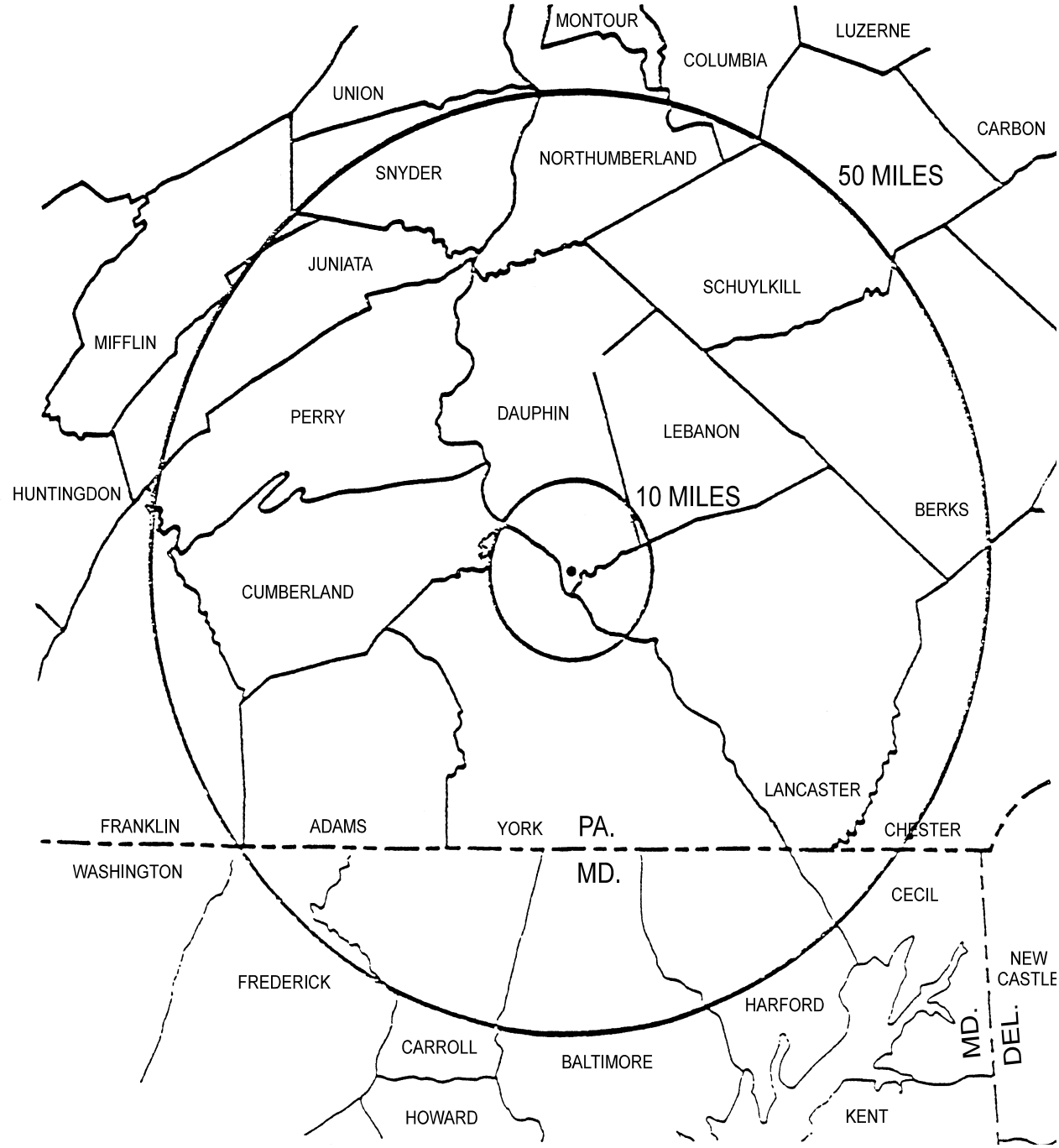


FIGURE CRANE 1-4: Plume Exposure and Ingestion Pathway EPZs

Risk Counties: Cumberland, Dauphin, Lancaster, Lebanon, York



Section 2: Organizational Control of Emergencies

Crane's Emergency Response Organization (ERO) and its key positions are described in the Constellation Radiological Emergency Plan for Crane (EP-CR-1000). This section describes interfaces among Constellation Nuclear emergency response personnel and specifies the offsite support available to respond to the nuclear generating stations.

2.1 Shift Technical Advisor (STA) / Incident Assessor

The responsibilities of the STA are delineated on OP-AA-101-111, "Roles and Responsibilities of On-Shift Personnel." If the STA is the Shift Manager or Unit Supervisor, then another Senior Reactor Operator (SRO) shall assist as Incident Assessor during unexpected conditions and transients. 2.2 Emergency Response Organization (ERO) Staffing

2.2 Emergency Response Organization (ERO) Staffing

Refer to Table CRANE B-1, Minimum Staffing Requirements for CRANE, in the Crane Radiological Emergency Plan for a description of 60-minute and full augmentation commitments. An illustration of the overall Constellation ERO command structure is provided in the Crane Radiological Emergency Plan, Figure CRANE B-1a.

2.2.1 Emergency Onsite Organization (Figure CRANE B-1b)

2.2.2 Emergency Offsite Organization (Figure CRANE B-1c)

2.2.3 Emergency Public Information Organization (Figure CRANE B-1d)

2.3 Emergency Response Organization (ERO) Training

Training is conducted in accordance with TQ-AA-113, "ERO Training and Qualification." Retraining is performed on an annual basis, which is defined as once per calendar year not to exceed 18 months between training sessions.

CRANE will offer training for hospital personnel, and ambulance and rescue, police and fire departments required to support implementation of the CRANE Emergency Plan. This training shall include the procedures for notification, basic radiation protection and their expected roles. For those support organizations that must enter the site, training shall also include site access procedures and the identity (by title) of the individual in the site emergency organization who will control the organization's support activities.

2.4 Non-Constellation Nuclear Support Groups

The nature of an emergency may require augmenting the emergency organizations with assistance from additional personnel and organizations. In order to ensure that support from local law enforcement, fire departments, hospitals, ambulance services and other organizations will be available on relatively short notice, agreements have been established with personnel and organizations. Agreements from offsite individuals, groups and agencies that support CRANE may take one of the following forms:

- Contracts
- Letters of Agreement
- Memoranda of Understanding
- Formal Emergency Plans

Refer to Appendix 2 for a listing of these support organizations.

2.4.1 Miscellaneous Organizations

- Other utilities
- Institute for Nuclear Power Operations (INPO)
- American Nuclear Insurers (ANI)
- Framatome
- Aviation services

2.4.2 Norfolk Southern Railroad Company

The Norfolk Southern Railway track crosses the access to the facility, and impeding site access could impact the implementation of time sensitive emergency actions. Theses emergency actions include augmentation of the Emergency Response Organization, use of off-site assistance, and evacuation of non-essential personnel. Therefore, a Memorandum Of Understanding (MOU) has been established with Norfolk Southern Railway Company. The purpose of the MOU is to ensure that stopped or disabled train traffic does not impede access to the island across the North Bridge for the duration of the emergency. This will provide reasonable assurances that there is sufficient time to allow implementation of emergency actions at CRANE in the event of a declared emergency. The MOU with Norfolk Southern Railway Company will be reviewed every five years.

The CRANE Staffing Tables and supporting information are re-located in EP-CR-1000.

Section 3: Classification of Emergencies

The CRANE Emergency Action Levels and supporting information are re-located in EP-AA-1009, Addendum 3.

Section 4: Emergency Measures

4.1 Notification of the Emergency Organization

Notifications for the Crane Clean Energy Center are in accordance with Section E.3 of the Crane Radiological Emergency Plan. For initial notification/escalation of Unusual Event, Alert and Site Area and General Emergencies, CRANE will notify the following offsite agencies within 15 minutes of event declaration:

- Pennsylvania Emergency Management Agency (PEMA)
- Dauphin County
- York County
- Lancaster County
- Lebanon County
- Cumberland County

Within one hour of event classification but immediately following notification of PEMA and the risk counties, CRANE will also notify the Nuclear Regulatory Commission.

Upon notification of an emergency at Crane Clean Energy Center, the Pennsylvania Bureau of Radiation Protection (BRP) will contact the appropriate station to verify that an emergency exists and to obtain technical information and then makes recommendations to PEMA regarding protective actions for the public. The BRP Support Plan For Fixed Nuclear Facility Incidents utilizes the Protective Action Guidelines in the U.S. Environmental Protection Agency (EPA) 400-R-92-001, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents".

In addition to the initial notification and verification, communication channels will be maintained between the facility and offsite emergency response organizations to allow for any further dissemination and update of information concerning the emergency.

The Commonwealth of Pennsylvania, in accordance with the State Radiological Emergency Response Plan, will coordinate offsite emergency support from Federal, State and local agencies

Constellation will provide follow-up information to the BRP or other off-site authorities. The follow-up information will keep these authorities apprised of existing or potential radiological releases, meteorological conditions, projected doses and contamination levels, licensee actions, recommend protective actions and other information pertinent to the authorities' responsibilities. The information may be provided over open communication paths or in person to BRP personnel.

4.1.1 Offsite Agency Response

1. **Risk Counties (Within Plume Exposure Pathway)**

   - The dispatcher at the Risk Counties shall notify their County Emergency Management Coordinator or his designated alternate.
   - The County Office of Emergency Management shall notify county and municipal personnel, as appropriate.
   - Dauphin County - Act as central communications agency in the event of a PEMA/CRANE communication breakdown.

2. **Pennsylvania Emergency Management Agency (PEMA)**

   Upon receiving notification of an emergency from the site, the PEMA Duty Officer Agency shall immediately notify the State Bureau of Radiation Protection (BRP).

   PEMA will also notify the following personnel, organizations, and agencies as appropriate in accordance with their standard operating procedures:

   a. Other affected County Emergency Management Agencies
   c. Other affected states
   d. Selected State agencies
   e. Selected Federal agencies

3. **Department of Environmental Protection / Bureau of Radiation Protection (DEP/BRP)**

   The Incident Manager, who receives the notification from PEMA, shall:

   - Contact the licensee to: (1) Verify actual origin of the emergency message; (2) Determine the classification of the emergency; and (3) Obtain and assess information and data pertaining to the emergency.
   - Initiate activation of the BRP emergency response organization, if appropriate.
   - Advise the PEMA Duty Officer or Operations Officer of the BRP initial assessment of the emergency.
   - Notify selected Federal agencies, as appropriate.

4.2 Assessment Actions

The effluent radiation monitoring system provides indications of gross releases of gaseous and liquid radioactivity. By applying calibration factors, meteorological data, or river flow, the gross indications are used to calculate approximate release rates in μCi/sec and dose rates at specific distances along the release pathways. Particulate and iodine analysis depends on collecting installed filter papers and charcoal cartridges for analysis in the counting room. Similar calculation procedures are applied to approximate release rates and dose rates due to iodine.

Detectors are strategically located throughout the plant. These detectors indicate and alarm locally and in the Control Room. They serve the purpose of indicating current dose rates in those areas and are used for local evacuation action levels and re-entry operations.

Certain plant operating systems contain radiation monitors. These systems are described in the CRANE UFSAR.

Portable monitoring instruments and sampling equipment consist of such items that are utilized and maintained on-site for normal day-to-day plant operations and are thus available for emergency use.

Refer to Section 5.2 for a listing of assessment resources.

4.2.1 Radiological Assessment and Offsite Monitoring

For the emergency assessment of gaseous releases, refer to the description of the dose projection model contained in Part II, Section I.4 of the Standard Plan.

For liquid releases, the radionuclide concentration at any downstream location is determined by taking liquid effluent concentrations and applying the effluent flow rate and volumetric flow rate of the receiving water. Downstream users will be notified to curtail intake if the projected concentration is above the level specified in the procedures.

4.2.2 Source Term Determination

Should the effluent radiation monitors be off-scale or otherwise inoperable, assessment of releases and off-site exposure would be made using the containment monitor readings, point of release grab samples, and pathway samples.

A detailed core damage assessment methodology has been established under Section 6.0 of the CRANE Technical Support Center Calculation Guides. The process used is based on measured physical and chemical parameters that occur in the plant when the core is damaged. Three (3) methods have been developed under Section 6.0 of the CRANE Technical Support Center Calculation Guides (per TDR 431) to determine core damage estimates:

1. In-core thermocouple temperature correlations to fuel conditions;

2. Radiation monitor and hydrogen production correlations based on fuel and plant system conditions; and

3. Chemical measurement correlations based on radionuclide inventory released into reactor coolant during core damage.

Throughout each emergency situation, continuing assessment will occur. Assessment actions at Crane Clean Energy Center may include an evaluation of plant conditions; in-plant, onsite, and initial offsite radiological measurements; and initial estimates of offsite doses. Core damage information is used to refine dose assessments and confirm or extend initial protective action recommendations. Crane Clean Energy Center utilizes EP-AA-110-302, Core Damage Assessment (PWR) as the basis methodology of post-accident core damage assessment. This methodology utilizes real-time plant indications. In addition, Crane Clean Energy Center may use samples of plant fluids and atmospheres as inputs to the CDAM (Core Damage Assessment Methodology) program for core damage estimation.

4.3 Protective Actions for the Offsite Public

The responsibility for actions to protect persons in offsite areas rests with the State and is described in detail in the State Emergency Plan and implemented in conjunction with the county emergency plans.

DEP/BRP is the specific agency responsible for evaluating information from the CRANE staff and all other sources and recommending to PEMA that protective actions be taken. The BRP has sheltering and evacuation as protective action options. The most appropriate protective action for a particular situation will depend on the magnitude of the release, duration of the release, wind speed, wind direction, time of day and transportation constraints. In the case of a General Emergency, circumstances may indicate the immediate need to initiate some precautionary protective action. This judgment is the responsibility of the BRP and should be based on an evaluation of the current plant conditions, dose projections relative to the PAG's and expected subsequent plant operations/evaluations.

Off-site it is the responsibility of the State Department of Agriculture, in conjunction with the Department of Environmental Protection, to issue guidance and coordinate actions to control contaminated agricultural products.

The means to warn or advise involved persons is a responsibility of the risk county. The risk county, in coordination with the State, is also responsible for the preparation and dissemination of information material for the general public on protective actions including necessary information (evacuation routes, maps, etc.) for the implementation of protective measures in the Plume Exposure Pathway.

The population within the 10-Mile Emergency Planning Zone (Plume Exposure Pathway) will be provided, on a periodic basis, information describing the methods by which they will be notified of an emergency and specific instructions that should be followed upon receipt of such notification.

4.3.1 Alert and Notification System (ANS)

The capability exists for the prompt notification of the general public within the Plume Exposure Pathway Emergency Planning Zone (EPZ) for CRANE.

The Alert and Notification System (ANS) for Crane relies on the Integrated Public Alert Warning System (IPAWS)-WEA (Wireless Emergency Alerts) and IPAWS-EAS (Emergency Alert System) as the primary means of alerting and notifying the public, respectively, and an independent electronic Mass Notification System (MNS) as the backup means.

The Integrated Public Alert Warning System (IPAWS) is operated by local governmental agencies and maintained by FEMA. A more specific description of the various prompt public notification systems is presented in the FEMA ANS Design Report for Crane.

4.3.2 Evacuation Time Estimates

The ETE study uses population data from the decennial census which includes parts of five Pennsylvania counties: Cumberland, Dauphin, Lancaster, Lebanon and York. The evacuation times are based on a detailed consideration of the EPZ roadway network and population distribution. The ETE Study, contained in EP-AA-1009 Addendum 2, Evacuation Time Estimates for the Exposure Pathway Emergency Planning Zone, presents evacuation times for daytime and nighttime scenarios under various weather conditions for the evacuation of various areas around the CRANE Station, once a decision has been made to evacuate.

4.3.3 Potassium Iodide (KI)

The Department of Health, Commonwealth of Pennsylvania, is responsible for providing advice to PEMA on the planning for the use, stockpiling and distribution of Potassium Iodide (KI) or other thyroid blocking agents and such other radiological health materials as may be required for the protection of the general public. Their decision shall also be based on U.S. FDA guidance.

Based on the criteria established under the Commonwealth of Pennsylvania Operations Plan, the CRANE Station will recommend to government officials that the general public be notified to take KI at a General Emergency classification in those areas were an evacuation or shelter has been recommended. This notification will be approved by the Emergency Director in Command and Control of PAR decision-making and off-site notifications and performed as part of the State / local notifications described under Sections II.B.4 and II.E.3 of the Crane Radiological Emergency Plan.

4.3.4 Public Information

a. Publications

Public information on protective actions is prepared and disseminated annually to provide clear instructions to the population-at -risk. Constellation Nuclear assists PEMA and risk counties in the preparation and distribution of their respective public information.

Pamphlets outlining public education response actions are readily available for transients in the 10-Mile EPZ. In addition, emergency information is provided to the operators of other recreational areas in the 10-Mile EPZ, as defined by the Commonwealth of Pennsylvania and risk counties.

These public information publications instruct the public to follow the wireless emergency alerts. These publications also identify the local radio stations to which the public should tune in for information related to the emergency. Additional materials (e.g., such as rumor control numbers, evacuation routes, etc) may also be included in these publications based on agreements with responsible State and risk county agencies.

b. News Media Education

Information kits are available to news media personnel. These kits include information on a variety of nuclear power plant related subjects.

4.3.5 Protective Action Recommendations (PARs) for the General Public

To aid the Emergency Response Organization during a developing emergency situation, EP-AA-111, "Emergency Classification and Protective Action Recommendations" has been developed.

4.4 Protective Actions for Onsite Personnel

During an emergency, personnel may be required to temporarily relocate to prevent or minimize exposure to radiation and radioactive materials. The following subsections discuss the policies applying to sheltering, evacuation and personnel accountability during emergencies at the CRANE site.

At the time an emergency is declared, an announcement is made on the site public *address* system to all personnel within the Owner Controlled area. The announcement will include the classifications of the event, a brief description of the event, and actions taken by site personnel. Shift personnel will proceed to their emergency assignments.

The CRANE licensee retains complete authority to determine and maintain sufficient control of all activities including the authority to exclude or remove personnel and property for land areas within the exclusion area and contamination will, thereby, be controlled. In addition, there are no areas for producing agricultural products within the exclusion area. In-plant contamination control will be in accordance with approved Radiological Controls procedures.

The primary protective measures for onsite personnel during an emergency is prompt evacuation from areas, which are affected by significant radiation, contamination, airborne radioactivity or other personnel hazards. All persons onsite at the time an emergency is declared shall be notified by means of the plant page supplemented by designated personnel providing notification in areas that the page does not cover.

4.4.1 Emergency Personnel Exposure

Exposure to personnel remaining onsite as or in support of ERO activities will be monitored. This may be accomplished through continuous monitoring for habitability at designated emergency and support facilities. Dosimetry will be issued to personnel leaving or working outside a monitored facility and will be available to ERO personnel located inside a site emergency facility, in the event of a radiological release or elevated plant radiation levels, as applicable, per approved procedures. Additional provisions have been made for dosimetry issue at the site entrance gates or other locations, if required. Dosimetry will be periodically read and recorded in accordance with approved RP procedures.

Emergency personnel, including those involved in the removal of injured persons, undertaking corrective actions, performing assessment or personnel decontamination, and providing first aid and support to ambulance services will have their radiation dose controlled in accordance with approved procedures and normal Radiation Protection (RP) practices.

When offsite emergency personnel are called to respond to CRANE, station RP support is provided to support these activities, which include the monitoring and control of radiation exposure and evaluation of radiological hazards.

4.4.2 Radiological Monitoring and Decontamination

Personnel and equipment decontamination will be initially accomplished at the Radiation Protection Access Control Point where specialized equipment and supplies are available. Procedures are written with specific details for decontamination. For personnel within the Protected Area, emergency situations, which require decontamination will be handled in accordance with these procedures.

All personnel leaving a Radiological Controlled Area (RCA) will be monitored for contamination. Any individual found to have contamination levels in excess of thresholds established in RP procedures will be considered contaminated.

Personnel found to be contaminated will undergo decontamination by radiological controls personnel (or other designated personnel as specified in Radiation Protection Procedures). Measures will be taken to prevent the spread of contamination. Such measures may include isolating affected areas, placing contaminated personnel in "clean" protective clothing before moving, and decontaminating affected personnel, their clothing and equipment prior to release, in accordance with applicable station Radiation Protection Procedures.

In the event that a release of contaminants has occurred or is occurring, in-plant potable water systems will be secured to prevent possible contamination. If food and water supplies are brought in for emergency personnel who remain on-site these supplies will be packaged in sealed containers and will be monitored by Radiation Protection personnel (using standard Rad Con practices and procedures) prior to use or consumption and on a normal routine basis. Any food or water supplies discovered as contaminated will immediately be disposed of as waste and will not be used.

Upon receipt of information that the emergency has entered recovery phase, in-plant facilities and areas will be surveyed, sampled, and cleared for use, or controlled as necessary, in accordance with applicable Radiation Protection practices.

4.4.3 Personnel Accountability / Site Evacuation

Upon declaration of a Site Area Emergency, General Emergency and/or at the discretion of the Station Emergency Director, essential personnel within the Protected Area will be accounted for at the Control Room, TSC and OSC unless other factors (e.g., security events) advise against it.

Non-essential personnel will be directed to proceed to their vehicles directly and to evacuate to designated Remote Assembly Areas or dismissed to their homes. The Station Emergency Director based on the prevailing radiological conditions will determine evacuation routes. This evacuation will be accomplished using private vehicles.

In support of these operations, a sweep of buildings, trailers, and other areas of the Owner Controlled area will commence to ensure that all persons have assembled and/or evacuated the site.

Refer to Section J of the Crane Radiological Emergency Plan for specific requirements for the initiation and completion of personnel accountability and the evacuation of non-essential personnel from the site. Search and rescue operations will be implemented to locate any missing persons.

4.4.4 Monitoring of Evacuees

At the Remote Assembly Areas (Figures CRANE 4-1 and CRANE 4-2), personnel and vehicles from the CRANE site will be monitored for radioactive contamination, if necessary. Individuals found to be contaminated will be decontaminated in accordance with applicable Radiation Protection Procedures. Vehicles found to be contaminated will be impounded until they can be decontaminated. Inclement weather will not affect the direction of the traffic flow but may increase evacuation times.

If anyone is found to be contaminated, showers, sinks and decontaminating supplies are available in close proximity to the plant. Equipment for decontamination personnel will be stored in Emergency Supply Lockers. Portable survey instruments are available and routinely calibrated for use in decontamination operations. All skin contamination problems will be treated using accepted Radiation Protection practices.

For contaminated personnel inside the Protected Area, the preferred decontamination facility will be those onsite at the CRANE Site Laboratory, if accessible; otherwise, offsite facilities will be used.

The registering and monitoring of the general public evacuating from the Plume Exposure Pathway EPZ, as described in Section II.J.12 of the Crane Radiological Emergency Plan, will occur at designated facilities per the respective State and County Radiological Emergency Response Plans.

4.5 Severe Accident Management

Accident management consists of those actions taken during the course of an accident, by the Emergency response Organization (ERO), specifically: plant operations, technical support, and plant management staff in order to:

- Prevent the accident from progressing to core damage;
- Terminate core damage once it begins;
- Maintain the capability of the containment as long as possible; and
- Minimize on-site and off-site releases and their effects.

The later three actions constitute a subset of accident management, referred to as Severe Accident Management (SAM) or severe accident mitigation. The Severe Accident Management Plan Procedures (SAMPs) provide sound technical strategies for maximizing the effectiveness of equipment and personnel in preventing, mitigating and terminating severe accidents.

Implementation of SAMPs is a collaborative effort between the Shift Manager and the Station Emergency Director in the TSC (once activated). The Station Emergency Director maintains ultimate responsibility for direction of mitigating strategies. Designated TSC personnel are also trained to assist in evaluating plant conditions using the SAM Technical Support Guidelines (TSG).

FIGURE CRANE 4-1: Remote Assembly Area – CRANE Training Center

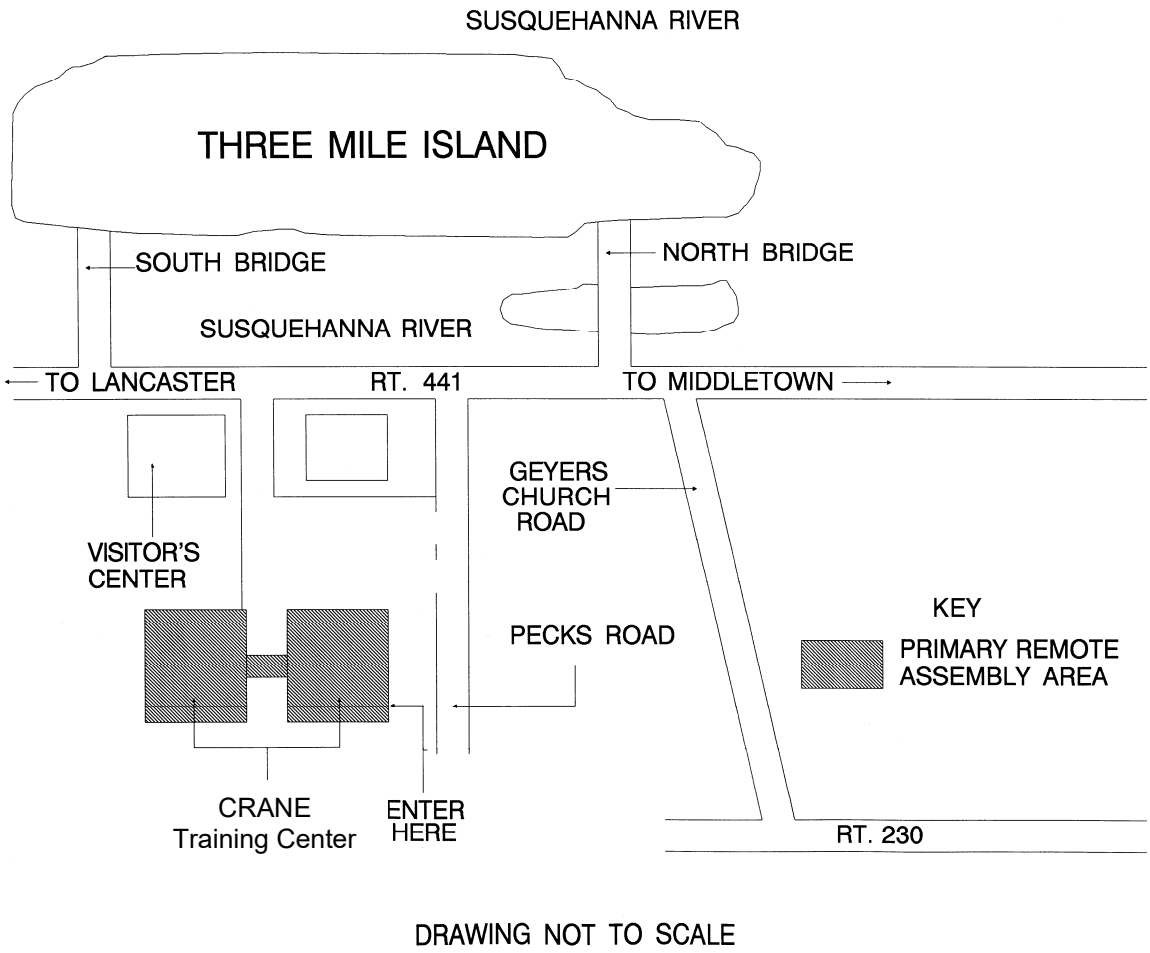
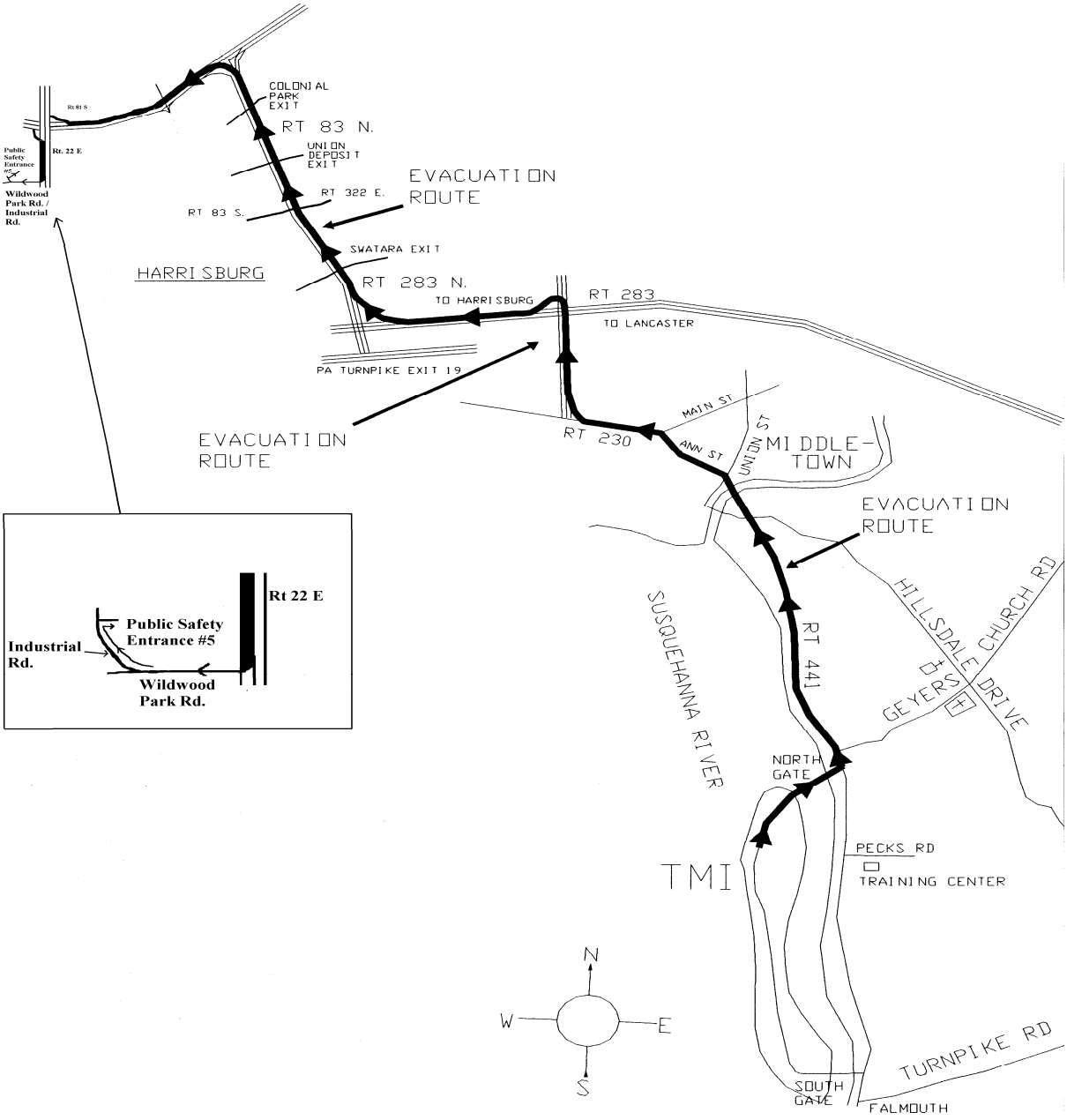


FIGURE CRANE 4-2: Remote Assembly Area – Harrisburg Area Community College



Section 5: Emergency Facilities and Equipment

5.1 Emergency Response Facilities

5.1.1 Station Control Room

The Control Room and Shift Manager's Office are designed to be habitable under accident conditions. These areas are located in seismically-rated structures and have adequate shielding to permit safe occupation for extended periods of time. The CRANE Control Room ventilation system has redundant fans and chillers and is provided with radiation and smoke detectors with appropriate alarms and interlocks. Provisions have been made for air from the control rooms to be recirculated through high efficiency particulate air (HEPA) and activated charcoal filters. Fresh air is drawn through underground ventilation tunnels which have been provided with protection against combustible vapors, incipient explosions or fires. The tunnels are Seismic Class I rated and also designed for a hypothetical aircraft incident.

Emergency lighting, power, ventilation system, and shielding walls enable operators to remain in the Control Room to ensure that the reactor will be maintained in a safe condition. In addition, the operators will be able to evaluate plant conditions and relay pertinent information to appropriate onsite and offsite personnel, organizations, and agencies during emergencies. To ensure the operations shift and other personnel assembled at the location can remain self-sufficient, emergency equipment and supplies will be stored in or near the Control Room. The location, type and quantity of emergency equipment and supplies available is specified in the Emergency Plan Administrative Procedures.

5.1.2 Technical Support Center (TSC)

The TSC is located on the 1st floor of the Operations Support Facility (OSF), which is outside but adjacent to the Protected Area. The TSC meets the requirements of NUREG-0696 for size and habitability, including a filtered HVAC system that can be isolated in the event of a radiological accident.

A backup electrical power source is designated in the event of a loss of the normal power supply. Uninterruptible power supply (UPS) capability is provided to designated electrical outlets to ensure that a transient loss of power does not occur to significant communications, dose projection, and data acquisition and display systems.

A room is provided for use by NRC response team members and the Resident Inspector during a declared emergency event. This conference room provides a workspace and telephone communications for a minimum of five (5) people.

Records and drawings, which describe conditions and layout of structures, systems, and components, are contained in filing cabinets inside the TSC.

5.1.3 Operational Support Center (OSC)

The OSC is located on the 305' Elevation of the Service Building. The OSC conforms to the requirements of Section H.1.c of the Crane Radiological Emergency Plan.

The OSC serves as a muster area for shift personnel and as a location to organize and dispatch emergency response teams (i.e., onsite radiological monitoring, fire brigade, rescue operations, damage control, and maintenance). Emergency equipment and supplies, including portable radios, portable lighting, protective clothing, and respirators, are maintained in emergency lockers located or adjacent to in the OSC. Additional emergency equipment, such as gamma and air monitoring equipment can be made promptly available to the OSC if needed.

In the event the OSC is not habitable, personnel report to backup facilities that can be designated based upon specific event conditions.

5.1.4 Emergency Operations Facility (EOF)

The dedicated Emergency Operations Facility (EOF) is located at 175 North Caln Road, Coatesville, PA, approximately 50 miles from the CRANE Site.

Primary staffing of the Coatesville facility will be from the Constellation Energy Mid-Atlantic Region Office located in Kennett Square, PA, which is approximately 18 miles drive (11 miles straight line distance) from the Coatesville facility.

Plant Monitoring System data is available through the Emergency Preparedness Data System (EPDS) at the EOF. The Coatesville facility has a designated diesel generator and UPS as a backup power source in the event of a loss of normal power.

The EOF equipment includes:

- Supplies and equipment for EOF personnel, and
- Sanitary and food preparation facilities.

Separate offices are provided for Constellation Energy, NRC, State representatives and other emergency personnel.

5.1.5 Joint Information Center (JIC)

The Joint Information Center (JIC) is the facility in which media personnel gather to receive information related to the emergency event. The JIC is co-located with the EOF at 175 North Caln Road, Coatesville, Pennsylvania.

5.1.6 Alternative Facility

The Alternative Facility maintains the capability for staging the TSC/OSC emergency response organization personnel in the event of a hostile action. This alternative facility has the capability for communications with the emergency operations facility, control room, and plant security and the capability for engineering assessment activities, including damage control team planning and preparation. Consistent with NRC EPFAQ No. 2013-005, the EOF will satisfy the offsite notification responsibilities for the Alternative Facility. The Alternative Facility is located at the Londonderry Fire Hall 2655 Foxianna Road, Middletown, Pennsylvania. **(CM-1, ref. AR 1362747.44)**

5.2 Assessment Resources

5.2.1 Radiation Monitoring System

The onsite Radiation Monitoring System contributes to personnel protection, equipment monitoring, data gathering, and accident assessment by measuring and recording radiation levels and concentrations of radioactive material at selected locations within the plant. The Radiation Monitoring System alarms and initiates required emergency actions when radiation levels or radionuclide concentrations exceed predetermined levels. Area, liquid, and atmospheric monitoring subsystems are required to perform these functions. Specific details regarding radiation monitoring and effluent monitoring systems can be found in system design descriptions (SDDs), site Final Safety Analysis Reports, and the CRANE Radiation Monitoring Setpoint Procedures.

The data from these subsystems are displayed by readout in the Control Room. Selected channels are recorded by recorders and/or the plant process computer, which are also located in the Control Room.

In general the radiation monitoring equipment is designed in accordance with the following:

- Each monitoring station has adjustable alarm, alert, and power supply failure alarms.
- Solid-state circuitry is used except for primary detectors.
- Most AC operated radiation monitoring equipment, except for the pump assemblies, is provided with power from the battery-backed, inverter-fed vital power supply bus.
- Each radiation monitor is capable of being checked periodically with solenoid actuated check sources.
- A pulse generator or solid sources are used for electrically checking each monitor or subsystem.
- The modules are designed so that an alarm and/or indication is initiated when failure occurs anywhere in the channel.

1. **Area Radiation Monitoring**

   The CRANE area radiation monitoring subsystem is comprised of channels, which utilize an ion chamber detector housed in a weatherproof container.

2. **Containment Radiation Monitors**

   Post accident radiation levels in containment are monitored by two channels of fully qualified high range area monitors. These monitors are ion chamber detectors and are designed to withstand a LOCA. Readout modules are located for these detectors on the radiation monitoring panel in the control room.

   The set points on this monitor could be used to indicate to the operator that the Emergency Action Levels (EALs) were reached under the Fission Product Barrier loss matrix provided in Section 3.

3. **Atmospheric Radiation Monitoring**

   Each installed atmospheric monitor (except the condenser off-gas, ESF ventilation exhaust and waste gas monitor) is comprised of a particulate measuring channel, iodine measuring channel, and a gaseous measuring channel. The atmospheric radiation monitor subsystem is comprised of monitors with fixed and movable particulate filters, and fixed radioiodine filters. Representative samples are obtained by means of a sampling head placed in a ventilation duct.

   Movable airborne monitors are typically used in the spent fuel handling area during refueling operations and in the radiochemical laboratory during laboratory sample preparation operations. These monitors are supplemented with various other portable radiation monitors. Each monitor contains three channels for particulate, iodine, and gaseous monitoring, respectively.

4. **Liquid Radiation Monitoring**

   The liquid radiation monitoring subsystem is comprised of monitors, each of which has a sampler, detector, and Control Room ratemeter module (exceptions are the IWTS/IWFS discharge monitor, waste treatment system discharge monitor and the turbine building sump pump). The monitors provide visual indications in the Control Room. The CRANE Primary Coolant Letdown monitor also contains a high range channel.

5. **Post Accident Sampling System (PASS)**

   Liquid Reactor Coolant System Post Accident Sample System (PASS) samples may be taken from the pressurizer and decay heat and reactor coolant letdown systems. Liquid samples may be analyzed for isotopic concentration, boron concentration, chloride concentration and dissolved gases.

The Containment Atmosphere Post Accident Sampling System (CATPASS) is used to sampling isotopic concentration in the containment atmosphere. MAP-5 microprocessor stations sample iodine and particulates in condenser off-gas and auxiliary and reactor building exhausts.

5.2.2 Fire Protection Devices

CRANE has implemented and maintains a Fire Protection Program as described in the updated FSAR for CRANE. The Fire Protection Program is controlled under CRANE license conditions.

5.2.3 Seismic Monitoring

Strong motion recording systems at CRANE measures ground motion and structural vibrating response caused by an earthquake occurring in the vicinity of the site. Cassette magnetic tape recorders located in the CRANE Control Room receive information supplied by triaxial sensor units which are firmly mounted on the Reactor Building. One triaxial sensor unit is attached immediately outside of the containment wall at the base of the Reactor Building. A second triaxial sensor is situated along the same Reactor Building axis but is attached to the Reactor Building ring girder. The triaxial sensor units begin to supply seismic data to the magnetic tape recorder after a signal is sent to the sensors by a remote starter unit. A remote starter unit attached to the base of the Reactor Building provides a signal for its systems sensor units when the starter unit detects a ground acceleration greater than a present threshold level. The remote starter also actuates an annunciator in the CRANE control room labeled "Threshold Seismic Condition". If the ground acceleration exceeds the horizontal or vertical setpoints, a seismic trigger, also mounted on the base of the Reactor Building, will cause a CRANE annunciator labeled "Operating Basis Earthquake" to actuate.

The time history of a ground motion and resulting vibrating response can be displayed by using magnetic tape cassettes containing the recorded data, and the magnetic tape playback system in the control rooms. The magnetic tape playback system produces visual playouts of selected magnetically recorded data. This is accomplished with a strip chart recorder built into the playback system. A visual playout allows quick analysis of the earthquake. The magnetic tapes are available also for detailed analysis.

Peak reading accelerographs are anchored to Class 1 selected items. These accelerographs will produce a permanent record of the peak amplitude of the low frequency accelerations caused by seismic disturbances.

This record is in the form of magnetic erasure clips which must be developed using the magnetic developer kit. After developing, these clips can be examined to verify seismic response which had been determined analytically.

5.2.4 Onsite Meteorological Monitors

At CRANE, basic meteorological information is obtained from a weather tower maintained at the north end of the Island. Real time information can be obtained from the plant process computer.

The meteorological measurement system is deployed on a 150 ft. tower. It measures wind speed and wind direction at 98 ft. and 145 ft. above grade. There are redundant speed and direction sensors at the 98 ft. level. Temperature is measured at both 31 ft. and 145 ft. from two sets of platinum sensors. Temperature difference (ΔT) is also derived and recorded. A recorder located inside the meteorological building adjacent to the weather tower records all of the above information. The Control Room also has a recorder with wind speed, direction, temperature, and differential temperature which is an indication of atmospheric stability.

Meteorological data can be remotely interrogated by telephone by NRC and Commonwealth of Pennsylvania.

Protective Measures personnel are capable of making real-time offsite estimates of atmospheric effluent transport and diffusion following an accidental airborne radioactive release from the plant. Real time meteorological information is obtained from the plant process computer. The recorder at the meteorological building located at the north end of CRANE has a storage capacity of several months of data. Beyond that time period the meteorological data is permanently stored in a history file. Back-up meteorological information is available from the National Weather Service directly and indirectly from other sources that collect National Weather Service information.

5.2.5 Process Monitors

Process monitors measure appropriate parameters that are indicative of the status of various plant systems and the reactors. These parameters are displayed and recorded in the Control Room, or at local panels in the plant

5.2.6 Laboratory Facilities

The CRANE laboratory facility is equipped to provide the water chemistry and radiochemical analysis support required during normal plant operations and emergencies.

5.3 Protective Facilities and Equipment

Personnel protective action is a function of the nature of the hazard (e.g., preparing for a hurricane is somewhat different from preparing for radiological hazards). Preplanned responses to basic hazards, high wind, flooding, earthquakes, and radiation exposure, are an integral part of the Emergency Plan. A fundamental concept in personnel protection is the evacuation of all individuals not essential to the operation, safety, security, and damage control of the plant. Obviously some hazards can occur before significant protective action can be applied (e.g., earthquake). When the situation permits positive action, the appropriate alarms are sounded and all personnel on the site either assume assigned emergency responsibilities or prepare for evacuation.

Provision has been made for adequate supplies and protective equipment for all personnel who may be required to perform emergency activities. Specific quantities of each type are detailed in station procedures and include equipment for personnel monitoring, determining the magnitude and continuously assessing the impact of the release of radioactive material, decontaminating personnel and providing emergency first aid. Additionally, a current prescription and adequate supplies of potassium iodide are maintained for issue to personnel exposed or suspected of exposure to radioactive iodine.

Onsite locations have been designated as emergency assembly points or areas where emergency teams will be assembled in accordance with the Emergency Plan Implementing Procedures or as directed by the Station Emergency Director. Major locations for onsite protective equipment and supplies are the Control Room, access control point, and processing center. Additional information regarding protective facilities can be obtained by consulting the UFSAR.

5.3.1 First Aid and Medical Equipment

A first aid facility is designed to support a wide range of immediate care requirements ranging from simple first aid to procedures requiring a physician.

Small kits placed throughout the plant provide the most readily available first aid. These kits contain items typically needed to care for minor injuries. Typical contents can be referenced in Table CRANE 5-1. The next level of first aid equipment is found at first aid stations. The medical staff can also provide Advanced Life Support and routine trauma care.

5.3.2 Damage Control Equipment

The CRANE plant site is extensively equipped to conduct preventive maintenance and repairs on mechanical, structural, electrical, and instrumentation and controls equipment found in the plant.

In addition to the equipment and materials required for normal maintenance, other items are available to handle extraordinary maintenance jobs that might arise in damage control. Selection of damage control equipment inventory is based upon (a) mitigating the consequences of flooding, (b) personnel rescue, (c) checking the uncontrolled flow of fluids from process systems, and (d) elimination of electrical hazards. Typical equipment available for damage control can be found in Table CRANE 5-1.

5.3.3 Radiation Protection Equipment

The CRANE plant site maintains an inventory of protective clothing, respiratory equipment, survey instruments and supplies to provide adequate contamination control for all personnel expected to be onsite who might be affected in the event of an emergency.

The supplies are maintained, updated, inventoried and calibrated, as appropriate, on a regular basis in accordance with applicable procedures. Storage locations of emergency supplies can be found in the site implementing documents. Typical equipment available can be found in Table CRANE 5-1.

5.3.4 Emergency Equipment Readiness

Designated emergency equipment and supplies and their storage locations will be listed in the Emergency Plan Implementing Documents. Such equipment and supplies will be maintained, inventoried, inspected and calibrated in accordance with approved site procedures. Equipment, supplies, and parts having shelf-lives will be checked and replaced as necessary.

To ensure that the necessary emergency equipment is maintained and available for use during emergency situations, readiness checklists have been developed and incorporated in Administrative Procedures. These checklists facilitate detailed inventory and calibration/functional checks of equipment contained in the emergency kits/lockers. The inventory checklists will be performed on a quarterly basis and to insure interim readiness, all kits/lockers are sealed or locked as appropriate.

Any deficiencies found during the inventory and inspection will be either cleared immediately or documented for corrective action. A report of each inventory and inspection, including documented deficiencies, will be prepared and submitted to the Emergency Preparedness Manager. He will ensure that cognizant department heads assign personnel to correct deficiencies and shall ensure that identified deficiencies are corrected in a reasonable period of time.

5.4 First Aid and Medical Facilities

5.4.1 Decontamination and Medical Response

Emergency first aid and medical treatment will be given to injured personnel who may or may not be contaminated. A comprehensive program of radiological control for injured/contaminated personnel has been developed and will be instituted when necessary during an emergency. The primary emphasis will be to initially address traumatic or life-threatening injuries since radiation injuries may not be immediately life threatening. Detailed instructions for treatment and transportation of contaminated and injured individuals are specified in appropriate procedures.

5.4.2 Medical Transportation

Agreements have been made with local medical support organizations to provide ambulance services to the site. Ambulance personnel will be certified in accordance with State regulations. CRANE will offer training to the squad members in the treatment and transportation of contaminated injured individuals. CRANE will provide radiological control technicians if available to assist the squads enroute to the hospital. CRANE or local first aid squads provide ambulance service for the facility.

When affected personnel must be transported, measures will be taken to prevent the spread of contamination. Such measures will include placing affected personnel in "clean" protective clothing or wrapping them in blankets. The Emergency Director will insure that these organizations, which provide the transportation and treatment, are alerted.

Detailed instructions for treatment and transportation of contaminated and injured individuals are specified in appropriate procedures.

A Letter of Agreement is established with the local Emergency Medical Services agencies to provide Emergency Medical Services in response to a Radiological Event including a Hostile Action Based Event. This includes transportation of patients from CRANE, including those who may have been exposed to radiation or may have injuries complicated by radioactive contamination, to the Penn State Milton S. Hershey Medical Center (HMC) or Penn State Health Lancaster Medical Center upon dispatch by the Dauphin County Emergency Dispatch.

5.4.3 Medical Treatment

Arrangements for hospital and medical services for injured or contaminated / overexposed personnel are provided for by letters of agreement.

The first level of treatment can be given on-site by personnel trained in first aid. If the severity of the injury requires more extensive or prolonged treatment, the patient will be transported for the second level of assistance. For conventional injuries (that is, non-radiation injuries), the patient will be transported to any of the local hospitals.

Arrangements for hospital and medical services for injured and/or contaminated/overexposed personnel are provided by Penn State Health Lancaster Medical Center and Penn State Milton S. Hershey Medical Center. These hospitals have agreed to accept contaminated patients for emergency medical and surgical treatment or observation. Detailed plans and procedures are in place for decontamination and treatment of contaminated patients.

A Letter of Agreement is established for Penn State Health Lancaster Medical Center and Penn State Milton S. Hershey Medical Center to provide assistance in support of the Radiological Emergency Plan at Crane Clean Energy Center to the extent of their capabilities should an emergency situation, including hostile action based event, occur at the Crane Clean Energy Center.

5.5 Communications

5.5.1 Emergency Communications

The provisions utilized for prompt communications among principal emergency response organizations, communications with the ERO and communications with the general public are described in Part II, Section F: Emergency Communications, of the Crane Radiological Emergency Plan.

5.5.2 Radio Communications

Radio communication equipment used during normal plant operations will be used in an emergency to communicate with mobile units and to provide backup to the telephone system.

At CRANE, radio capabilities include the following frequencies from Control Room, OSC, TSC, CAS/SAS and mobile vehicle / potable units, as applicable:

- CRANE Operations Frequencies
- CRANE Security Frequency
- Environmental and Radiological System Frequency
- Maintenance and Rad Con Frequency

Dedicated channels on the redundant T-1 lines to the CRANE radio bay station in the TSC Radiological Assessment Room will allow access from the existing Coatesville multi-channel, fixed base radio system used under the common Emergency Plan for LGS & PBAPS. At the TSC bay station, the T-1 lines will tie into the Station Radio System, thus allowing the use of the existing Environmental and Radiological Frequency for communications with field survey team within the CRANE 10-mile Emergency Planning Zone (EPZ).

The fixed base radio repeaters, antenna system and radio consoles for the Coatesville EOF are powered from a variety of emergency AC sources (diesel backup and alternate battery supplies).

5.5.3 Station Warning System

1. **Alarms**

Audible alarms are a quick and effective means of communicating emergency warnings on the site. Alarms currently installed at CRANE include:

- Station Emergency Alarm
- Fire Alarm
- Reactor Building Evacuation Alarm

Each alarm provides a distinctive sound that all site personnel and contractors are trained to recognize and respond to. The Station Emergency Alarm will be followed by an announcement that provides emergency information such as class of emergency declared, accountability directions, radiological precautions, etc. At CRANE, the Reactor Building evacuation alarm is supplemented with flashing lights at specific locations in the Reactor Building to provide both audible and visual warnings.

The Control Room alarm systems consist of overhead annunciators, panel annunciators and computer alarms. The overhead and panel annunciators consist of flashing translucent tiles and audible indicators (i.e., buzzer or horn). The computer alarms use annunciators and also provide specific data using the alarm printer. At CRANE, alarm data is also provided by CRTs.

2. **Plant Paging System**

The Plant Paging System provides plant-wide paging from the Control Room and all remote stations plus private communications during normal operating conditions.

The plant paging system provides immediate warning and instructions to onsite personnel in the event of an emergency. Phone stations and speakers of this subsystem are located in vital plant areas.

5.6 Law Enforcement Agencies

A Letter of Agreement is established for Local Law Enforcement to support Crane Clean Energy Center to respond to a Radiological Event including a Hostile Action Based Event, in conjunction with the National Incident Management System in accordance with the established communications protocol.

5.7 Fire Fighting Organizations

A Letter of Agreement is established for the Local Fire Departments to respond to a Radiological Event including a Hostile Action Based Event, in conjunction with the Mutual Aid System, upon dispatch by the Dauphin and/or Lancaster County Emergency Dispatch Service

TABLE CRANE 5-1: Inventory of Emergency Kits By General Category

The following is a list of typical equipment available for use during emergencies. While specific equipment designations and items may be subject to change, equivalent emergency activity capabilities will be maintained. Procedures define the specific locations, types, and amounts of equipment for emergency use and define requirements for applicable surveillance, testing, maintenance, and inventory activities to ensure that the equipment is in a state of readiness.

I. RADIATION MONITORING

A. Typical Contents

1. Full Face Respirators with Canisters
2. Survey Instruments - Radiation Survey Meters, Countrate Meters
3. Dosimetry Equipment - Dosimeters/Chargers
4. Protective Clothing
5. Air Sampler and Cartridges
6. Support Materials - Paper, Pencils, Envelopes, Maps, Procedures, Etc.

II. FIRST AID

A. Minor Injury

1. Contain items typically needed for minor injuries.
2. Placed throughout Plant

B. Employee Kits

1. Contain sufficient quantities to serve expected needs of approximately 100 employees.

   NOTE: Locations as determined by Medical Department.

   a. Stretchers

   b. Employee size first aid kits

C. First Aid and Medical Facility

1. Equipment inventory to support professional medical treatment.
2. Contains equipment necessary for examination of patients.

III. DAMAGE CONTROL

A. Typical Equipment Available

1. Hand tools
2. Cutting/Welding equipment
3. Patching materials
4. Portable blowers
5. Submersible pumps
6. Electrical equipment

APPENDIX 1: NUREG-0654 CROSS-REFERENCE

Annex Section	NUREG-0654
1.0	Part I, Section A
1.1	Part I, Section B
1.2	Part I, Section D
1.3	Part I, Section D
Figure CRANE 1-1	Part I, Section D
Figure CRANE 1-2	Part II, Section J.10
Figure CRANE 1-3	Part II, Section J.10
Figure CRANE 1-4	Part II, Section J.10 & 11
2.0	Part II, Section B.1
2.1	Part II, Section B.5
2.2	Part II, Section A.3
2.3	Part II, Section C.3
2.4	Part II, Section B.1 & 2
Table CRANE 2-1	Part II, Section B (Table B-1)
Figure CRANE 2-1	Part II, Section B.1
Figure CRANE 2-2	Part II, Section B.6
Figure CRANE 2-3	Part II, Section B.5 & 7
Figure CRANE 2-4	Part II, Section B.5 & 7
3.0	Part II, Section D
3.1	Part II, Section D.1 & 2
3.2	Part II, Section D.1 & 2
3.3	Part II, Section D.1 & 2
3.4	Not Applicable
3.5	Part II, Section D.3
Table CRANE 3-1	Part II, Section D.1 & 2
Table CRANE 3-2	Part II, Section D.1 & 2
4.1	Part II, Section E.1 & J.7
4.2	Part II, Section I.2 & 3
4.3	Part II, Section J.10.f
4.3.1	Part II, Section E.6
4.3.2	Part II, Section J.8
4.3.3	Part II, Section J.6.c
4.3.4.a	Part II, Section G.1 & 2
4.3.4.b	Part II, Section G.5
4.3.5	Part II, Section J.7
4.4.1	Part II, Section K.5 & 7
4.4.2	Part II, Section J.5
4.4.3	Part II, Section J.3
4.5	Not Applicable
EP-AA-111	Part II, Section I.2 & 3
Figure CRANE 4-1	Part II, Section J.4
Figure CRANE 4-2	Part II, Section J.4
5.1.1	Part II, Section B.1
5.1.2	Part II, Section H.1
5.1.3	Part II, Section H.1
5.1.4	Part II, Section H.2 & G.3.b
5.1.5	Part II, Section G.3.a
5.2.1	Part II, Section H.5.b, H.6.c &I.2
5.2.2	Part II, Section H.5.d

APPENDIX 1: NUREG-0654 CROSS-REFERENCE

Annex Section	NUREG-0654
5.2.3	Part II, Section H.5.a
5.2.4	Part II, Section H.5.a & 8
5.2.5	Part II, Section H.5.c
5.2.6	Part II, Section H.6.c
5.2.7	Not Applicable
5.2.8	Part II, Section H.6.b & 7, I.9-10
5.3	Part II, Section H.9-10
5.4	Part II, Section L.1 & 2
5.5	Part II, Section F.1
Table CRANE 5-1	Part II, Section H.11
Appendix 1	Part II, Section P.8
Appendix 2	Part II, Section P.4

APPENDIX 2: SITE-SPECIFIC LETTERS OF AGREEMENT

The following is a listing of letters of agreement, memorandum of understanding, and contracts specific to emergency response activities in support of the CRANE Station. Letters of agreement, memorandum of understanding, and contracts common to multiple Constellation Nuclear stations are listed under Appendix 3 to the Constellation Nuclear Standardized Radiological Emergency Plan.

Medical Support Organizations

- Penn State Health Milton S. Hershey Medical Center
- South Central Emergency Medical Services (EMS)
- Penn State Health Lancaster Medical Center

Firefighting Organizations

- Londonderry Fire Company

Law Enforcement Agencies

- Pennsylvania State Police

Other Agencies

- Londonderry Fire Department (Staging Area)
- Pennsylvania Emergency Management Agency (PEMA)
- Harrisburg Area Community College
- Norfolk Southern Railway Company

ENCLOSURE 1C

Markup Version of EP-AA-1009
Addendum 3

Crane Clean Energy Center Renewed
Facility License No. DPR-50

CONSTELLATION

EMERGENCY ACTION LEVELS
FOR CRANE CLEAN ENERGY CENTER

REVISION HISTORY

Rev. 0 December 2014		
Rev. 1 March 2016		
Rev. 2 January 2017		
Rev. 3 TBD		

Section 1: Classification of Emergencies

1.1 General

Section D of the Constellation Nuclear Standardized Emergency Plan divides the types of emergencies into four EMERGENCY CLASSIFICATION LEVELS (ECLs). The first four are the UNUSUAL EVENT (UE), ALERT, SITE AREA EMERGENCY (SAE), and GENERAL EMERGENCY (GE). These ECLs are entered by satisfying the Initiating Condition (IC) through meeting an Emergency Action Level (EAL) of the IC provided in this section of the Annex. The ECLs are escalated from least severe to most severe according to relative threat to the health and safety of the public and emergency workers. Depending on the severity of an event, prior to returning to a standard day-to-day organization, a state or phase called RECOVERY may be entered to provide dedicated resources and organization in support of restoration and communication activities following the termination of the emergency.

UNUSUAL EVENT (UE): 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.

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 EPA Protective Action Guideline exposure levels.

SITE AREA EMERGENCY (SAE): Events are in progress or have occurred which involve an 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 Protective Action Guideline exposure levels beyond the site boundary.

GENERAL EMERGENCY (GE): 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 Protective Action Guideline exposure levels offsite for more than the immediate site area.

RECOVERY: Recovery can be considered as a phase of the emergency and is entered by meeting emergency termination criteria provided in EP-AA-111 Emergency Classification and Protective Action Recommendations.

EMERGENCY CLASSIFICATION LEVEL (ECL): One of a set of names or titles established by the US Nuclear Regulatory Commission (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 emergency classification levels, in ascending order of severity, are:

- UNUSUAL EVENT (UE)
- ALERT
- SITE AREA EMERGENCY (SAE)
- GENERAL EMERGENCY (GE)

INITIATING CONDITION (IC): An event or condition that aligns with the definition of one of the four EMERGENCY CLASSIFICATION LEVELS by virtue of the potential or actual effects or consequences.

EMERGENCY ACTION LEVEL (EAL): A pre-determined, site-specific, observable threshold for an INITIATING CONDITION that, when met or exceeded, places the plant in a given EMERGENCY CLASSIFICATION LEVEL.

An emergency is classified by assessing plant conditions and comparing abnormal conditions to ICs and EALs, based on the designated Operational Condition (MODE). Modes 1 through 6 are defined in the Technical Specifications (T.S). "Defueled" Mode was established for classification purposes to reflect conditions where all fuel has been removed from the Reactor Pressure Vessel.

Mode	Description
1	**Power Operation:** The plant is in the Power Operation (PwrOps) condition when the indicated neutron power is two percent of rated power, or greater, as indicated on the power range channels.
2	**Startup / Hot Standby:** The plant shall be considered to be in the Startup (SU) mode when the shutdown margin is reduced with the intent of going critical. The plant is in the Hot Standby (HStby) condition when all of the following conditions exist: a. T_{avg} is greater than 525°F b. The reactor is critical c. Indicated neutron power on the power range channels is less than two percent of rated power.
3	**Hot Shutdown:** The plant is in the Hot Shutdown (HSD) condition when the reactor is subcritical by at least one percent delta k/k and T_{avg} is at or greater than 525°F.
4	**Heatup/Cooldown:** The plant is in the Heatup/Cooldown (HU/CD) condition when the reactor coolant temperature is greater than 200°F and less than 525°F.
5	**Cold Shutdown:** The plant is in the Cold Shutdown (CSD) Condition when the reactor is subcritical by at least one percent delta k/k and T_{avg} is no more than 200°F. Additionally the reactor coolant system pressure allowed is defined by Technical Specification 3.1.2.
6	**Refueling:** The plant is in the Refueling condition when, even with all of the control rods removed, the reactor would be subcritical by at least one percent delta k/k and the reactor coolant temperature at the decay heat removal pump suction is no more than 140°F. Additionally, the allowable reactor coolant system pressure is defined by Technical Specification 3.1.2.
D	**Defuel:** No fuel in the Reactor Vessel

Hot Matrix - applies in modes (1), (2), (3) and (4)

Cold Matrix - applies in modes (5), (6), and (D)

Individuals responsible for the classification of events will refer to the Initiating Condition and EALs on the matrix of the appropriate station Standardized Emergency Plan Annex (this document). This matrix will contain ICs, EALs, Mode Applicability Designators, appropriate EAL numbering system, and additional guidance necessary to classify events. It may be provided as a user aid.

The matrix is set up in six Recognition Categories. The first is designated as "R" and relates to Abnormal Radiological Conditions / Abnormal Radiological Effluent Releases. The second is designated as "F" and relates to Fission Product Barrier Degradation. The third is designated as "M" and relates to hot condition System Malfunctions. The fourth is designated as "C" and relates to Cold Shutdown / Refueling System Malfunctions. The fifth is designated as "H" and relates to Hazards and Other Conditions Affecting Plant Safety. The sixth is designated "E- H" and relates to ISFSI Malfunctions.

The matrix is designed to provide an evaluation of the Initiating Conditions from the worst conditions (General Emergencies) on the left to the relatively less severe conditions on the right (Unusual Events). Evaluating conditions from left to right will reduce the possibility that an event will be under classified. All Recognition Categories should be reviewed for applicability prior to classification.

The Initiating Conditions are coded with a two letter and one number code. The first letter is the Recognition Category designator, the second letter is the Classification Level, “U” for (NOTIFICATION OF) UNUSUAL EVENT, “A” for ALERT, “S” for SITE AREA EMERGENCY and “G” for GENERAL EMERGENCY.

The EAL number is a sequential number for that Recognition Category series. All ICs that are describing the severity of a common condition (series) will have the same number.

The EAL number may then be used to reference a corresponding page(s), which provides the basis information pertaining to the IC:

- EAL
- Mode Applicability
- Basis

Classification is not to be made without referencing, comparing and satisfying the specified Emergency Action Levels.

A list of definitions is provided as part of this document for terms having specific meaning to the EALs. Site specific definitions are provided for terms with the intent to be used for a particular IC/EAL and may not be applicable to other uses of that term at other sites, the Emergency Plan or procedures.

References are also included to documents that were used to develop the EALs.

References to the Emergency Director means the person in Command and Control as defined in the Emergency Plan. Classification of emergencies is a non-delegable responsibility of Command and Control for the onsite facilities with responsibility assigned to the Shift Emergency Director (Control Room Shift Manager) or the Station Emergency Director (Technical Support Center). Classification of emergencies remains the responsibility of the applicable onsite facility even after Command and Control is transferred to the Corporate Emergency Director (Emergency Operations Facility).

Although the majority of the EALs provide very specific thresholds, the Emergency Director must remain alert to events or conditions that lead to the conclusion that exceeding the EAL is IMMINENT. If, in the judgment of the Emergency Director, an IMMINENT situation is at hand, the classification should be made as if the EAL has been exceeded. While this is particularly prudent at the higher ECL (as the early classification may provide for more effective implementation of protective measures), it is nonetheless applicable to all ECLs.

1.2 Classification, Instrumentation and Transient Events

Classifications are based on evaluation of each Unit. All classifications are to be based upon valid indications, reports or conditions. Indications, reports or conditions are considered valid when they are verified by (1) an instrument channel check, or (2) indications on related or redundant indications, or (3) by direct observation by plant personnel, such that doubt related to the indication's operability, the condition's existence, or the report's accuracy is removed. Implicit in this is the need for timely assessment.

Indications used for monitoring and evaluation of plant conditions include the normally used instrumentation, backup or redundant instrumentation, and the use of other parameters that provide information that supports determination if an EAL has been reached. When an EAL refers to a specific instrument or indication that is determined to be inaccurate or unavailable, then alternate indications shall be used to monitor the specified condition.

During an event that results in changing parameters trending towards an EAL classification, and instrumentation that was available to monitor this parameter becomes unavailable or the parameter goes off scale, the parameter should be assumed to have been exceeded consistent with the trend and the classification made if there are no other direct or indirect means available to determine if the EAL has not been exceeded.

The assessment of some EALs is based on the results of analyses that are necessary to ascertain whether a specific EAL has been exceeded (e.g., dose assessments, chemistry sampling, RCS leak rate calculation, etc.); the EAL and/or the associated basis discussion will identify the necessary analysis. In these cases, the 15-minute declaration period starts with the availability of the analysis results that show the EAL to be exceeded (i.e., this is the time that the EAL information is first available).

Planned evolutions involve preplanning to address the limitations imposed by the condition, the performance of required surveillance testing, and the implementation of specific controls prior to knowingly entering the condition in accordance with the specific requirements of the site's Technical Specifications. Activities which cause the site to operate beyond that allowed by the site's Technical Specifications, planned or unplanned, may result in an EAL being met or exceeded. Planned evolutions to test, manipulate, repair, perform maintenance or modifications to systems and equipment that result in an EAL being met or exceeded are not subject to classification and activation requirements as long as the evolution proceeds as planned and is within the operational limitations imposed by the specific operating license. However, these conditions may be subject to the reporting requirements of 10 CFR 50.72.

When two or more EALs are determined, declaration will be made on the highest classification level for the Unit.

Concerning ECL Downgrading, Constellation Nuclear policy is that ECLs shall not be downgraded to a lower classification. Once declared, the event shall remain in effect until no Classification is warranted or until such time as conditions warrant classification to Recovery.

There may be cases in which a plant condition that exceeded an EAL was not recognized at the time of occurrence but is identified well after the condition has occurred (e.g., as a result of routine log or record review), and the condition no longer exists. In these cases, an emergency should not be declared. Reporting requirements of 10 CFR 50.72 are applicable, the guidance of NUREG-1022, Event Reporting Guidelines 10 CFR 50.72 and 50.73 and the Reportability Reference Manual, should be applied.

1.3 Mode Applicability

The plant-operating mode that existed at the time that the event occurred, prior to any protective system or operator action initiated in response to the condition, is compared to the mode applicability of the EALs. If an event occurs, and a lower or higher plant-operating mode is reached before the emergency classification can be made, the declaration shall be based on the mode that existed at the time the event occurred.

For events that occur in Cold Shutdown or Refueling, escalation is via EALs that have Cold Shutdown or Refueling for mode applicability, even if Hot Shutdown (or a higher mode) is entered during any subsequent heat-up. In particular, the Fission Product Barrier Matrix EALs are applicable only to events that initiate in Hot Shutdown or higher.

If there is a change in Mode following an event declaration, any subsequent events involving EALs outside of the current declaration escalation path will be evaluated on the Mode of the plant at the time the subsequent events occur.

1.4 Emergency Director Judgment

Emergency Director (ED) Judgment EALs are provided in the Hazards and Other Condition Affecting Plant Safety section and on the Fission Product Barrier (FPB) Matrix. Both of the ED Judgment EALs have specific criteria for when they should be applied.

The Hazards Section ED Judgment EALs are intended to address unanticipated conditions which are not addressed explicitly by other EALs but warrant declaration of an emergency because conditions exist which are believed by the ED to fall under specific emergency classifications (UE, Alert, SAE or GE).

The FPB Matrix ED Judgment EALs are intended to include unanticipated conditions, which are not addressed explicitly by any of the other FPB threshold values, but warrant determination because conditions exist that fall under the broader definition for a significant Loss or Potential Loss of the barrier (equal to or greater than the defined FPB threshold values).

1.5 Fission Product Barrier (FPB) Threshold

A fission product barrier threshold is a pre-determined, site-specific, observable threshold indicating the loss or potential loss of a fission product barrier.

FPB thresholds represent threats to the defense in depth design concept that precludes the release of radioactive fission products to the environment. This concept relies on multiple physical barriers, any one of which, if maintained intact, precludes the release of significant amounts of radioactive fission products to the environment. The primary FPBs are:

- Fuel Clad (FC)
- Reactor Coolant System (RCS)
- Containment (CT)

Upon determination that one or more FPB thresholds have been exceeded, the combination of barrier loss and/or potential loss thresholds is compared to the FPB IC/EAL criteria to determine the appropriate ECL.

In some accident sequences, the ICs and EALs presented in the Abnormal Radiation Levels/ Radiological Effluent (R) Recognition Category will be exceeded at the same time, or shortly after, the loss of one or more fission product barriers. This redundancy is intentional as the former ICs address radioactivity releases that result in certain offsite doses from whatever cause, including events that might not be fully encompassed by fission product barriers (e.g., spent fuel pool accidents, design containment leakage following a LOCA, etc.).

1.6 Fission Product Barrier Restoration

Fission Product Barriers are not treated the same as EAL threshold values. Conditions warranting declaration of the loss or potential loss of a FPB may occur resulting in a specific classification. The condition that caused the loss or potential loss declaration could be rectified as the result of Operator action, automatic actions, or designed plant response. Barriers will be considered re- established when there are direct verifiable indications (containment penetration or open valve has been isolated, coolant sample results, etc) that the barrier has been restored and is capable of mitigating future events.

The reestablishment of a FPB does not alter or lower the existing classification. Termination and entry into RECOVERY phase is still required for exiting the present classification. However the reestablishment of the barrier should be considered in determining future classifications should plant conditions or events change.

1.7 Definitions

CONFINEMENT BOUNDARY: The irradiated fuel dry storage cask barrier(s) between areas containing radioactive substances and the environment.

CONTAINMENT CLOSURE: The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under existing plant conditions.

EXPLOSION: A rapid, violent and catastrophic failure of a piece of equipment due to combustion, chemical reaction or overpressurization. A release of steam (from high energy lines or components) or an electrical component failure (caused by short circuits, grounding, arcing, etc.) should not automatically be considered an explosion. Such events may require a post-event inspection to determine if the attributes of an explosion are present.

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

FISSION PRODUCT BARRIER (FPB) THRESHOLD: A pre-determined, site-specific, observable threshold indicating the loss or potential loss of a fission product barrier.

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

HOSTILE ACTION: An act toward CRANE 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 site. 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).

HOSTILE FORCE: Any 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.

NORMAL LEVELS: As applied to radiological IC/EALs, the highest reading in the past twenty-four hours excluding the current peak value.

OWNER CONTROLLED AREA (OCA): The property associated with the station and owned by the company. Access is normally limited to persons entering for official business.

PROJECTILE: An object directed toward CRANE that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA: An area that normally encompasses all controlled areas within the security protected area fence.

REFUELING PATHWAY: all the cavities, tubes, canals and pools through which irradiated fuel may be moved or stored, but not including the reactor vessel below the flange.

RUPTURED: The condition of a steam generator in which primary-to-secondary leakage is of sufficient magnitude to require a safety injection.

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

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.

UNISOLABLE: An open or breached system line that cannot be isolated, remotely or locally.

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.

VISIBLE DAMAGE: Damage to a component or structure that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected component or structure.

1.8 Response to a TMI-2 Emergency

TMI-2 alarms will be monitored on a 24-hour a day basis remotely from Unit 1 or by another appropriate location in the event of a failure of the remote monitoring system. For failures of specific local alarm capabilities, local conditions will be monitored in accordance with the applicable procedures.

A TMI-2 related emergency will be reported to the CRANE Control Room. CRANE Control Room personnel will assess and evaluate the situation; classify the event as required based on impact to the site per the EALs; and provide the appropriate response.

1.9 State, County and Local Classification System

State, county and local emergency plans incorporate the same emergency classification system as that utilized in this plan annex. Since both the State and CRANE classification schemes include events which have significant potential for radioactive releases, it is imperative that specific guidance for initiating protective actions be available to the "decision-making" personnel in emergency response organizations and agencies. The Commonwealth of Pennsylvania has, for planning purposes, adopted the Environmental Protection Agency (EPA) protective action guides (PAG's).

Emergency Action Level Technical Basis Page Index

General		Site Area		Alert		Unusual Event	
EAL	**Pg.**	**EAL**	**Pg.**	**EAL**	**Pg.**	**EAL**	**Pg.**
RG1	2-33	RS1	2-35	RA1	2-37	RU1	2-39
RG2	2-41	RS2	2-42	RA2	2-43	RU2	2-45
				RA3	2-47		
						RU4	2-49
FG1	2-50	FS1	2-51	FA1	2-52		

Fuel Clad		RCS		Containment	
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				CT4	2-67
FC5	2-57	RC5	2-62	CT5	2-72

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MG2	2-80	MS2	2-82				
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				MA4	2-89	MU4	2-91
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						CU3	2-107
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						HU3	2-133
						HU4	2-136
				HA5	2-138		
						HU6	2-140
HG7	2-142	HS7	2-143	HA7	2-144	HU7	2-145
						E-HU1	2-146

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

Abnormal Rad Levels / Radiological Effluents

Radiological Effluents

GENERAL EMERGENCY

RG1 Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mRem TEDE or 5,000 mRem thyroid CDE. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

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.
- 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.
- 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.

1. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for ≥ **15 minutes**.

   OR

2. Dose assessment Using actual meteorology indicates doses at or beyond the site boundary of **EITHER**:
   a. **> 1,000 mRem TEDE.**

      OR

   b. **> 5,000 mRem CDE Thyroid.**

   OR

3. Field survey results at or beyond the site boundary indicate **EITHER**:
   a. Gamma (closed window) dose rates **> 1,000 mR/hr** are expected to continue for ≥ **60 minutes**.

      OR

   b. Analyses of field survey samples indicate **> 5,000 mRem CDE Thyroid** for **60 minutes** of inhalation.

SITE AREA EMERGENCY

RS1 Release of gaseous radioactivity resulting in offsite dose greater than 100 mRem TEDE or 500 mRem thyroid CDE. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

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.
- 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.
- 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.

1. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for ≥ **15 minutes**.

   OR

2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of **EITHER**:
   a. **> 100 mRem TEDE.**

      OR

   b. **> 500 mRem CDE Thyroid.**

   OR

3. Field survey results at or beyond the site boundary indicate **EITHER**:
   a. Gamma (closed window) dose rates **> 100 mR/hr** are expected to continue for ≥ **60 minutes**.

      OR

   b. Analyses of field survey samples indicate **> 500 mRem CDE Thyroid** for **60 minutes** of inhalation.

ALERT

RA1 Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mRem TEDE or 50 mRem thyroid CDE. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

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.
- 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.
- 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.

1. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for ≥ **15 minutes**.

   OR

2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of **EITHER**:
   a. **> 10 mRem TEDE.**

      OR

   b. **> 50 mRem CDE Thyroid.**

   OR

   3. Analysis of a liquid effluent sample indicates a concentration or release that would result in doses greater than **EITHER** of the following at or beyond the site boundary
      a. 10 mREM TEDE for **60 minutes** of exposure

      OR

      b. 50 mREM CDE Thyroid for **60 minutes** of exposure

4. Field survey results at or beyond the site boundary indicate **EITHER**:
   a. Gamma (closed window) dose rates **> 10 mR/hr** are expected to continue for ≥ **60 minutes**.

      OR

   b. Analyses of field survey samples indicate **> 50 mRem CDE Thyroid** for **60 minutes** of inhalation.

UNUSUAL EVENT

RU1 Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

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 60 minutes.
- 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.

1. Reading on **ANY** of the following effluent monitors **> 2 times alarm setpoint** established by a current radioactive release discharge permit for ≥ **60 minutes**.
   - RM-L-6, Radwaste Discharge
   - RM-L-12, IWTS / IWFS Discharge
   - RM-A-7, Waste Gas Decay Tank Discharge
   - Discharge Permit specified monitor

   OR

2. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for ≥ **60 minutes**.

   OR

3. Confirmed sample analyses for gaseous or liquid releases indicate concentrations or release rates **> 2 times ODCM Limit** with a release duration of ≥ **60 minutes**.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT

Abnormal Rad Levels / Radiological Effluents

Table R1 Effluent Monitor Thresholds

Monitor	General Emergency	Site Area Emergency	Alert	Unusual Event
RM-G-25 (Cond Offgas)	9.50 E+06 mR/hr	1.03 E+06 mR/hr	1.03 E+05 mR/hr	1.17 E+03 mR/hr
RM-A-8GH (Station Vent)	3.20 E+05 cpm	3.20 E+04 cpm	3.23 E+03 cpm	7.15 E+01 cpm
RM-G-24 (RB Purge)	5.69 E+05 mR/hr	5.69 E+04 mR/hr	5.69 E+03 mR/hr	6.49 E+01 mR/hr
RM-A-14 (ESF Vent)	7.18 E+02 uCi/cc	7.18 E+01 uCi/cc	7.18 E+00 uCi/cc	8.18 E-02 uCi/cc

Irradiated Fuel

RG2 Spent fuel pool level cannot be restored to at least 2.050 ft. as indicated on SF-LI- 1219A(B) for 60 minutes or longer. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

1. **Note:** The Emergency Director should declare the General Emergency promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. Spent fuel pool level cannot be restored to at least **2.050 ft.** as indicated on SF-LI- 1219A(B) for **60 minutes** or longer.

RS2 Spent fuel pool level at 2.050 ft. as indicated on SF-LI-1219A(B). 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

1. Lowering of spent fuel pool level to **2.050 ft.** as indicated on SF-LI-1219A(B).

RA2 Significant lowering of water level above, or damage to, irradiated fuel. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

1. Uncovery of irradiated fuel in the REFUELING PATHWAY.

   OR

2. Damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by **ANY** Table R2 Radiation Monitor reading **> 1,000 mRem/hr**.

   OR

3. Lowering of spent fuel pool level to **10.134 ft.** as indicated on SF-LI-1219A(B).

RU2 UNPLANNED loss of water level above irradiated fuel. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

1. a. UNPLANNED water level drop in the REFUELING PATHWAY.

   AND

   b. UNPLANNED Area Radiation Monitor reading rise on **ANY** radiation monitors in Table R2.

Table R2 Radiation Monitors

RMS	Area Monitored	Mode
RM-G-9	FHB Bridge Rad Monitor	ALL
RM-G-6	RB Auxiliary Bridge Rad Monitor	5, 6
RM-G-7	RB Main Bridge Rad Monitor	5, 6

Area Rad Levels

Table R3 Areas Requiring Continuous Occupancy

- Main Control Room
- Central Alarm Station – (by survey)

Table R4
Areas with Entry Related Mode Applicability

Area	Entry Related Mode Applicability
Auxiliary Building • 281’ shielded area • 305’ above DH Vaults	Modes 4, 5, and 6
Fuel Handling Building • 281’ 1C ES Vlvs MCC	

RA3 Radiation levels that impede access to equipment necessary for normal plant operations, cooldown or shutdown. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

Note: If the equipment in the room or area listed in Table R4 was already inoperable, or out of service, before the event occurred, then no emergency classification is warranted.

1. Dose rate **> 15 mR/hr** in **ANY** of the areas contained in Table R3.

   OR

2. UNPLANNED event results in radiation levels that prohibit or significantly impede access to **ANY** of the following Table R4 plant rooms or areas.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Abnormal Rad Levels / Radiological Effluents			
Fuel Clad Degradation			**RU4** Reactor coolant activity greater than Technical Specification allowable limits. 1 2 3 4 **Emergency Action Levels (EAL):** 1. Letdown Monitor RM-L-1 **alert alarm** (high or low channel). **OR** 2. Sample analysis indicates **EITHER** of the following: a. Dose Equivalent I-131 specific coolant activity **> 60.0 uCi/gm**. **OR** b. Dose Equivalent XE-133 specific coolant activity **> 797.0 uCi/gm**.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Fission Product Barrier			
FG1 Loss of ANY Two Barriers AND Loss or Potential Loss of the third barrier. 1 2 3 4	**FS1** Loss or Potential Loss of ANY two barriers. 1 2 3 4	**FA1** ANY Loss or ANY Potential Loss of either Fuel Clad or RCS. 1 2 3 4	None

Sub-Category	FC – Fuel Clad		RC – Reactor Coolant System		CT - Containment	
	Loss	Potential Loss	Loss	Potential Loss	Loss	Potential Loss
1. RCS or SG Tube Leakage	None	1. RCITS hot leg instruments indicate **0 inches** after lowering trend. **AND** 2. In-core thermocouples are unavailable. **AND** 3. **ALL** RCP's are secured.	1. RCS leakage results in **< 25° Sub Cooling Margin**. **OR** 2. Steam Generator tube RUPTURE that requires / results in an ESAS actuation.	3. UNISOLABLE RCS leakage **> 150 gpm**. **OR** 4. a. RCS Pressure **> 2450 psig**. **AND** b. RCS Pressure not lowering.	1. SG tube leakage **> 150 gpm**. **AND** 2. UNISOLABLE steam release from the affected S/G to the environment.	None
2. Inadequate Heat Removal	1. T_{clad} **> 1400°F.**	2. **> 25°F** Superheat. **OR** 3. HPI-PORV Cooling in effect.	None	1. HPI-PORV Cooling in effect.	None	1. T_{clad} **> 1800°F**. **AND** 2. EOP restoration procedures **not** effective in **< 15 minutes**.
3. Containment Radiation / RCS Activity	1. Containment radiation monitor (RM-G-22 or RM-G-23) reading **> 1.95E+03 R/hr**. **OR** 2. Coolant activity **> 300 uCi/gm** Dose Equivalent I-131.	None	1. Containment radiation monitor (RM-G-22 or RM-G-23) reading **> 25 R/hr**.	None	None	1. Containment radiation monitor (RM-G-22 or RM-G-23) reading **> 4.40E+03 R/hr**.

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Fission Product Barrier			
FG1 Loss of ANY Two Barriers AND Loss or Potential Loss of the third barrier. 1 2 3 4	**FS1** Loss or Potential Loss of ANY two barriers. 1 2 3 4	**FA1** ANY Loss or ANY Potential Loss of either Fuel Clad or RCS. 1 2 3 4	None
4. Containment Integrity or Bypass	None	None	None	None	1. Containment isolation is required and **ANY** of the following: a. UNPLANNED lowering in containment pressure following initial pressure rise. **OR** b. Containment pressure or water level response **not** consistent with LOCA conditions. **OR** c. UNISOLABLE pathway from containment to the environment exists **OR** 2. Indication of RCS leakage outside of containment.	3. Reactor Building Pressure **> 55 psig** and rising. **OR** 4. Hydrogen Concentration in Containment ≥ **4%**. **OR** 5. a. Reactor Building pressure **> 30 psig**. **AND** b. Reactor Building Emergency cooling is less than **ANY** one of the following conditions: **SPRAY** / **COOLERS**: 2 / 0; 0 / 3; 1 / 1
5. Emergency Director Judgment	1. Any Condition in the opinion of the Emergency Director that indicates Loss of the Fuel Clad Barrier.	2. Any Condition in the opinion of the Emergency Director that indicates Potential Loss of the Fuel Clad Barrier.	1. Any Condition in the opinion of the Emergency Director that indicates Loss of the RCS Barrier.	2. Any Condition in the opinion of the Emergency Director that indicates Potential Loss of the RCS Barrier.	1. Any Condition in the opinion of the Emergency Director that indicates Loss of the Containment Barrier.	2. Any Condition in the opinion of the Emergency Director that indicates Potential Loss of the Containment Barrier.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
System Malfunction			
Loss of AC Power	**MG1** Prolonged loss of all offsite and all onsite AC power to emergency busses. 1 2 3 4 **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. Loss of **ALL** offsite AC power to Emergency 4KV buses. **AND** 2. Failure of EG-Y-1A, EG-Y-1B Emergency Diesel Generators and EG-Y-4 SBO Diesel Generator to supply power to Emergency 4KV buses. **AND** 3. **EITHER** of the following: a. Restoration of at least one Emergency 4KV bus in **< 4 hours** is **not** likely. **OR** b. **> 25°F superheat.**	**MS1** Loss of all offsite and all onsite AC power to emergency busses for 15 minutes or longer. 1 2 3 4 **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. Loss of **ALL** offsite AC Power to Emergency 4KV buses. **AND** 2. Failure of EG-Y-1A, EG-Y-1B Emergency Diesel Generators and EG-Y-4 SBO Diesel Generator to supply power to Emergency 4KV buses. **AND** 3. Failure to restore power to at least one Emergency 4KV bus in **< 15 minutes** from the time of loss of both offsite and onsite AC power.	**MA1** Loss of all but one AC power source to emergency buses for 15 minutes or longer. 1 2 3 4 **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. AC power capability to Emergency 4KV buses reduced to only one of the following power sources for ≥ **15 minutes.** • Auxiliary Transformer 1A • Auxiliary Transformer 1B • Emergency Diesel Generator EG-Y-1A • Emergency Diesel Generator EG-Y-1B • SBO Diesel Generator EG-Y-4 **AND** 2. **ANY** additional single power source failure will result in a loss of **ALL** AC power to SAFETY SYSTEMS.	**MU1** Loss of all offsite AC power capability to emergency buses for 15 minutes or longer. 1 2 3 4 **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. Loss of **ALL** offsite AC power capability to Emergency 4KV busses for ≥ **15 minutes**.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
System Malfunction				
Loss of DC Power	**MG2** Loss of all AC and Vital DC power sources for 15 minutes or longer. 1 2 3 4 **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. Loss of **ALL** offsite AC power to Emergency 4KV buses. **AND** 2. Failure of EG-Y-1A, EG-Y-1B Emergency Diesel Generators and EG-Y-4 SBO Diesel Generator to supply power to Emergency 4KV buses. **AND** 3. Voltage is **< 105 VDC** on 125 VDC Distribution System 1A and 1B. **AND** 4. **ALL** AC and Vital DC power sources have been lost for **≥ 15 minutes**.	**MS2** Loss of all vital DC power for 15 minutes or longer. 1 2 3 4 **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. Voltage is **< 105 VDC** on 125 VDC Distribution System 1A and 1B for **≥ 15 minutes**.		
RPS Failure		**MS3** Inability to shutdown the reactor causing a challenge to core cooling or RCS heat removal. 1 2 **Emergency Action Levels (EAL):** 1. Automatic or Manual Trip did **not** shutdown the reactor as indicated by Reactor Power **≥ 5%**. **AND** 2. **ALL** manual actions to shutdown the reactor have been unsuccessful as indicated by Reactor Power **≥ 5%**. **AND** 3. **EITHER** of the following conditions exist: a. **T_{clad} > 1400°F**. **OR** b. HPI-PORV Cooling in effect.	**MA3** Automatic or manual trip fails to shutdown the reactor, and subsequent manual actions taken at the reactor control consoles are not successful in shutting down the reactor. 1 2 **Emergency Action Levels (EAL):** **Note:** A manual action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does not include manually driving in control rods or implementation of boron injection strategies. 1. Automatic Trip did **not** shutdown the reactor as indicated by Reactor Power **≥ 5%**. **AND** 2. Manual actions taken at the Console Center are **not** successful in shutting down the reactor as indicated by Reactor Power **≥ 5%**.	**MU3** Automatic or manual trip fails to shutdown the reactor. 1 2 **Emergency Action Levels (EAL):** **Note:** A manual action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does not include manually driving in control rods or implementation of boron injection strategies. 1. a. Automatic Trip did not shutdown the reactor as indicated by Reactor Power **≥ 5%**. **AND** b. Subsequent manual action taken at the Console Center is successful in shutting down the reactor as indicated by Reactor Power **< 5%**. **OR** 2. a. Manual Trip did not shutdown the reactor as indicated by Reactor Power **≥ 5%**. **AND** b. Subsequent automatic Trip is successful in shutting down the reactor as indicated by Reactor Power **< 5%**.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
System Malfunction				
Control Room Indications	**Table M1 Control Room Parameters** • Reactor Power • PZR Level • RCS Pressure • In Core/Core Exit Temperature • Level in at least one OTSG. • OTSG Emergency Feed Water Flow	**Table M2 Significant Transients** • Automatic Turbine Runback **> 25%** thermal reactor power • Electrical Load Rejection **> 25%** full electrical load • Reactor Trip • ESAS Actuation • Thermal Power oscillations **> 10%**	**MA4** UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress. 1 2 3 4 **Emergency Action Levels (EAL):** 1. **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.a. UNPLANNED event results in the inability to monitor **ANY** Table M1 parameters from within the Control Room for ≥ **15 minutes**. **AND** b. **ANY** Table M2 transient in progress.	**MU4** UNPLANNED loss of Control Room indications for 15 minutes or longer. 1 2 3 4 **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. UNPLANNED event results in the inability to monitor **ANY** Table M1 parameters from within the Control Room for ≥ **15 minutes**.
Hazard affects Safety System			**MA5** Hazardous event affecting a SAFETY SYSTEM required for the current operating mode. 1 2 3 4 **Emergency Action Levels (EAL):** **Note:** If it is determined that the conditions of MA5 are not met then assess the event via HU3, HU4, or HU6. 1. The occurrence of **ANY** of the following hazardous events: • Seismic event (earthquake) • Internal or external flooding event • High winds or tornado strike • FIRE • EXPLOSION • Other events with similar hazard characteristics as determined by the Shift Manager **AND** 2. **EITHER** of the following: a. Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM required by Technical Specifications for the current operating mode. **OR** b. The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure required by Technical Specifications for the current operating mode.	

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
System Malfunction				
RCS Leak				**MU6** RCS leakage for 15 minutes or longer. 1 2 3 4 **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. RCS unidentified or pressure boundary leakage **> 10 gpm** for ≥ **15 minutes**. **OR** 2. RCS identified leakage **> 25 gpm** for ≥ **15 minutes**. **OR** 3. Leakage from the RCS to a location outside containment **> 25 gpm** for ≥ **15 minutes**.
Communications			**Table M3 Communications Capability** System / Onsite / Offsite / NRC Radios: X / / / Plant page: X / / / Plant Telephone System: X / / / Commercial Telephones: X / X / X NARS: / X / / ENS: / X / X HPN: / X / X Satellite phones: / X / X	**MU7** Loss of all onsite or offsite communications capabilities. 1 2 3 4 **Emergency Action Levels (EAL):** 1. Loss of **ALL** Table M3 **Onsite** communications capability affecting the ability to perform routine operations. **OR** 2. Loss of **ALL** Table M3 **Offsite** communication capability affecting the ability to perform offsite notifications. **OR** 3. Loss of **ALL** Table M3 **NRC** communication capability affecting the ability to perform NRC notifications.
Containment				**MU8** Failure to isolate containment or loss of containment pressure control. 1 2 3 4 **Emergency Action Levels (EAL):** 1. a. Failure of containment to isolate when required by an actuation signal. **AND** b. **ANY** required penetration remains open **> 15 minutes** of the actuation signal. **OR** 2. a. Reactor Building pressure **> 30 psig.** **AND** b. Reactor Building Emergency cooling is less than **ANY** one of the following conditions for ≥ **15 minutes**: SPRAY / COOLERS 2 / 0 0 / 3 1 / 1

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Hazards and Other conditions Affecting Plant Safety				
Hostile Action	**HG1** HOSTILE ACTION resulting in loss of physical control of the facility. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. A notification from the Security Force that a HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA. **AND** 2. a. **ANY** Table H1 safety function **cannot** be controlled or maintained. **OR** b. Damage to spent fuel has occurred or is IMMINENT.	**HS1** HOSTILE ACTION within the PROTECTED AREA. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. A notification from the Security Force that a HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA.	**HA1** HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. A validated notification from NRC of an aircraft attack threat **< 30 minutes** from the site. **OR** 2. Notification by the Security Force that a HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLED AREA.	**HU1** Confirmed SECURITY CONDITION or threat. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. Notification of a credible security threat directed at the site as determined per SY-AA-101-132, Security Assessment and Response to Unusual Activities. **OR** 2. A validated notification from the NRC providing information of an aircraft threat. **OR** 3. Notification by the Security Force of a SECURITY CONDITION that does **not** involve a HOSTILE ACTION.
Transfer of Plant Control	**Table H1 Safety Functions** • Reactivity Control (ability to shut down the reactor and keep it shutdown) • Core Cooling (ability to cool the core) • RCS Heat Removal (ability to maintain heat sink)	**HS2** Inability to control a key safety function from outside the Control Room. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. A Control Room evacuation has resulted in plant control being transferred from the Control Room to alternate locations per OP-TM-EOP-020, Cooldown from Outside the Control Room. **AND** 2. Control of **ANY** Table H1 key safety function is **not** reestablished in **< 15 minutes**.	**HA2** Control Room evacuation resulting in transfer of plant control to alternate locations. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. A Control Room evacuation has resulted in plant control being transferred from the Control Room to alternate locations per OP-TM-EOP-020, Cooldown from Outside the Control Room.	

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Hazards and Other conditions Affecting Plant Safety			
Fire		**Table H2 Vital Areas** • Reactor Building • Intake Building • Intermediate Building • Control Tower • Auxiliary and Fuel Handling Buildings • 1A and 1B Diesel Generator Buildings • BWST • CST	**HU3** FIRE potentially degrading the level of safety of the plant. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. Escalation of the emergency classification level would be via IC CA2 or MA5 1. A FIRE in **ANY** Table H2 area is **not** extinguished in **< 15-minutes** of **ANY** of the following FIRE detection indications: • Report from the field (i.e., visual observation) • Receipt of multiple (more than 1) fire alarms or indications • Field verification of a single fire alarm **OR** 2. a. Receipt of a single fire alarm in **ANY** Table H2 area (i.e., no other indications of a FIRE). **AND** b. The existence of a FIRE is **not** verified in **< 30 minutes** of alarm receipt. **OR** 3. A FIRE within the plant PROTECTED AREA not extinguished in **< 60-minutes** of the initial report, alarm or indication. **OR** 4. A FIRE within the plant PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish.

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Hazards and Other conditions Affecting Plant Safety			
Earthquake			**HU4** Seismic event greater than OBE levels. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** **Note:** For emergency classification if EAL 2.b is not able to be confirmed, then the occurrence of a seismic event is confirmed in manner deemed appropriate by the Shift Manager or Emergency Director in ≤ 15 mins of the event. 1. Seismic event **> Operating Basis Earthquake (OBE)** as indicated by seismic Alarms **PRF-1-3** Operating Basis earthquake. **OR** 2. When Seismic Monitoring Equipment is **not** available: **OR** a. Control Room personnel feel an actual or potential seismic event. **AND** b. **ANY** one of the following confirmed in ≤ **15 mins** of the event: • The earthquake resulted in Modified Mercalli Intensity (MMI) ≥ **VI** and occurred ≤**3.5 miles** of the plant. • The earthquake was magnitude ≥ **6.0**. • The earthquake was magnitude ≥ **5.0** and occurred ≤ **125 miles** of the plant.
Toxic Gas		**Table H3** **Areas with Entry Related Mode Applicability** **Auxiliary Building** • 281' shielded area • 305' above DH Vaults **Fuel Handling Building** • 281' 1C ES Vlvs MCC Modes 4, 5, and 6	**HA5** Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown. 4 5 6 **Emergency Action Levels (EAL):** **Note:** If the equipment in the listed room or area was already inoperable, or out of service, before the event occurred, then no emergency classification is warranted. 1. Release of a toxic, corrosive, asphyxiant or flammable gas in **ANY** Table H3 area. **AND** 2. Entry into the room or area is prohibited or impeded.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Hazards and Other conditions Affecting Plant Safety				
Hazardous Event				**HU6** Hazardous event. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** **Note:** EAL #4 does not apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents. 1. Tornado strike within the PROTECTED AREA. **OR** 2. Internal room or area flooding of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component required by Technical Specifications for the current operating mode. **OR** 3. 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). **OR** 4. A hazardous event that results in onsite conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles. **OR** 5. a. Abnormal river water level at the intake Pump and Screen House, as indicated by **EITHER**: 1. **> 296 ft. el.** (high level). **OR** 2. **< 274 ft. el.** (low level). **OR** b. River flow forecasted to exceed **900,000 CFS** within the next **12 hours**.
Emergency Director Judgment	**HG7** Other conditions exist which in the judgment of the Emergency Director warrant declaration of a GENERAL EMERGENCY. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 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 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 Protective Action Guideline exposure levels offsite for more than the immediate site area.	**HS7** Other conditions exist which in the judgment of the Emergency Director warrant declaration of a SITE AREA EMERGENCY. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 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 Protective Action Guideline exposure levels beyond the site boundary.	**HA7** Other conditions exist which in the judgment of the Emergency Director warrant declaration of an ALERT. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 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 Protective Action Guideline exposure levels.	**HU7** Other conditions exist which in the judgment of the Emergency Director warrant declaration of an UNUSUAL EVENT. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 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.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Independent Spent Fuel Storage Facility				
Confinement Boundary				**E-HU1** Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by a radiation reading greater than **ANY** of the following: 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by a radiation reading greater than **ANY** of the following: a. **240 mrem/hour** gamma on the vertical concrete surfaces. **OR** b. **10 mrem/hour** neutron on the vertical concrete surfaces. **OR** c. **900 mrem/hour** (neutron + gamma) on the top.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

Abnormal Rad Levels / Radiological Effluents

GENERAL EMERGENCY

RG1 Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mRem TEDE or 5,000 mRem thyroid CDE. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

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.
- 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.
- 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.

Radiological Effluents

1. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for ≥ **15 minutes**.

   OR

2. Dose assessment Using actual meteorology indicates doses at or beyond the site boundary of **EITHER**:
   a. **> 1,000 mRem TEDE.**

      OR

   b. **> 5,000 mRem CDE Thyroid.**

   OR

3. Field survey results at or beyond the site boundary indicate **EITHER**:
   a. Gamma (closed window) dose rates **> 1,000 mR/hr** are expected to continue for ≥ **60 minutes**.

      OR

   b. Analyses of field survey samples indicate **> 5,000 mRem CDE Thyroid** for **60 minutes** of inhalation.

SITE AREA EMERGENCY

RS1 Release of gaseous radioactivity resulting in offsite dose greater than 100 mRem TEDE or 500 mRem thyroid CDE. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

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.
- 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.
- 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.

1. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for ≥ **15 minutes**.

   OR

2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of **EITHER**:
   a. **> 100 mRem TEDE.**

      OR

   b. **> 500 mRem CDE Thyroid.**

   OR

3. Field survey results at or beyond the site boundary indicate **EITHER**:
   a. Gamma (closed window) dose rates **> 100 mR/hr** are expected to continue for ≥ **60 minutes**.

      OR

   b. Analyses of field survey samples indicate **> 500 mRem CDE Thyroid** for **60 minutes** of inhalation.

ALERT

RA1 Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mRem TEDE or 50 mRem thyroid CDE. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

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.
- 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.
- 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.

1. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for ≥ **15 minutes**.

   OR

2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of **EITHER**:
   a. **> 10 mRem TEDE.**

      OR

   b. **> 50 mRem CDE Thyroid.**

   OR

   3. Analysis of a liquid effluent sample indicates a concentration or release that would result in doses greater than **EITHER** of the following at or beyond the site boundary
      c. 10 mREM TEDE for **60 minutes** of exposure

      OR

      d. 50 mREM CDE Thyroid for **60 minutes** of exposure

4. Field survey results at or beyond the site boundary indicate **EITHER**:
   a. Gamma (closed window) dose rates **> 10 mR/hr** are expected to continue for ≥ **60 minutes**.

      OR

   b. Analyses of field survey samples indicate **> 50 mRem CDE Thyroid** for **60 minutes** of inhalation.

UNUSUAL EVENT

RU1 Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

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 60 minutes.
- 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.

1. Reading on **ANY** of the following effluent monitors **> 2 times alarm setpoint** established by a current radioactive release discharge permit for ≥ **60 minutes**.
   - RM-L-6, Radwaste Discharge
   - RM-L-12, IWTS / IWFS Discharge
   - RM-A-7, Waste Gas Decay Tank Discharge
   - Discharge Permit specified monitor

   OR

2. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for ≥ **60 minutes**.

   OR

3. Confirmed sample analyses for gaseous or liquid releases indicate concentrations or release rates **> 2 times ODCM Limit** with a release duration of ≥ **60 minutes**.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT

Abnormal Rad Levels / Radiological Effluents

Table R1 Effluent Monitor Thresholds

Monitor	General Emergency	Site Area Emergency	Alert	Unusual Event
RM-G-25 (Cond Offgas)	9.50 E+06 mR/hr	1.03 E+06 mR/hr	1.03 E+05 mR/hr	1.17 E+03 mR/hr
RM-A-8GH (Station Vent)	3.20 E+05 cpm	3.20 E+04 cpm	3.23 E+03 cpm	7.15 E+01 cpm
RM-G-24 (RB Purge)	5.69 E+05 mR/hr	5.69 E+04 mR/hr	5.69 E+03 mR/hr	6.49 E+01 mR/hr
RM-A-14 (ESF Vent)	7.18 E+02 uCi/cc	7.18 E+01 uCi/cc	7.18 E+00 uCi/cc	8.18 E-02 uCi/cc

Irradiated Fuel

RG2 Spent fuel pool level cannot be restored to at least 2.050 ft. as indicated on SF-LI- 1219A(B) for 60 minutes or longer. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

Note: If the equipment in the room or area listed in Table R4 was already inoperable, or out of service, before the event occurred, then no emergency classification is warranted.

1. Spent fuel pool level cannot be restored to at least **2.050 ft.** as indicated on SF-LI- 1219A(B) for **60 minutes** or longer.

RS2 Spent fuel pool level at 2.050 ft. as indicated on SF-LI-1219A(B). 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

1. Lowering of spent fuel pool level to **2.050 ft.** as indicated on SF-LI-1219A(B).

RA2 Significant lowering of water level above, or damage to, irradiated fuel. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

1. Uncovery of irradiated fuel in the REFUELING PATHWAY.

   OR

2. Damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by **ANY** Table R2 Radiation Monitor reading **> 1,000 mRem/hr**.

   OR

3. Lowering of spent fuel pool level to **10.134 ft.** as indicated on SF-LI-1219A(B).

RU2 UNPLANNED loss of water level above irradiated fuel. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

1. a. UNPLANNED water level drop in the REFUELING PATHWAY.

   AND

   b. UNPLANNED Area Radiation Monitor reading rise on **ANY** radiation monitors in Table R2.

Table R2 Radiation Monitors

RMS	Area Monitored	Mode
RM-G-9	FHB Bridge Rad Monitor	ALL
RM-G-6	RB Auxiliary Bridge Rad Monitor	5, 6
RM-G-7	RB Main Bridge Rad Monitor	5, 6

Area Rad Levels

Table R3 Areas Requiring Continuous Occupancy

- Main Control Room
- Central Alarm Station – (by survey)

Table R4
Areas with Entry Related Mode Applicability

Area	Entry Related Mode Applicability
Auxiliary Building • 281’ shielded area • 305’ above DH Vaults	Modes 4, 5, and 6
Fuel Handling Building • 281’ 1C ES Vlvs MCC	

RA3 Radiation levels that impede access to equipment necessary for normal plant operations, cooldown or shutdown. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

Note: If the equipment in the room or area listed in Table R4 was already inoperable, or out of service, before the event occurred, then no emergency classification is warranted.

1. Dose rate **> 15 mR/hr** in **ANY** of the areas contained in Table R3.

   OR

2. UNPLANNED event results in radiation levels that prohibit or significantly impede access to **ANY** of the following Table R4 plant rooms or areas.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Cold Shutdown / Refueling System Malfunctions				
Loss of AC Power			**CA1** Loss of all offsite and all onsite AC power to emergency busses for 15 minutes or longer. 5 6 D **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. Loss of **ALL** offsite AC power to Emergency 4KV buses. **AND** 2. Failure of EG-Y-1A, EG-Y-1B Emergency Diesel Generators and EG-Y-4 SBO Diesel Generator to supply power to Emergency 4KV buses. **AND** 3. Failure to restore power to at least one Emergency 4KV bus in **< 15 minutes** from the time of loss of both offsite and onsite AC power.	**CU1** Loss of all but one AC power source to emergency buses for 15 minutes or longer. 5 6 D **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. AC power capability to Emergency 4KV buses reduced to only one of the following power sources for **≥ 15 minutes**. • Auxiliary Transformer 1A • Auxiliary Transformer 1B • Emergency Diesel Generator EG-Y-1A • Emergency Diesel Generator EG-Y-1B • SBO Diesel Generator EG-Y-4 **AND** 2. **ANY** additional single power source failure will result in a loss of **ALL** AC power to SAFETY SYSTEMS.
Safety System			**CA2** Hazardous event affecting SAFETY SYSTEM required for the current operating mode. 5 6 **Emergency Action Levels (EAL):** **Note:** If it is determined that the conditions of CA2 are not met then assess the event via HU3, HU4, or HU6. 1. The occurrence of **ANY** of the following hazardous events: • Seismic event (earthquake) • Internal or external flooding event • High winds or tornado strike • FIRE • EXPLOSION • Other events with similar hazard characteristics as determined by the Shift Manager **AND** 2. **EITHER** of the following: a. Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM required by Technical Specifications for the current operating mode. **OR** b. The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure required by Technical Specifications for the current operating mode.	

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

Cold Shutdown / Refueling System Malfunctions

DC Power

UNUSUAL EVENT

CU3 Loss of Vital DC power for 15 minutes or longer. 5 6

Emergency Action Levels (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. Indicated voltage is **< 105 VDC** on required 125 VDC Distribution System 1A and 1B for **≥ 15 minutes**.

Communications

Table C1 Communications Capability

System	Onsite	Offsite	NRC
Radios	X		
Plant page	X		
Plant Telephone System	X		
Commercial Telephones	X	X	X
NARS		X	
ENS		X	X
HPN		X	X
Satellite phones		X	X

UNUSUAL EVENT

CU4 Loss of all onsite or offsite communications capabilities. 5 6 D

Emergency Action Levels (EAL):

1. Loss of **ALL** Table C1 **Onsite** communications capability affecting the ability to perform routine operations.

   OR

2. Loss of **ALL** Table C1 **Offsite** communication capability affecting the ability to perform offsite notifications.

   OR

3. Loss of **ALL** Table C1 **NRC** communication capability affecting the ability to perform NRC notifications.

Heat Sink

Table C2 RCS Heat-up Duration Thresholds

RCS Status	Containment Closure Status	Heat-up Duration
Intact	Not Applicable	60 minutes*
Not Intact **OR** Reduced Inventory	Established	20 minutes*
	Not Established	0 minutes

* If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced, then EAL #1 is **not** applicable.

ALERT

CA5 Inability to maintain the plant in cold shutdown. 5 6

Emergency Action Levels (EAL):

Notes:

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
- A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when heat removal function is available does not warrant classification.

1. UNPLANNED rise in RCS temperature **> 200ºF** for **> Table C2 duration**.

   OR

2. UNPLANNED RCS pressure rise **> 10 psig** as a result of temperature rise. (This EAL does not apply in solid plant conditions.)

UNUSUAL EVENT

CU5 UNPLANNED rise in RCS temperature. 5 6

Emergency Action Levels (EAL):

Notes:

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
- A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when heat removal function is available does not warrant classification.

1. UNPLANNED rise in RCS temperature **> 200ºF**.

   OR

2. Loss of the following for **≥ 15 minutes**.
   - **ALL** RCS temperature indications

     AND
   - **ALL** RCS level indications

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Cold Shutdown / Refueling System Malfunctions				
RCS Leakage / Inventory	**CG6** Loss of reactor vessel/RCS inventory affecting fuel clad integrity with containment challenged. [5] [6] **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. a. Reactor Vessel / RCS level **cannot** be monitored for ≥ **30 minutes**. **AND** b. Core uncovery is indicated by **ANY** of the following: • Table C3 indications of a sufficient magnitude to indicate core uncover. **OR** • Erratic Source Range Neutron Monitor indication. **OR** • Radiation Monitor RM-G-6 or RM-G-7 reading **> 3 R/hr**. **AND** c. **ANY** Containment Challenge Indication (Table C4).	**CS6** Loss of reactor vessel/RCS inventory affecting core decay heat removal capability. [5] [6] **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. Reactor Vessel / RCS level **cannot** be monitored for ≥ **30 minutes**. **AND** 2. Core uncovery is indicated by **ANY** of the following: • Table C3 indications of a sufficient magnitude to indicate core uncover. **OR** • Erratic Source Range Neutron Monitor indication. **OR** • Radiation Monitor RM-G-6 or RM-G-7 reading **> 3 R/hr**.	**CA6** Loss of reactor vessel/RCS inventory. [5] [6] **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. Loss of Reactor Vessel / RCS inventory as indicated by RCS level **< 0 inches** on Draindown Level indicator. **OR** 2. a. Reactor Vessel / RCS level **cannot** be monitored for ≥ **15 minutes**. **AND** b. Loss of Reactor Vessel / RCS inventory per Table C3 indications. **Table C4 Containment Challenge Indications** • Hydrogen Concentration in Containment **> 4%** • UNPLANNED rise in containment pressure • CONTAINMENT CLOSURE **not** established* *if CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute core uncovery time limit, then escalation to a General Emergency is not required.	**CU6** UNPLANNED loss of reactor vessel/RCS inventory for 15 minutes or longer. [5] [6] **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. UNPLANNED loss of reactor coolant results in the inability to restore and maintain Reactor Vessel / RCS level to ≥ **procedurally established lower limit** for ≥ **15 minutes**. **OR** 2. a. Reactor Vessel / RCS level **cannot** be monitored. **AND** b. Loss of Reactor Vessel / RCS inventory per Table C3 indications. **Table C3 Indications of RCS Leakage** • UNPLANNED Reactor Bldg Sump level rise* • UNPLANNED Auxiliary Bldg. Sump level rise* • UNPLANNED BWST level rise* • UNPLANNED RCDT level rise* • UNPLANNED rise in RCS makeup • Observation of leakage or inventory loss * Rise in level is attributed to a loss of reactor vessel/RCS inventory.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Hazards and Other conditions Affecting Plant Safety				
Hostile Action	**HG1** HOSTILE ACTION resulting in loss of physical control of the facility. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. A notification from the Security Force that a HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA. **AND** 2. a. **ANY** Table H1 safety function **cannot** be controlled or maintained. **OR** b. Damage to spent fuel has occurred or is IMMINENT.	**HS1** HOSTILE ACTION within the PROTECTED AREA. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. A notification from the Security Force that a HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA.	**HA1** HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. A validated notification from NRC of an aircraft attack threat **< 30 minutes** from the site. **OR** 2. Notification by the Security Force that a HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLED AREA.	**HU1** Confirmed SECURITY CONDITION or threat. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. Notification of a credible security threat directed at the site as determined per SY-AA-101-132, Security Assessment and Response to Unusual Activities. **OR** 2. A validated notification from the NRC providing information of an aircraft threat. **OR** 3. Notification by the Security Force of a SECURITY CONDITION that does **not** involve a HOSTILE ACTION.
Transfer of Plant Control	**Table H1 Safety Functions** • Reactivity Control (ability to shut down the reactor and keep it shutdown) • Core Cooling (ability to cool the core) • RCS Heat Removal (ability to maintain heat sink)	**HS2** Other conditions exist which in the judgment of the Emergency Director warrant declaration of a SITE AREA EMERGENCY. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. A Control Room evacuation has resulted in plant control being transferred from the Control Room to alternate locations per OP-TM-EOP-020, Cooldown from Outside the Control Room. **AND** 2. Control of **ANY** Table H1 key safety function is **not** reestablished in **< 15 minutes**.	**HA2** Control Room evacuation resulting in transfer of plant control to alternate locations. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. A Control Room evacuation has resulted in plant control being transferred from the Control Room to alternate locations per OP-TM-EOP-020, Cooldown from Outside the Control Room.	

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Hazards and Other conditions Affecting Plant Safety				
Fire			**Table H2 Vital Areas** • Reactor Building • Intake Building • Intermediate Building • Control Tower • Auxiliary and Fuel Handling Buildings • 1A and 1B Diesel Generator Buildings • BWST • CST	**HU3** FIRE potentially degrading the level of safety of the plant. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. A FIRE in **ANY** Table H2 area is **not** extinguished in **< 15-minutes** of **ANY** of the following FIRE detection indications: • Report from the field (i.e., visual observation) • Receipt of multiple (more than 1) fire alarms or indications • Field verification of a single fire alarm **OR** 2. a. Receipt of a single fire alarm in **ANY** Table H2 area (i.e., no other indications of a FIRE). **AND** b. The existence of a FIRE is **not** verified in **< 30 minutes** of alarm receipt. **OR** 3. A FIRE within the plant PROTECTED AREA not extinguished in **< 60-minutes** of the initial report, alarm or indication. **OR** 4. A FIRE within the plant PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish.

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Hazards and Other conditions Affecting Plant Safety				
Earthquake				**HU4** Seismic event greater than OBE levels. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** **Note:** For emergency classification if EAL 2.b is not able to be confirmed, then the occurrence of a seismic event is confirmed in manner deemed appropriate by the Shift Manager or Emergency Director in ≤ 15 mins of the event. 1. Seismic event **> Operating Basis Earthquake (OBE)** as indicated by seismic Alarms **PRF-1-3** Operating Basis earthquake. **OR** 2. When Seismic Monitoring Equipment is **not** available: **OR** a. Control Room personnel feel an actual or potential seismic event. **AND** b. **ANY** one of the following confirmed in ≤ **15 mins** of the event: • The earthquake resulted in Modified Mercalli Intensity (MMI) ≥ **VI** and occurred ≤ **3.5 miles** of the plant. • The earthquake was magnitude ≥ **6.0.** • The earthquake was magnitude ≥**5.0** and occurred ≤ **125 miles** of the plant.
Toxic Gas		**Table H3** **Areas with Entry Related Mode Applicability** **Auxiliary Building** • 281’ shielded area • 305’ above DH Vaults **Fuel Handling Building** • 281’ 1C ES Vlvs MCC Modes 4, 5, and 6	**HA5** Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown. 4 5 6 **Emergency Action Levels (EAL):** **Note:** If the equipment in the listed room or area was already inoperable, or out of service, before the event occurred, then no emergency classification is warranted 1. Release of a toxic, corrosive, asphyxiant or flammable gas in **ANY** Table H3 area. **AND** 2. Entry into the room or area is prohibited or impeded.	

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Hazards and Other conditions Affecting Plant Safety				
Hazardous Event				**HU6** Hazardous event. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** **Note:** EAL #4 does not apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents. 1. Tornado strike within the PROTECTED AREA. **OR** 2. Internal room or area flooding of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component required by Technical Specifications for the current operating mode. **OR** 3. 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). **OR** 4. A hazardous event that results in onsite conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles. **OR** 5. a. Abnormal river water level at the intake Pump and Screen House, as indicated by **EITHER**: 1. **> 296 ft. el.** (high level). **OR** 2. **< 274 ft. el.** (low level). **OR** b. River flow forecasted to exceed **900,000 CFS** within the next **12 hours**.
Emergency Director Judgment	**HG7** Other conditions exist which in the judgment of the Emergency Director warrant declaration of a GENERAL EMERGENCY. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 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 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 Protective Action Guideline exposure levels offsite for more than the immediate site area.	**HS7** Other conditions exist which in the judgment of the Emergency Director warrant declaration of a SITE AREA EMERGENCY. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 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 Protective Action Guideline exposure levels beyond the site boundary.	**HA7** Other conditions exist which in the judgment of the Emergency Director warrant declaration of an ALERT. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 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 Protective Action Guideline exposure levels.	**HU7** Other conditions exist which in the judgment of the Emergency Director warrant declaration of an UNUSUAL EVENT. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 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.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Independent Spent Fuel Storage Facility				
Confinement Boundary				**E-HU1** Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by a radiation reading greater than **ANY** of the following: 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by a radiation reading greater than **ANY** of the following: a. **240 mrem/hour** gamma on the vertical concrete surfaces. **OR** b. **10 mrem/hour** neutron on the vertical concrete surfaces. **OR** c. **900 mrem/hour** (neutron + gamma) on the top.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RG1

Initiating Condition:

Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mRem TEDE or 5,000 mRem thyroid CDE.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

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.
- 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.
- 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.

1. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for **≥ 15 minutes**.

   OR

2. Dose assessment Using actual meteorology indicates doses at or beyond the site boundary of **EITHER**:

   a. **> 1,000 mRem TEDE**.

      OR

   b. **> 5,000 mRem CDE Thyroid**.

   OR

3. Field survey results at or beyond the site boundary indicate **EITHER**:

   a. Gamma (closed window) dose rates **> 1,000 mR/hr** are expected to continue for **≥ 60 minutes**.

      OR

   b. Analyses of field survey samples indicate **> 5,000 mRem CDE Thyroid** for **60 minutes** of inhalation.

Table R1 Effluent Monitor Thresholds

Effluent Monitor	General Emergency
RM-G-25 (Cond Offgas)	9.50 E+06 mR/hr
RM-A-8GH (Station Vent)	3.20 E+05 cpm
RM-G-24 (RB Purge)	5.69 E+05 mR/hr
RM-A-14 (ESF Vent)	7.18 E+02 uCi/cc

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RG1 (cont)

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to the EPA Protective Action Guides (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 while the 5,000 mRem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

Basis Reference(s):

1. NEI 99-01 Rev 6, AG1
2. EP-EAL-0609, Criteria for Choosing Radiological Gaseous Effluent EAL Threshold Values, Three Mile Island Unit-1 (TMI-1)
3. EP-AA-112-500 Emergency Environmental Monitoring
4. FSAR Section 11.4 Radiation Monitoring System
5. EP-AA-110-200 Dose Assessment
6. EP-AA-110-201 On Shift Dose Assessment

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RS1

Initiating Condition:

Release of gaseous radioactivity resulting in offsite dose greater than 100 mRem TEDE or 500 mRem thyroid CDE.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

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.
- 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.
- 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.

1. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for **≥ 15 minutes**.

   OR

2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of **EITHER**:

   a. **> 100 mRem TEDE**.

      OR

   b. **> 500 mRem CDE Thyroid**.

   OR

3. Field survey results at or beyond the site boundary indicate **EITHER**:

   a. Gamma (closed window) dose rates **> 100 mR/hr** are expected to continue for **≥ 60 minutes**.

      OR

   b. Analyses of field survey samples indicate **> 500 mRem CDE Thyroid** for **60 minutes** of inhalation.

Table R1 Effluent Monitor Thresholds

Effluent Monitor	Site Area Emergency
RM-G-25 (Cond Offgas)	1.03 E+06 mR/hr
RM-A-8GH (Station Vent)	3.20 E+04 cpm
RM-G-24 (RB Purge)	5.69 E+04 mR/hr
RM-A-14 (ESF Vent)	7.18 E+01 uCi/cc

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RS1 (cont)

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to 10% of the EPA Protective Action Guides (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% of the EPA PAG of 1,000 mRem while the 500 mRem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

Escalation of the emergency classification level would be via IC RG1.

Basis Reference(s):

1. NEI 99-01 Rev 6, AS1
2. EP-EAL-0609, Criteria for Choosing Radiological Gaseous Effluent EAL Threshold Values, Three Mile Island Unit-1 (TMI-1)
3. EP-AA-112-500 Emergency Environmental Monitoring
4. FSAR Section 11.4 Radiation Monitoring System
5. EP-AA-110-200 Dose Assessment
6. EP-AA-110-201 On Shift Dose Assessment

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RA1

Initiating Condition:

Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mRem TEDE or 50 mRem thyroid CDE.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

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.
- 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.
- 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.

1. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for ≥ **15 minutes**.

   OR

2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of **EITHER**:

   a. **> 10 mRem TEDE**.

      OR

   b. **> 50 mRem CDE Thyroid**.

   OR

3. Analysis of a liquid effluent sample indicates a concentration or release that would result in doses greater than **EITHER** of the following at or beyond the site boundary

   a. 10 mREM TEDE for **60 minutes** of exposure

      OR

   b. 50 mREM CDE Thyroid for **60 minutes** of exposure

4. Field survey results at or beyond the site boundary indicate **EITHER**:

   a. Gamma (closed window) dose rates **> 10 mR/hr** are expected to continue for ≥ **60 minutes**.

      OR

   b. Analyses of field survey samples indicate **> 50 mRem CDE Thyroid** for **60 minutes** of inhalation.

Table R1 Effluent Monitor Thresholds

Effluent Monitor	Alert

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RM-G-25 (Cond Offgas)	1.03 E+05 mR/hr
RM-A-8GH (Station Vent)	3.23 E+03 cpm
RM-G-24 (RB Purge)	5.69 E+03 mR/hr
RM-A-14 (ESF Vent)	7.18 E+00 uCi/cc

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RA1 (cont)

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% of the EPA Protective Action Guides (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% of the EPA PAG of 1,000 mRem while the 50 mRem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

Escalation of the emergency classification level would be via IC RS1.

Basis Reference(s):

1. NEI 99-01 Rev 6, AA1
2. OP 1101-2.1 Radiation Monitoring System Setpoints
3. FSAR Section 11.4 Radiation Monitoring System
4. OP-TM-MAP-C0101, Radiation Level HI
5. EP-EAL-0609, Criteria for Choosing Radiological Gaseous Effluent EAL Threshold Values, Three Mile Island Unit-1 (TMI-1)
6. EP-EAL-0616, Three Mile Island Criteria for Choosing Radiological Liquid Effluent EAL Threshold Values
7. EP-EAL-0622, Three Mile Island Criteria for Choosing Radiological Gaseous Effluent EAL Threshold Values for Waste Gas Decay Tanks

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RU1

Initiating Condition:

Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

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 60 minutes.
- 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.

1. Reading on **ANY** of the following effluent monitors **> 2 times alarm setpoint** established by a current radioactive release discharge permit for **≥ 60 minutes**.
   - RM-L-6, Radwaste Discharge
   - RM-L-12, IWTS / IWFS Discharge
   - RM-A-7, Waste Gas Decay Tank Discharge
   - Discharge Permit specified monitor

   OR

2. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for **≥ 60 minutes**.

   OR

3. Confirmed sample analyses for gaseous or liquid releases indicate concentrations or release rates **> 2 times ODCM Limit** with a release duration of **≥ 60 minutes**.

Table R1 Effluent Monitor Thresholds

Effluent Monitor	Unusual Event
RM-G-25 (Cond Offgas)	1.17 E+03 mR/hr
RM-A-8GH (Station Vent)	7.15 E+01 cpm
RM-G-24 (RB Purge)	6.49 E+01 mR/hr
RM-A-14 (ESF Vent)	8.18 E-02 uCi/cc

Basis:

This 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 un-monitored, including those for which a radioactivity discharge permit is normally prepared.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RU1 (cont)

Basis (cont):

Nuclear power plants 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 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.

Releases should not be prorated or averaged. For example, a release exceeding 4 times release limits for 30 minutes does not meet the EAL.

EAL #1 Basis

This EAL addresses radioactivity releases that cause effluent radiation monitor readings to exceed 2 times the limit established by a radioactivity discharge permit. This EAL will typically be associated with planned batch releases from non-continuous release pathways (e.g., radwaste, waste gas).

The effluent monitors listed are those normally used for planned discharges. If a discharge is performed using a different flowpath or effluent monitor other than those listed (e.g., a portable or temporary effluent monitor), then the declaration criteria will be based on the monitor specified in the Discharge Permit.

EAL #2 Basis

This EAL addresses normally occurring continuous radioactivity releases from monitored gaseous effluent pathways.

EAL #3 Basis

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, etc.).

Escalation of the emergency classification level would be via IC RA1.

Basis Reference(s):

1. NEI 99-01 Rev 6, AU1
2. OP 1101-2.1 Radiation Monitoring System Setpoints
3. FSAR Section 11.4 Radiation Monitoring System
4. Offsite Dose Calculation (ODCM)
5. OP-TM-MAP-C0101, Radiation Level HI
6. EP-EAL-0609, Criteria for Choosing Radiological Gaseous Effluent EAL Threshold Values, Three Mile Island Unit-1 (TMI-1)

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RG2

Initiating Condition:

Spent fuel pool level cannot be restored to at least 2.050 ft. as indicated on SF-LI- 1219A(B) for 60 minutes or longer.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

Note: The Emergency Director should declare the General Emergency promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. Spent fuel pool level cannot be restored to at least **2.050 ft.** as indicated on SF-LI- 1219A(B) for **60 minutes** or longer.

Basis:

This IC addresses a significant loss of spent fuel pool inventory control and makeup capability leading to a prolonged uncovery of spent fuel. This condition will lead to fuel damage and a radiological release to the environment.

It is recognized that this IC would likely not be met until well after another General Emergency IC was met; however, it is included to provide classification diversity.

Basis Reference(s):

1. NEI 99-01 Rev 6, AG2
2. EP-EAL-1009, Criteria for Choosing Spent Fuel Pool Level 3 and Level 2 EAL Threshold Values for TMI Station

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RS2

Initiating Condition:

Spent fuel pool level at 2.050 ft. as indicated on SF-LI-1219A(B).

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

1. Lowering of spent fuel pool level to **2.050 ft.** as indicated on SF-LI-1219A(B).

Basis:

This IC addresses a significant loss of spent fuel pool inventory control and makeup capability leading to IMMINENT fuel damage. This condition entails major failures of plant functions needed for protection of the public and thus warrant a Site Area Emergency declaration.

It is recognized that this IC would likely not be met until well after another Site Area Emergency IC was met; however, it is included to provide classification diversity.

Escalation of the emergency classification level would be via IC RG1 or RG2.

Basis Reference(s):

1. NEI 99-01 Rev 6, AS2
2. EP-EAL-1009, Criteria for Choosing Spent Fuel Pool Level 3 and Level 2 EAL Threshold Values for TMI Station

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RA2

Initiating Condition:

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

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

1. Uncovery of irradiated fuel in the REFUELING PATHWAY.

   OR

2. Damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by **ANY** Table R2 Radiation Monitor reading **> 1,000 mRem/hr**.

   OR

3. Lowering of spent fuel pool level to **10.134 ft.** as indicated on SF-LI-1219A(B).

Table R2 Radiation Monitors

RMS	Area Monitored	Mode
RM-G-9	FHB Bridge Rad Monitor	ALL
RM-G-6	RB Auxiliary Bridge Rad Monitor	5, 6
RM-G-7	RB Main Bridge Rad Monitor	5, 6

Basis:

REFUELING PATHWAY: all the cavities, tubes, canals and pools through which irradiated fuel may be moved or stored, but not including the reactor vessel below the flange.

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.

This IC addresses events that have caused IMMINENT or actual damage to an irradiated fuel assembly. 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 E-HU1.1.

EAL #1 Basis

This EAL escalates from RU2 in that the loss of level, in the affected portion of the REFUELING PATHWAY, is of sufficient magnitude to have resulted in uncovery of irradiated fuel.

Indications of irradiated fuel uncovery may include direct or indirect visual observation (e.g., reports from personnel or camera images), as well as significant changes in water and radiation levels, or other plant parameters. Computational aids may also be used (e.g., a boil-off curve). Classification of an event using this EAL should be based on the totality of available indications, reports and observations.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RA2 (cont)

Basis (cont):

While an area radiation monitor could detect a rise in a dose rate due to a lowering of water level in some portion of the REFUELING PATHWAY, the reading may not be a reliable indication of whether or not the fuel is actually uncovered. To the degree possible, readings should be considered in combination with other available indications of inventory loss.

A drop in water level above irradiated fuel within the reactor vessel may be classified in accordance Recognition Category C during the Cold Shutdown and Refueling modes.

EAL #2 Basis

This EAL addresses a release of radioactive material caused by mechanical damage to irradiated fuel. Damaging events may include the dropping, bumping or binding of an assembly, or dropping a heavy load onto an assembly. A rise in readings on radiation monitors should be considered in conjunction with in-plant reports or observations of a potential fuel damaging event (e.g., a fuel handling accident).

EAL #3 Basis:

Spent fuel pool 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 spent fuel pool. This condition reflects a significant loss of spent fuel pool water inventory and thus it is also a precursor to a loss of the ability to adequately cool the irradiated fuel assembles stored in the pool.

Escalation of the emergency would be based on either Recognition Category R or C ICs.

Basis Reference(s):

1. NEI 99-01 Rev 6, AA2
2. Operating Procedure OP-TM-MAP-C0105 RCS Draindown LVL HI/LO
3. OP-TM-MAP-C0101, Radiation Level HI
4. UFSAR, Section 14.2.2.1 - “Fuel Handling Accident”
5. Technical Specification 3.8.11 (Reactor Cavity Level)
6. Operating Procedure OP 1101-2.1 Radiation Monitoring System Setpoints
7. EP-EAL-1009, Criteria for Choosing Spent Fuel Pool Level 3 and Level 2 EAL Threshold Values for TMI Station

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RU2

Initiating Condition:

UNPLANNED loss of water level above irradiated fuel.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

1. a. UNPLANNED water level drop in the REFUELING PATHWAY.

   AND

   b. UNPLANNED Area Radiation Monitor reading rise on **ANY** radiation monitors in Table R2.

Table R2 Radiation Monitors

RMS	Area Monitored	Mode
RM-G-9	FHB Bridge Rad Monitor	ALL
RM-G-6	RB Auxiliary Bridge Rad Monitor	5, 6
RM-G-7	RB Main Bridge Rad Monitor	5, 6

Basis:

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.

REFUELING PATHWAY: all the cavities, tubes, canals and pools through which irradiated fuel may be moved or stored, but not including the reactor vessel below the flange.

This IC addresses a loss in water level above irradiated fuel sufficient to cause elevated radiation levels. This condition could be a precursor to a more serious event and is also indicative of a minor loss in the ability to control radiation levels within the plant. It is therefore a potential degradation in the level of safety of the plant.

A water level loss will be primarily determined by indications from available level instrumentation. Other sources of level indications may include reports from plant personnel (e.g., from a refueling crew) or video camera observations (if available) or from any other temporarily installed monitoring instrumentation. A significant drop in the water level may also cause a rise in the radiation levels of adjacent areas that can be detected by monitors in those locations.

The effects of planned evolutions should be considered. For example, a refueling bridge area radiation monitor reading may rise due to planned evolutions such as lifting of the reactor vessel head or movement of a fuel assembly. Note that this EAL is applicable only in cases where the elevated reading is due to an UNPLANNED loss of water level.

A drop in water level above irradiated fuel within the reactor vessel may be classified in accordance Recognition Category C during the Cold Shutdown and Refueling modes.

Escalation of the emergency classification level would be via IC RA2.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RU2 (cont)

Basis Reference(s):

1. NEI 99-01 Rev 6, AU2
2. UFSAR, Section 14.2.2.1 - “Fuel Handling Accident”
3. OP-TM-MAP-C0105 RCS Draindown
4. OP 1202-12, Excessive Radiation Levels
5. OP 1101-2.1 Radiation Monitoring System Setpoints
6. Technical Specification 3.8.11 (Reactor Cavity Level)

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RA3

Initiating Condition:

Radiation levels that impede access to equipment necessary for normal plant operations, cooldown or shutdown.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

Note: If the equipment in the room or area listed in Table R4 was already inoperable, or out of service, before the event occurred, then no emergency classification is warranted.

1. Dose rate **> 15 mR/hr** in **ANY** of the areas contained in Table R3.

Table R3 Areas Requiring Continuous Occupancy

• Main Control Room
• Central Alarm Station – (by survey)

OR

2. UNPLANNED event results in radiation levels that prohibit or significantly impede access to **ANY** of the following Table R4 plant rooms or areas.

Table R4 Areas with Entry Related Mode Applicability

Area	Entry Related Mode Applicability
Auxiliary Building	Modes 4, 5, and 6
• 281’ shielded area	
• 305’ above DH Vaults	
Fuel Handling Building	
• 281’ 1C ES Vlvs MCC	

Basis:

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.

This IC addresses elevated radiation levels in certain plant rooms/areas sufficient to preclude or impede personnel from performing actions necessary to transition the plant from normal plant operation to cooldown and shutdown as specified in normal plant procedures. As such, it represents an actual or potential substantial degradation of the level of safety of the plant. The Emergency Director should consider the cause of the increased radiation levels and determine if another IC may be applicable.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RA3 (cont)

Basis (cont):

Assuming all plant equipment is operating as designed, normal operation is capable from the Main Control Room (MCR). The plant is also able to transition into a hot shutdown condition from the MCR, therefore Table R4 is a list of plant rooms or areas with entry- related mode applicability that contain equipment which require a manual/local action necessary to transition the plant from normal plant operation to cooldown and shutdown as specified in normal operating procedures (establish shutdown cooling), where if this action is not completed the plant would not be able to attain and maintain cold shutdown. This Table does not include rooms or areas for which entry is required solely to perform actions of an administrative or record keeping nature (e.g., normal rounds or routine inspections).

Rooms and areas listed in EAL #1 do not need to be included in EAL #2, including the Control Room.

For EAL #2, an Alert declaration is warranted if entry into the affected room/area is, or may be, procedurally required during the plant operating mode in effect and the elevated radiation levels preclude the ability to place shutdown cooling in service. The emergency classification is not contingent upon whether entry is actually necessary at the time of the increased radiation levels. Access should be considered as impeded if extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., installing temporary shielding beyond that required by procedures, requiring use of non- routine protective equipment, requesting an extension in dose limits beyond normal administrative limits).

An emergency declaration is not warranted if any of the following conditions apply.

- The plant is in an operating mode different than the mode specified for the affected room/area (i.e., entry is not required during the operating mode in effect at the time of the elevated radiation levels). For example, the plant is in Mode 1 when the radiation rise occurs, and the procedures used for normal operation, cooldown and shutdown do not require entry into the affected room until Mode 4.
- The increased radiation levels are a result of a planned activity that includes compensatory measures which address the temporary inaccessibility of a room or area (e.g., radiography, spent filter or resin transfer, etc.).
- The action for which room/area entry is required is of an administrative or record keeping nature (e.g., normal rounds or routine inspections).
- The access control measures are of a conservative or precautionary nature, and would not actually prevent or impede a required action.

Escalation of the emergency classification level would be via Recognition Category R, C or F ICs.

Basis Reference(s):

1. NEI 99-01 Rev 6, AA3
2. FSAR Section 5.01 Class I Structures, Components, and Systems
3. OP-TM-MAP-C0101, Radiation Level HI

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RU4

Initiating Condition:

Reactor coolant activity greater than Technical Specification allowable limits.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

1. Letdown Monitor RM-L-1 **alert alarm** (high or low channel).

   OR

2. Sample analysis indicates **EITHER** of the following:
   a. Dose Equivalent I-131 specific coolant activity **> 60.0 uCi/gm**.

      OR

   b. Dose Equivalent XE-133 specific coolant activity **> 797.0 uCi/gm**.

Basis:

This IC addresses a reactor coolant activity value that exceeds an allowable limit specified in Technical Specifications. This condition is a precursor to a more significant event and represents a potential degradation of the level of safety of the plant.

Conditions that cause the specified monitor to alarm that are not related to fuel clad degradation should not result in the declaration of an Unusual Event.

This EAL addresses site-specific radiation monitor readings that provide indication of a degradation of fuel clad integrity.

Escalation of the emergency classification level would be via ICs FA1 or the Recognition Category R ICs.

Basis Reference(s):

1. NEI 99-01 Rev 6, SU3
2. Operating Procedure 1101-2.1 Radiation Monitoring System Setpoints
3. FSAR Section 11.4.4, Liquid Monitoring Subsystem
4. OP-TM-MAP-C0101, Radiation Level HI
5. Technical Specifications 3.1.4, Reactor Coolant System Activity

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

FG1

Initiating Condition:

Loss of ANY Two Barriers AND Loss or Potential Loss of the third barrier.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Refer to Fission Product Barrier Loss and Potential Loss threshold values to determine barrier status.

Basis:

Fuel Cladding, RCS and Containment comprise the fission product barriers.

At the General Emergency classification level each barrier is weighted equally.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

FS1

Initiating Condition:

Loss or Potential Loss of ANY two barriers.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Refer to Fission Product Barrier Loss and Potential Loss threshold values to determine barrier status.

Basis:

Fuel Cladding, RCS and Containment comprise the fission product barriers.

At the Site Area Emergency classification level, each barrier is weighted equally.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

FA1

Initiating Condition:

ANY Loss or ANY Potential Loss of either Fuel Clad or RCS.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Refer to Fission Product Barrier Loss and Potential Loss threshold values to determine barrier status.

Basis:

Fuel Cladding, RCS and Containment comprise the fission product barriers.

At the Alert classification level, Fuel Cladding and RCS barriers are weighted more heavily than the Containment barrier. Unlike the Containment barrier, loss or potential loss of either the Fuel Cladding or RCS barrier may result in the relocation of radioactive materials or degradation of core cooling capability. Note that the loss or potential loss of Containment barrier in combination with loss or potential loss of either Fuel Cladding or RCS barrier results in declaration of a Site Area Emergency under EAL FS1.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

FC1

Sub-Category:

RCS or SG Tube Leakage

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

POTENTIAL LOSS

1. RCITS hot leg instruments indicate **0 inches** after lowering trend.

   AND

2. In-core thermocouples are unavailable.

   AND

3. **ALL** RCP's are secured.

Basis:

There is no Loss threshold associated with RCS or SG Tube Leakage.

Potential Loss Threshold #1 Basis:

This reading indicates a reduction in reactor vessel water level sufficient to allow the onset of heat-induced cladding damage.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3
2. FSAR 7.3.2.2.c.10.d
3. OP-TM-EOP-008, RCS Superheated
4. OP-TM-EOP-010, Emergency Procedure Rules Guides and Graphs

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

FC2

Sub-Category:

Inadequate Heat Removal

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

LOSS

1. **T_{clad} > 1400°F**.

POTENTIAL LOSS

2. **> 25°F** Superheat.

   OR

3. HPI-PORV Cooling in effect.

Basis:

Loss Threshold #1 Basis

This reading indicates temperatures within the core are sufficient to cause significant superheating of reactor coolant.

Potential Loss Threshold #2 Basis

This reading indicates temperatures within the core are sufficient to allow the onset of heat-induced cladding damage.

Potential Loss Threshold #3 Basis

This condition indicates an extreme challenge to the ability to remove RCS heat using the steam generators (i.e., loss of an effective secondary-side heat sink). This condition represents a potential loss of the Fuel Clad Barrier. In accordance with EOPs, there may be unusual accident conditions during which operators intentionally reduce the heat removal capability of the steam generators; during these conditions, classification using threshold is not warranted.

Meeting this threshold results in a Site Area Emergency because this threshold is identical to RCS Barrier RC2 Potential Loss threshold; both will be met. This condition warrants a Site Area Emergency declaration because inadequate RCS heat removal may result in fuel heat-up sufficient to damage the cladding and raise RCS pressure to the point where mass will be lost from the system.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

FC2 (cont)

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3
2. OS-24 Attachment D
3. OP-TM-EOP-004, Lack of Primary to Secondary Heat Transfer
4. OP-TM-EOP-008, RCS Superheated
5. OP-TM-EOP-010, Emergency Procedure Rules, Guides And Graphs
6. OS-24, Conduct of Operations during Abnormal and Emergency Events

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

FC3

Sub-Category:

Containment Radiation / RCS Activity

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

LOSS

1. Containment radiation monitor (RM-G-22 or RM-G-23) reading **> 1.95E+03 R/hr**.

   OR

2. Coolant activity **> 300 uCi/gm** Dose Equivalent I-131.

Basis:

Loss Threshold #1 Basis:

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that reactor coolant activity equals 300uCi/gm dose equivalent I-131. Reactor coolant activity above this level is greater than that expected for iodine spikes and corresponds to an approximate range of 2% to 5% fuel clad damage. Since this condition indicates that a significant amount of fuel clad damage has occurred, it represents a loss of the Fuel Clad Barrier.

The radiation monitor reading in this threshold is higher than that specified for RCS Barrier RC3 Loss Threshold since it indicates a loss of both the Fuel Clad Barrier and the RCS Barrier. Note that a combination of the two monitor readings appropriately escalates the emergency classification level to a Site Area Emergency.

Loss Threshold #2 Basis:

This threshold indicates that RCS radioactivity concentration is greater than 300 uCi/gm dose equivalent I-131. Reactor coolant activity above this level is greater than that expected for iodine spikes and corresponds to an approximate range of 2% to 5% fuel clad damage. Since this condition indicates that a significant amount of fuel clad damage has occurred, it represents a loss of the Fuel Clad Barrier.

It is recognized that sample collection and analysis of reactor coolant with highly elevated activity levels could require several hours to complete. Nonetheless, a sample-related threshold is included as a backup to other indications.

There is no Fuel Clad Barrier Potential Loss threshold associated with RCS Activity / Containment Radiation.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3
2. OP-TM-MAP-C0101, Radiation Level HI
3. FSAR Section 11.4.4, Liquid Monitoring System Description
4. Calculation C3640-98-034, Prediction of the Response of RM-G-6 and 7 to Fuel Damage
5. Core Damage Assessment Methodology (CDAM)

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

FC5

Sub-Category:

Emergency Director Judgment.

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

LOSS

1. Any condition in the opinion of the Emergency Director that indicates Loss of the Fuel Clad Barrier.

POTENTIAL LOSS

2. Any condition in the opinion of the Emergency Director that indicates Potential Loss of the Fuel Clad Barrier.

Basis:

Loss Threshold #1 Basis

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the Fuel Clad Barrier is lost.

Potential Loss Threshold #2 Basis

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the Fuel Clad Barrier is potentially lost. The Emergency Director should also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

RC1

Sub-Category:

RCS or SG Tube Leakage

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

LOSS

1. RCS leakage results in **< 25º Sub Cooling Margin**.

   OR

2. Steam Generator tube RUPTURE that requires / results in an ESAS actuation.

POTENTIAL LOSS

3. UNISOLABLE RCS leakage **> 150 gpm**.

   OR

4. a. RCS Pressure **> 2450 psig**.

      AND

   b. RCS Pressure not lowering.

Basis:

UNISOLABLE: An open or breached system line that cannot be isolated, remotely or locally.

RUPTURE(D): The condition of a steam generator in which primary-to-secondary leakage is of sufficient magnitude to require a safety injection.

Failure to isolate the leak, within 15 minutes or if known that the leak cannot be isolated within 15 minutes, from the start of the leak requires immediate classification.

Loss Threshold #1 Basis

This threshold is based on an UNISOLABLE RCS leak of sufficient size to require an automatic or manual actuation of the Emergency Core Cooling System (ECCS). This condition clearly represents a loss of the RCS Barrier.

This threshold is applicable to unidentified and pressure boundary leakage, as well as identified leakage. It is also applicable to UNISOLABLE RCS leakage through an interfacing system. The mass loss may be into any location – inside containment, to the secondary-side (i.e., steam generator tube leakage) or outside of containment.

A steam generator with primary-to-secondary leakage of sufficient magnitude to require a safety injection is considered to be RUPTURED. If a RUPTURED steam generator also has an UNISOLABLE steam release outside of containment, the declaration escalates to a Site Area Emergency since the Containment Barrier CT1 Loss threshold will also be met.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

RC1 (cont)

Basis (cont):

Potential Loss Threshold #2 Basis

This threshold is based on an UNISOLABLE RCS leak that results in the inability to maintain pressurizer level within specified limits by operation of a normally used charging (makeup) pump, but an ESAS actuation has not occurred. The threshold is met when an operating procedure, or operating crew supervision, directs that a standby charging (makeup) pump be placed in service to restore and maintain pressurizer level.

This threshold is applicable to unidentified and pressure boundary leakage, as well as identified leakage. It is also applicable to UNISOLABLE RCS leakage through an interfacing system. The mass loss may be into any location – inside containment, to the secondary-side (i.e., steam generator tube leakage) or outside of containment.

If a leaking steam generator also has an UNISOLABLE steam release outside of containment, the declaration escalates to a Site Area Emergency since the Containment Barrier Loss threshold CT1 will also be met.

Potential Loss Threshold #3 Basis

This condition indicates an extreme challenge to the integrity of the RCS pressure boundary.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3
2. OP-TM-EOP-010 Emergency Procedure Rules, Guides And Graphs
3. OP-TM-EOP-002 Loss of 25°F Subcooled Margin
4. OP-TM-MAP-D031, MU Flow HI
5. OP-TM-EOP-005, OTSG Tube Leakage

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

RC2

Sub-Category:

Inadequate Heat Removal

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

POTENTIAL LOSS

1. HPI-PORV Cooling in effect.

Basis:

There is no Loss threshold associated with Inadequate Heat Removal.

Potential Loss Threshold Basis

HPI-PORV Cooling in effect indicates a Lack of Primary to Secondary Heat Transfer capability.

This condition indicates an extreme challenge to the ability to remove RCS heat using the steam generators (i.e., loss of an effective secondary-side heat sink). This condition represents a potential loss of the RCS Barrier. In accordance with EOPs, there may be unusual accident conditions during which operators intentionally reduce the heat removal capability of the steam generators; during these conditions, classification using threshold is not warranted.

Meeting this threshold results in a Site Area Emergency because this threshold is identical to Fuel Clad Barrier FC2 Potential Loss Threshold #3; both will be met. This condition warrants a Site Area Emergency declaration because inadequate RCS heat removal may result in fuel heat-up sufficient to damage the cladding and raise RCS pressure to the point where mass will be lost from the system.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3
2. OP-TM-EOP-004, Lack of Primary to Secondary Heat Transfer

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

RC3

Sub-Category:

Containment Radiation / RCS Activity

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

LOSS

1. Containment radiation monitor (RM-G-22 or RM-G-23) reading **> 25 R/hr**.

Basis:

Loss Threshold Basis

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that reactor coolant activity equals Technical Specification allowable limits. This value is lower than that specified for Fuel Clad Barrier FC3 Loss threshold #1 since it indicates a loss of the RCS Barrier only.

There is no RCS Potential Loss threshold associated with RCS Activity / Containment Radiation.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3
2. EP-EAL-0611, Criteria for Choosing Containment Radiation Monitor Reading Indicative of Loss of RCS Barrier

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

RC5

Sub-Category:

Emergency Director Judgment.

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

LOSS

1. Any condition in the opinion of the Emergency Director that indicates Loss of the RCS Barrier.

POTENTIAL LOSS

2. Any condition in the opinion of the Emergency Director that indicates Potential Loss of the RCS Barrier.

Basis:

Loss Threshold #1 Basis

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the RCS Barrier is lost.

Potential Loss Threshold #2 Basis

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the RCS Barrier is potentially lost. The Emergency Director should also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

CT1

Sub-Category:

RCS or SG Tube Leakage

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

LOSS

1. SG tube leakage **> 150 gpm**.

   AND

2. UNISOLABLE steam release from the affected S/G to the environment.

Basis:

UNISOLABLE: An open or breached system line that cannot be isolated, remotely or locally.

RUPTURE(D): The condition of a steam generator in which primary-to-secondary leakage is of sufficient magnitude to require a safety injection.

Loss Threshold Basis

This threshold addresses a leaking or RUPTURED Steam Generator (SG) that also has an UNISOLABLE steam release to the environment. The condition of the SG, whether leaking or RUPTURED, is determined in accordance with the thresholds for RCS Barrier RC1 Potential Loss Threshold 3 and Loss Threshold 2, respectively. This condition represents a bypass of the containment barrier.

The determination of UNISOLABLE steam release is not necessarily dependent upon entry into, or diagnostic steps within, a procedure. For example, if the pressure in a steam generator is decreasing uncontrollably and the affected steam generator isolation procedure is not entered because procedure use rules are dictating implementation of another procedure to address a higher priority condition, the steam generator is still considered to have an UNISOLABLE steam release for emergency classification purposes.

The UNISOLABLE steam release criterion establishes an appropriate lower bound on the size of a steam release that may require an emergency classification. Steam releases of this size are readily observable with normal Control Room indications. The lower bound for this aspect of the containment barrier is analogous to the lower bound criteria specified in IC RU3 for the fuel clad barrier (i.e., RCS activity values) and IC MU6 for the RCS barrier (i.e., RCS leak rate values).

This threshold also applies to prolonged steam releases necessitated by operational considerations such as the forced steaming of a leaking or RUPTURED steam generator directly to atmosphere to cooldown the plant, or to drive an auxiliary (emergency) feed water pump. These types of conditions will result in a significant and sustained release of radioactive steam to the environment (and are thus similar to an UNISOLABLE steam release condition). The inability to isolate the steam flow without an adverse effect on plant cooldown meets the intent of a loss of containment.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

CT1 (cont)

Basis (cont):

Steam releases associated with the expected operation of a SG power operated relief valve or safety relief valve do not meet the intent of this threshold. Such releases may occur intermittently for a short period of time following a reactor trip as operators process through emergency operating procedures to bring the plant to a stable condition and prepare to initiate a plant cooldown. Steam releases associated with the unexpected operation of a valve (e.g., a stuck-open safety valve) meets this threshold.

Following an SG tube leak or rupture, there may be minor radiological releases through a secondary-side system component (e.g., air ejectors, glad seal exhausters, valve packing, etc.). These types of releases do not constitute a loss or potential loss of containment but should be evaluated using the Recognition Category R ICs.

The emergency classification levels resulting from primary-to-secondary leakage, with or without a steam release from the affected SG, are summarized below.

Primary to Secondary Leak Rate	**Affected SG has UNISOLABLE steam release Outside of Containment?**	
	Yes	**No**
Less than or equal to 25 gpm	No classification	No classification
Greater than 25 gpm	Unusual Event per MU6	Unusual Event per MU6
Greater than 150 gpm. The capacity of one makeup pump in the normal charging mode is exceeded. *(RCS Barrier Potential Loss)*	Site Area Emergency per FS1	Alert per FA1
Requires an automatic or manual ESAS actuation. *(RCS Barrier Loss)*	Site Area Emergency per FS1	Alert per FA1

There is no Potential Loss threshold associated with RCS or SG Tube Leakage.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3
2. OP-TM-EOP-010, Emergency Procedure Rules, Guides And Graphs
3. OP-TM-EOP-005, OTSG Tube Leakage
4. OP-TM-EOP-001, Reactor Trip

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

CT2

Sub-Category:

Inadequate Heat Removal

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

POTENTIAL LOSS

1. **T_{clad} > 1800°F**.

   AND

2. EOP restoration procedures **not** effective in **< 15 minutes**.

Basis:

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.

There is no Loss threshold associated with Inadequate Heat Removal.

Potential Loss Threshold Basis

This condition represents an IMMINENT core melt sequence which, if not corrected, could lead to vessel failure and an increased potential for containment failure. For this condition to occur, there must already have been a loss of the RCS Barrier and the Fuel Clad Barrier. If implementation of a procedure(s) to restore adequate core cooling is not effective (successful) within 15 minutes, it is assumed that the event trajectory will likely lead to core melting and a subsequent challenge of the Containment Barrier.

The restoration procedure is considered “effective” if core exit thermocouple readings are decreasing and/or if reactor vessel level is increasing. Whether or not the procedure(s) will be effective should be apparent within 15 minutes. The Emergency Director should escalate the emergency classification level as soon as it is determined that the procedure(s) will not be effective.

Severe accident analyses (e.g., NUREG-1150) have concluded that function restoration procedures can arrest core degradation in a significant fraction of core damage scenarios, and that the likelihood of containment failure is very small in these events. Given this, it is appropriate to provide 15 minutes beyond the required entry point to determine if procedural actions can reverse the core melt sequence.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3
2. OP-TM-EOP-008, RCS Superheated
3. OP-TM-EOP-010, Emergency Procedure Rules, Guides And Graphs
4. OP-TM-EOP-006, LOCA Cooldown

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

CT3

Sub-Category:

Containment Radiation / RCS Activity

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

POTENTIAL LOSS

1. Containment radiation monitor (RM-G-22 or RM-G-23) reading **> 4.40E+03 R/hr**.

Basis:

There is no Loss threshold associated with RCS Activity / Containment Radiation.

Potential Loss Threshold Basis

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that 20% of the fuel cladding has failed. This level of fuel clad failure is well above that used to determine the analogous Fuel Clad Barrier Loss and RCS Barrier Loss thresholds.

NUREG-1228, *Source Estimations During Incident Response to Severe Nuclear Power Plant Accidents*, indicates the fuel clad failure must be greater than approximately 20% in order for there to be a major release of radioactivity requiring offsite protective actions. For this condition to exist, there must already have been a loss of the RCS Barrier and the Fuel Clad Barrier. It is therefore prudent to treat this condition as a potential loss of containment which would then escalate the emergency classification level to a General Emergency.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3
2. Core Damage Assessment Methodology (CDAM)

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

CT4

Sub-Category:

Containment Integrity or Bypass

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

LOSS

1. Containment isolation is required and **ANY** of the following:
   a. UNPLANNED lowering in containment pressure following initial pressure rise.
      OR
   b. Containment pressure or water level response **not** consistent with LOCA conditions.
      OR
   c. UNISOLABLE pathway from containment to the environment exists.
   OR
2. Indication of RCS leakage outside of containment.

POTENTIAL LOSS

3. Reactor Building Pressure **> 55 psig** and rising.
   OR
4. Hydrogen Concentration in Containment **≥ 4%**.
   OR
5. a. Reactor Building pressure **> 30 psig**.
      AND
   b. Reactor Building Emergency cooling is less than **ANY** one of the following conditions:

SPRAY	COOLERS
2	0
0	3
1	1

Basis:

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.

UNISOLABLE: An open or breached system line that cannot be isolated, remotely or locally.

Failure to isolate the leak, within 15 minutes or if known that the leak cannot be isolated within 15 minutes, from the start of the leak requires immediate classification.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

CT4 (cont)

Basis (cont):

Loss Threshold #1 Basis:

These thresholds address a situation where containment isolation is required and one of three conditions exists as discussed below. Users are reminded that there may be accident and release conditions that simultaneously meet ALLloss thresholds 1.a, 1.b, and 1.c.

1.a and 1.b – Containment integrity has been lost, i.e., the actual containment atmospheric leak rate likely exceeds that associated with allowable leakage (or sometimes referred to as design leakage). Following the release of RCS mass into containment, containment pressure will fluctuate based on a variety of factors; a loss of containment integrity condition may (or may not) be accompanied by a noticeable drop in containment pressure. Recognizing the inherent difficulties in determining a containment leak rate during accident conditions, it is expected that the Emergency Director will assess this threshold using judgment, and with due consideration given to current plant conditions, and available operational and radiological data (e.g., containment pressure, readings on radiation monitors outside containment, operating status of containment pressure control equipment, etc.).

Refer to the middle piping run of Figure 3-F-1. Two simplified examples are provided. One is leakage from a penetration and the other is leakage from an in-service system valve. Depending upon radiation monitor locations and sensitivities, the leakage could be detected by any of the four monitors depicted in the figure.

Another example would be a loss or potential loss of the RCS barrier, and the simultaneous occurrence of two faulted locations on a steam generator where one fault is located inside containment (e.g., on a steam or feedwater line) and the other outside of containment. In this case, the associated steam line provides a pathway for the containment atmosphere to escape to an area outside the containment.

Following the leakage of RCS mass into containment and a rise in containment pressure, there may be minor radiological releases associated with allowable (design) containment leakage through various penetrations or system components. These releases do not constitute a loss or potential loss of containment but should be evaluated using the Recognition Category R ICs.

1.c – Conditions are such that there is an UNISOLABLE pathway for the migration of radioactive material from the containment atmosphere to the environment. As used here, the term “environment” includes the atmosphere of a room or area, outside the containment, that may, in turn, communicate with the outside-the-plant atmosphere (e.g., through discharge of a ventilation system or atmospheric leakage). Depending upon a variety of factors, this condition may or may not be accompanied by a noticeable drop in containment pressure.

Refer to the top piping run of Figure 3-F-1. In this simplified example, the inboard and outboard isolation valves remained open after a containment isolation was required (i.e., containment isolation was not successful). There is now an UNISOLABLE pathway from the containment to the environment.

The existence of a filter is not considered in the threshold assessment. Filters do not remove fission product noble gases. In addition, a filter could become ineffective due to iodine and/or particulate loading beyond design limits (i.e., retention ability has been exceeded) or water saturation from steam/high humidity in the release stream.

Leakage between two interfacing liquid systems, by itself, does not meet this threshold.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

CT4 (cont)

Basis (cont):

Refer to the bottom piping run of Figure 3-F-1. In this simplified example, leakage in an RCP seal cooler is allowing radioactive material to enter the Auxiliary Building. The radioactivity would be detected by the Process Monitor. If there is no leakage from the closed water cooling system to the Auxiliary Building, then no threshold has been met. If the pump or system piping developed a leak that allowed steam/water to enter the Auxiliary Building, then loss threshold 2 would be met. Depending upon radiation monitor locations and sensitivities, this leakage could be detected by any of the four monitors depicted in the figure.

Following the leakage of RCS mass into containment and a rise in containment pressure, there may be minor radiological releases associated with allowable (design) containment leakage through various penetrations or system components. Minor releases may also occur if a containment isolation valve(s) fails to close but the containment atmosphere escapes to a closed system. These releases do not constitute a loss or potential loss of containment but should be evaluated using the Recognition Category R ICs.

The status of the containment barrier during an event involving steam generator tube leakage is assessed using Containment Barrier CT1 Loss threshold.

Loss Threshold #2 Basis:

Containment sump, temperature, pressure and/or radiation levels will rise if reactor coolant mass is leaking into the containment. If these parameters have not increased, then the reactor coolant mass may be leaking outside of containment (i.e., a containment bypass sequence). Raises in sump, temperature, pressure, flow and/or radiation level readings outside of the containment may indicate that the RCS mass is being lost outside of containment.

Unexpected elevated readings and alarms on radiation monitors with detectors outside containment should be corroborated with other available indications to confirm that the source is a loss of RCS mass outside of containment. If the fuel clad barrier has not been lost, radiation monitor readings outside of containment may not rise significantly; however, other unexpected changes in sump levels, area temperatures or pressures, flow rates, etc. should be sufficient to determine if RCS mass is being lost outside of the containment.

Refer to the middle piping run of Figure 3-F-1. In this simplified example, a leak has occurred at a reducer on a pipe carrying reactor coolant in the Auxiliary Building. Depending upon radiation monitor locations and sensitivities, the leakage could be detected by any of the four monitors depicted in the figure.

To ensure proper escalation of the emergency classification, the RCS leakage outside of containment must be related to the mass loss that is causing the RCS Barrier RC1 Loss Threshold 1 and/or Potential Loss threshold 3 to be met.

Potential Loss Threshold #3 Basis

If containment pressure exceeds the design pressure, there exists a potential to lose the Containment Barrier. To reach this level, there must be an inadequate core cooling condition for an extended period of time; therefore, the RCS and Fuel Clad barriers would already be lost. Thus, this threshold is a discriminator between a Site Area Emergency and General Emergency since there is now a potential to lose the third barrier.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

CT4 (cont)

Basis (cont):

Potential Loss Threshold #4 Basis

The existence of an explosive mixture means, at a minimum, that the containment atmospheric hydrogen concentration is sufficient to support a hydrogen burn (i.e., at the lower deflagration limit). A hydrogen burn will raise containment pressure and could result in collateral equipment damage leading to a loss of containment integrity. It therefore represents a potential loss of the Containment Barrier.

Potential Loss Threshold #5 Basis

This threshold describes a condition where containment pressure is greater than the setpoint at which containment energy (heat) removal systems are designed to automatically actuate, and less than one full train of equipment is capable of operating per design. The 15-minute criterion is included to allow operators time to manually start equipment that may not have automatically started, if possible. This threshold represents a potential loss of containment in that containment heat removal/depressurization systems (e.g., containment sprays, ice condenser fans, etc., but not including containment venting strategies) are either lost or performing in a degraded manner.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3
2. FSAR Section 6.6 Reactor Building Pressure-Time Response
3. Technical Specifications 3.5.3, Engineered Safeguards Protection System Actuation Setpoints
4. FSAR Section 6.3.3, Actuation
5. FSAR Section 6.5.3, Hydrogen Generation
6. OP-TM-EOP-006, LOCA Cooldown
7. 1302-5.25 Reactor Building Sump Level
8. FSAR Section 5.2 Reactor Building
9. FSAR Section 9.2, Chemical Addition and Sampling System
10. OP-TM-EOP-002, Loss of 25°F Subcooling Margin
11. OP-TM-EOP-006, LOCA Cooldown
12. OP-TM-EOP-010, Emergency Procedure Rules, Guides and Graphs
13. OP-TM-MAP-D0301, High Make-up Flow

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

Figure 3-F-1: PWR Containment Integrity or Bypass Examples

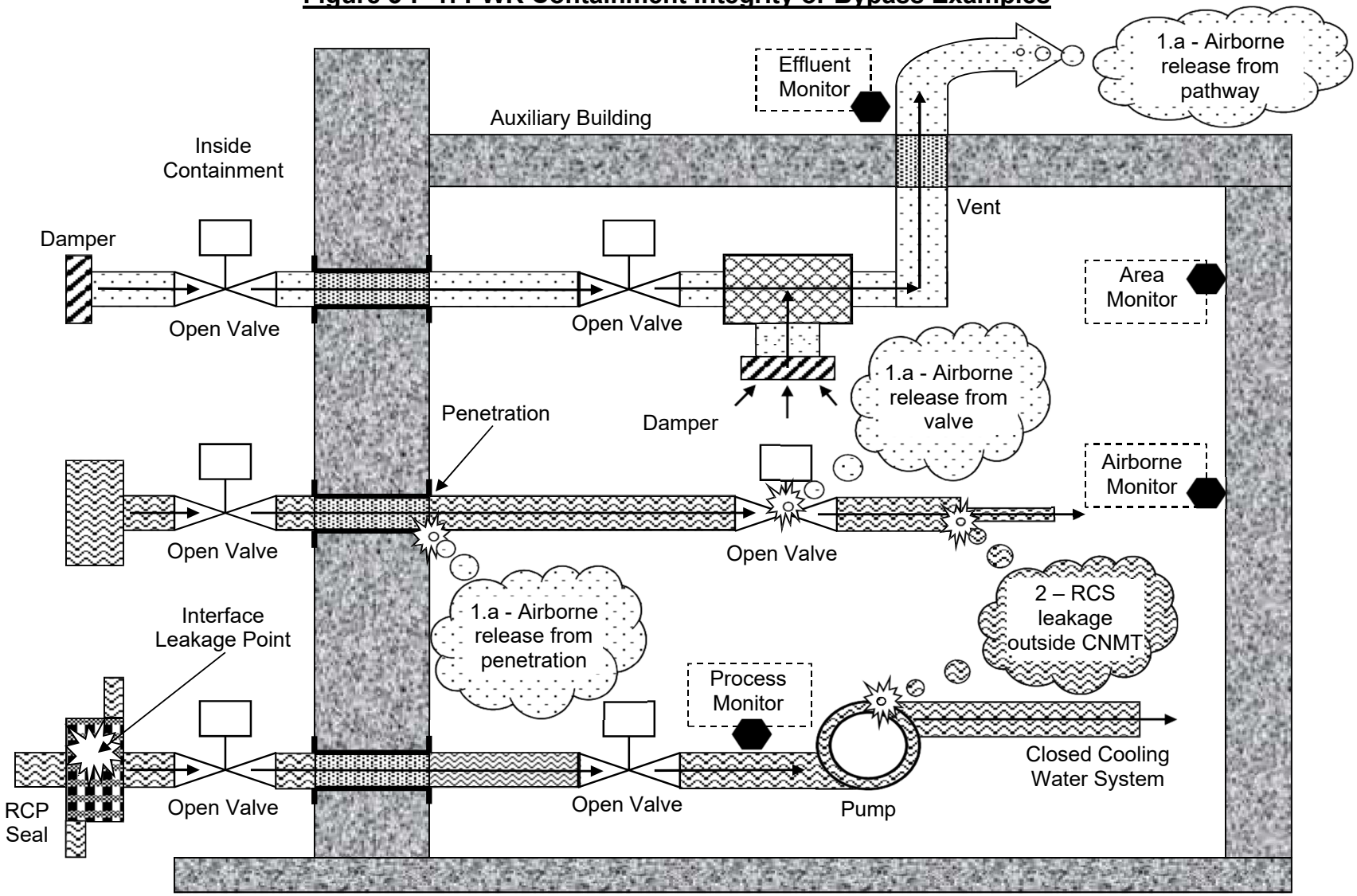


Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

CT5

Sub-Category:

Emergency Director Judgment.

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

LOSS

1. Any condition in the opinion of the Emergency Director that indicates Loss of the Containment Barrier.

POTENTIAL LOSS

2. Any condition in the opinion of the Emergency Director that indicates Potential Loss of the Containment Barrier.

Basis:

Loss Threshold #1 Basis

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the Containment Barrier is lost.

Potential Loss Threshold #2 Basis

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the Containment Barrier is potentially lost. The Emergency Director should also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MG1

Initiating Condition:

Prolonged loss of all offsite and all onsite AC power to emergency busses.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. Loss of **ALL** offsite AC power to Emergency 4KV buses.

   AND

2. Failure of EG-Y-1A, EG-Y-1B Emergency Diesel Generators and EG-Y-4 SBO Diesel Generator to supply power to Emergency 4KV buses.

   AND

3. **EITHER** of the following:

   a. Restoration of at least one Emergency 4KV bus in **< 4 hours** is **not** likely.

      OR

   b. **> 25°F superheat**.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses a prolonged loss of all power sources to AC emergency buses. A loss of all AC power compromises the performance of all SAFETY SYSTEMS requiring electric power including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal and the ultimate heat sink. A prolonged loss of these buses will lead to a loss of any fission product barriers. In addition, fission product barrier monitoring capabilities may be degraded under these conditions.

The EAL should require declaration of a General Emergency prior to meeting the thresholds for IC FG1. This will allow additional time for implementation of offsite protective actions.

Escalation of the emergency classification from Site Area Emergency will occur if it is projected that power cannot be restored to at least one AC emergency bus by the end of the analyzed station blackout coping period. Beyond this time, plant responses and event trajectory are subject to greater uncertainty, and there is an increased likelihood of challenges to multiple fission product barriers.

The estimate for restoring at least one emergency bus should be based on a realistic appraisal of the situation. Mitigation actions with a low probability of success should not be used as a basis for delaying a classification upgrade. The goal is to maximize the time available to prepare for, and implement, protective actions for the public.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MG1 (cont)

Basis (cont):

If ANY mitigative strategy is effective in supplying power to ANY one Emergency 4KV bus in < 4 hours, escalation to General Emergency shall not be considered.

The EAL will also require a General Emergency declaration if the loss of AC power results in parameters that indicate an inability to adequately remove decay heat from the core.

Basis Reference(s):

1. NEI 99-01 Rev 6, SG1
2. OP-TM-EOP-010 Emergency Procedure Rules, Guides And Graphs
3. FSAR Section 8.2.2 Unit Distribution System
4. FSAR Section 8.2.3 Sources of Auxiliary Power
5. FSAR Section 8.5 Station Blackout
6. Technical Specification Section 3.7, Unit Electric Power System
7. 1107-1 Normal Electrical System
8. 1107-2A Emergency Electrical - 4KV and 480 Volt
9. OP-TM-AOP-020 Loss Of Station Power
10. 1107-3 Diesel Generator
11. 1107-9 SBO Diesel Generator
12. OP-TM-EOP-008 RCS Superheated
13. OS-24, Conduct of Operation during Abnormal and Emergency Events

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MS1

Initiating Condition:

Loss of all offsite and all onsite AC power to emergency busses for 15 minutes or longer.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. Loss of **ALL** offsite AC Power to Emergency 4KV buses.

   AND

2. Failure of EG-Y-1A, EG-Y-1B Emergency Diesel Generators and EG-Y-4 SBO Diesel Generator to supply power to Emergency 4KV buses.

   AND

3. Failure to restore power to at least one Emergency 4KV bus in **< 15 minutes** from the time of loss of both offsite and onsite AC power.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses a total loss of AC power that compromises the performance of all SAFETY SYSTEMS requiring electric power including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal and the ultimate heat sink. In addition, fission product barrier monitoring capabilities may be degraded under these conditions. This IC represents a condition that involves actual or likely major failures of plant functions needed for the protection of the public.

If ANY mitigative strategy is effective in supplying power to ANY one Emergency 4KV bus within 15 minutes from the time of loss of both offsite and onsite AC power, escalation to Site Area Emergency shall not be considered.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level would be via ICs RG1, FG1, MG1, or MG2.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MS1 (cont)

Basis Reference(s):

1. NEI 99-01 Rev 6, SS1
2. FSAR Section 8.2.3, Sources of Auxiliary Power
3. Technical Specification Section 3.7, Unit Electric Power System
4. 1107-1 Normal Electrical System
5. 1107-2A Emergency Electrical - 4KV and 480 Volt
6. OP-TM-AOP-020 Loss Of Station Power
7. 1107-3 Diesel Generator
8. 1107-9 SBO Diesel Generator
9. FSAR Section 8.2.2, Unit Distribution System
10. FSAR Section 8.5, Station Blackout

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MA1

Initiating Condition:

Loss of all but one AC power source to emergency buses for 15 minutes or longer.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. AC power capability to Emergency 4KV buses reduced to only one of the following power sources for ≥ **15 minutes.**
   - Auxiliary Transformer 1A
   - Auxiliary Transformer 1B
   - Emergency Diesel Generator EG-Y-1A
   - Emergency Diesel Generator EG-Y-1B
   - SBO Diesel Generator EG-Y-4

   AND

2. **ANY** additional single power source failure will result in a loss of **ALL** AC power to SAFETY SYSTEMS.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC describes a significant degradation of offsite and onsite AC power sources such that any additional single failure would result in a loss of all AC power to SAFETY SYSTEMS. In this condition, the sole AC power source may be powering one, or more than one, train of safety-related equipment. This IC provides an escalation path from IC MU1.

An “AC power source” is a source recognized in AOPs and EOPs, and capable of supplying required power to an emergency bus. Some examples of this condition are presented below.

- A loss of all offsite power with a concurrent failure of all but one emergency power source (e.g., an onsite diesel generator).
- A loss of all offsite power and loss of all emergency power sources (e.g., onsite diesel generators) with a single train of emergency buses being back-fed from the unit main generator.
- A loss of emergency power sources (e.g., onsite diesel generators) with a single train of emergency buses being back-fed from an offsite power source.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of power.

Escalation of the emergency classification level would be via IC MS1.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MA1 (cont)

Basis Reference(s):

1. NEI 99-01 Rev 6, SA1
2. FSAR Section 8.2.3, Sources of Auxiliary Power
3. FSAR Section 8.5, Station Blackout
4. Technical Specification Section 3.7, Unit Electric Power System
5. 1107-1 Normal Electrical System
6. 1107-2A Emergency Electrical - 4KV and 480 Volt
7. OP-TM-AOP-020 Loss Of Station Power
8. 1107-3 Diesel Generator
9. 1107-9 SBO Diesel Generator
10. FSAR Section 8.2.2, Unit Distribution System

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MU1

Initiating Condition:

Loss of all offsite AC power capability to emergency buses for 15 minutes or longer.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. Loss of **ALL** offsite AC power capability to Emergency 4KV busses for ≥ **15 minutes**.

Basis:

This IC addresses a prolonged loss of offsite power. The loss of offsite power sources renders the plant more vulnerable to a complete loss of power to AC emergency buses. This condition represents a potential reduction in the level of safety of the plant.

For emergency classification purposes, “capability” means that an offsite AC power source(s) is available to the emergency buses, whether or not the buses are powered from it.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of offsite power.

Escalation of the emergency classification level would be via IC MA1.

Basis Reference(s):

1. NEI 99-01 Rev 6, SU1
2. FSAR Section 8.2.3, Sources of Auxiliary Power
3. Technical Specification Section 3.7, Unit Electric Power System
4. 1107-1 Normal Electrical System
5. 1107-2A Emergency Electrical - 4KV and 480 Volt
6. OP-TM-AOP-020 Loss Of Station Power
7. 1107-3 Diesel Generator
8. 1107-9 SBO Diesel Generator
9. FSAR Section 8.2.2, Unit Distribution System

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MG2

Initiating Condition:

Loss of all AC and Vital DC power sources for 15 minutes or longer.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. Loss of **ALL** offsite AC power to Emergency 4KV buses.

   AND

2. Failure of EG-Y-1A, EG-Y-1B Emergency Diesel Generators and EG-Y-4 SBO Diesel Generator to supply power to Emergency 4KV buses.

   AND

3. Voltage is **< 105 VDC** on 125 VDC Distribution System 1A and 1B.

   AND

4. **ALL** AC and Vital DC power sources have been lost for **≥ 15 minutes**.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses a concurrent and prolonged loss of both AC and Vital DC power. A loss of all AC power compromises the performance of all SAFETY SYSTEMS requiring electric power including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal and the ultimate heat sink. A loss of Vital DC power compromises the ability to monitor and control SAFETY SYSTEMS. A sustained loss of both AC and DC power will lead to multiple challenges to fission product barriers.

If ANY mitigative strategy is effective in supplying power to ANY one Emergency 4KV bus AND ANY one Vital DC bus (voltage >105 VDC) within 15 minutes, escalation to General Emergency shall not be considered.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses. The 15-minute emergency declaration clock begins at the point when all EALs are met.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MG2 (cont)

Basis Reference(s):

1. NEI 99-01 Rev 6, SG8
2. FSAR Section 8.2.2.6, 250/125 VDC System
3. 1107-2C Vital DC Electrical System
4. OP-TM-AOP-023, A DC System Failure
5. OP-TM-AOP-024, B DC System Failure
6. FSAR Section 8.2.2, Unit Distribution System
7. FSAR Section 8.2.3, Sources of Auxiliary Power
8. Technical Specification Section 3.7, Unit Electric Power System
9. 1107-1 Normal Electrical System
10. 1107-2A Emergency Electrical - 4KV and 480 Volt
11. OP-TM-AOP-020 Loss Of Station Power
12. 1107-3 Diesel Generator
13. 1107-9 SBO Diesel Generator
14. FSAR Section 8.5, Station Blackout

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MS2

Initiating Condition:

Loss of all vital DC power for 15 minutes or longer.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. Voltage is **< 105 VDC** on 125 VDC Distribution System 1A and 1B for **≥ 15 minutes**.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses a loss of Vital DC power which compromises the ability to monitor and control SAFETY SYSTEMS. In modes above Cold Shutdown, this condition involves a major failure of plant functions needed for the protection of the public.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level would be via ICs RG1, FG1 or MG3.

Basis Reference(s):

1. NEI 99-01 Rev 6, SS8
2. FSAR Section 8.2.2.6, 250/125 VDC System
3. 1107-2C Vital DC Electrical System
4. OP-TM-AOP-023, A DC System Failure
5. OP-TM-AOP-024, B DC System Failure

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MS3

Initiating Condition:

Inability to shutdown the reactor causing a challenge to core cooling or RCS heat removal.

Operating Mode Applicability:

1, 2

Emergency Action Level (EAL):

1. Automatic or Manual Trip did **not** shutdown the reactor as indicated by Reactor Power ≥ **5%**.

   AND

2. **ALL** manual actions to shutdown the reactor have been unsuccessful as indicated by Reactor Power ≥ **5%**.

   AND

3. **EITHER** of the following conditions exist:

   a. **T_{clad} > 1400°F**.

      OR

   b. HPI-PORV Cooling in effect.

Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor trip that results in a reactor shutdown, all subsequent operator manual actions, both inside and outside the Control Room including driving in control rods and boron injection, are unsuccessful, and continued power generation is challenging the capability to adequately remove heat from the core and/or the RCS. This condition will lead to fuel damage if additional mitigation actions are unsuccessful and thus warrants the declaration of a Site Area Emergency.

In some instances, the emergency classification resulting from this IC/EAL may be higher than that resulting from an assessment of the plant responses and symptoms against the Recognition Category F ICs/EALs. This is appropriate in that the Recognition Category F ICs/EALs do not address the additional threat posed by a failure to shutdown the reactor. The inclusion of this IC and EAL ensures the timely declaration of a Site Area Emergency in response to prolonged failure to shutdown the reactor.

A reactor shutdown is determined in accordance with applicable Emergency Operating Procedure criteria.

Escalation of the emergency classification level would be via IC RG1 or FG1.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MS3 (cont)

Basis Reference(s):

1. NEI 99-01 Rev 6, SS5
2. OP-TM-EOP-004, Lack of Primary-to-Secondary Heat Transfer
3. OP-TM-EOP-010, Emergency Procedure Rules, Guides And Graphs
4. OP-TM-EOP-001, Reactor Trip
5. 1102-4 Power Operation
6. OP-TM-641-000- Reactor Protection System (RPS/DSS)

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MA3

Initiating Condition:

Automatic or manual trip fails to shutdown the reactor, and subsequent manual actions taken at the reactor control consoles are not successful in shutting down the reactor.

Operating Mode Applicability:

1, 2

Emergency Action Level (EAL):

Note: A manual action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does not include manually driving in control rods or implementation of boron injection strategies.

1. Automatic Trip did **not** shutdown the reactor as indicated by Reactor Power ≥ **5%**.

   AND

2. Manual actions taken at the Console Center are **not** successful in shutting down the reactor as indicated by Reactor Power ≥ **5%**.

Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic reactor trip that results in a reactor shutdown, and subsequent operator manual actions taken at the Console Center to shutdown the reactor are also unsuccessful. This condition represents an actual or potential substantial degradation of the level of safety of the plant. An emergency declaration is required even if the reactor is subsequently shutdown by an action taken away from the Console Center since this event entails a significant failure of the RPS.

A manual action at the Console Center is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor trip. This action does not include manually driving in control rods or implementation of boron injection strategies. If this action(s) is unsuccessful, operators would immediately pursue additional manual actions at locations away from the Console Center (e.g., locally opening breakers). Actions taken at back-panels or other locations within the Control Room, or any location outside the Control Room, are not considered to be “at the Console Center”.

The plant response to the failure of an automatic reactor trip will vary based upon several factors including the reactor power level prior to the event, availability of the condenser, performance of mitigation equipment and actions, other concurrent plant conditions, etc. If the failure to shutdown the reactor is prolonged enough to cause a challenge to the core cooling or RCS heat removal safety functions, the emergency classification level will escalate to a Site Area Emergency via IC MS3. Depending upon plant responses and symptoms, escalation is also possible via IC FS1. Absent the plant conditions needed to meet either IC MS3 or FS1, an Alert declaration is appropriate for this event.

~~classification level will escalate to a Site Area Emergency via IC MS3. Depending upon plant responses and symptoms, escalation is also possible via IC FS1. Absent the plant conditions needed to meet either IC MS3 or FS1, an Alert declaration is appropriate for this event.~~

It is recognized that plant responses or symptoms may also require an Alert declaration in accordance with the Recognition Category F ICs; however, this IC and EAL are included to ensure a timely emergency declaration.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

A reactor shutdown is determined in accordance with applicable Emergency Operating Procedure criteria.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MA3 (cont)

Basis Reference(s):

1. NEI 99-01 Rev 6, SA5
2. OP-TM-EOP-004, Lack of Primary-to-Secondary Heat Transfer
3. OP-TM-EOP-010, Emergency Procedure Rules, Guides And Graphs
4. OP-TM-EOP-001, Reactor Trip
5. 1102-4 Power Operation
6. OP-TM-641-000- Reactor Protection System (RPS/DSS)

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MU3

Initiating Condition:

Automatic or manual trip fails to shutdown the reactor.

Operating Mode Applicability:

1, 2

Emergency Action Level (EAL):

Note: A manual action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does not include manually driving in control rods or implementation of boron injection strategies.

1. a. Automatic Trip did not shutdown the reactor as indicated by Reactor Power ≥ **5%**.

   AND

   b. Subsequent manual action taken at the Console Center is successful in shutting down the reactor as indicated by Reactor Power **< 5%**.

   OR

2. a. Manual Trip did not shutdown the reactor as indicated by Reactor Power ≥ **5%**.

   AND

   b. Subsequent automatic Trip is successful in shutting down the reactor as indicated by Reactor Power **< 5%**.

Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor trip that results in a reactor shutdown, and either a subsequent operator manual action taken at the Console Center or an automatic trip is successful in shutting down the reactor. This event is a precursor to a more significant condition and thus represents a potential degradation of the level of safety of the plant.

EAL #1 Basis

Following the failure on an automatic reactor trip, operators will promptly initiate manual actions at the Console Center to shutdown the reactor (e.g., initiate a manual reactor trip). If these manual actions are successful in shutting down the reactor, core heat generation will quickly fall to a level within the capabilities of the plant's decay heat removal systems.

EAL #2 Basis

If an initial manual reactor trip is unsuccessful, a concurrent plant condition, may lead to the generation of an automatic reactor trip signal. If a subsequent automatic trip is successful in shutting down the reactor, core heat generation will quickly fall to a level within the capabilities of the plant's decay heat removal systems.

A manual action at the Console Center is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor trip). This action does not include manually driving in control rods or implementation of boron injection strategies. Actions taken at back-panels or other locations within the Control Room, or any location outside the Control Room, are not considered to be "at the Console Center".

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MU3 (cont)

Basis (cont):

The plant response to the failure of an automatic or manual reactor trip will vary based upon several factors including the reactor power level prior to the event, availability of the condenser, performance of mitigation equipment and actions, other concurrent plant conditions, etc. If subsequent operator manual actions taken at the Console Center are also unsuccessful in shutting down the reactor, then the emergency classification level will escalate to an Alert via IC MA3. Depending upon the plant response, escalation is also possible via IC FA1. Absent the plant conditions needed to meet either IC MA3 or FA1, an Unusual Event declaration is appropriate for this event.

A reactor shutdown is determined in accordance with applicable Emergency Operating Procedure criteria.

Should a reactor trip signal be generated as a result of plant work (e.g., RPS setpoint testing), the following classification guidance should be applied.

- If the signal generated as a result of plant work causes a plant transient that creates a real condition that should have included an automatic reactor trip and the RPS fails to automatically shutdown the reactor, then this IC and the EALs are applicable, and should be evaluated.
- If the signal generated as a result of plant work does not cause a plant transient but should have generated an RPS trip signal and the trip failure is determined through other means (e.g., assessment of test results), then this IC and the EALs are not applicable and no classification is warranted.

Basis Reference(s):

1. NEI 99-01 Rev 6, SU5
2. OP-TM-EOP-010, Emergency Procedure Rules, Guides And Graphs
3. OP-TM-EOP-001, Reactor Trip
4. 1102-4 Power Operation
5. OP-TM-641-000- Reactor Protection System (RPS/DSS)

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MA4

Initiating Condition:

UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. a. UNPLANNED event results in the inability to monitor **ANY** Table M1 parameters from within the Control Room for ≥ **15 minutes**.

Table M1 Control Room Parameters

- Reactor Power
- PZR Level
- RCS Pressure
- In Core/Core Exit Temperature
- Level in at least one OTSG.
- OTSG Emergency Feed Water Flow

AND

b. **ANY** Table M2 transient in progress.

Table M2 Significant Transients

- Automatic Turbine Runback **> 25%** thermal reactor power
- Electrical Load Rejection **> 25%** full electrical load
- Reactor Trip
- ESAS Actuation
- Thermal Power oscillations **> 10%**

Basis:

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.

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses the difficulty associated with monitoring rapidly changing plant conditions during a transient without the ability to obtain SAFETY SYSTEM parameters from within the Control Room. During this condition, the margin to a potential fission product barrier challenge is reduced. It thus represents a potential substantial degradation in the level of safety of the plant.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MA4 (cont)

Basis (cont):

As used in this EAL, an “inability to monitor” means that values for any of the listed parameters cannot be determined from within the Control Room. This situation would require a loss of all of the Control Room sources for the given parameter(s). For example, the reactor power level cannot be determined from any analog, computer point, digital and recorder source within the Control Room.

An event involving a loss of plant indications, annunciators and/or display systems is evaluated in accordance with 10 CFR 50.72 (and associated guidance in NUREG-1022) to determine if an NRC event report is required. The event would be reported if it significantly impaired the capability to perform emergency assessments. In particular, emergency assessments necessary to implement abnormal operating procedures, emergency operating procedures, and emergency plan implementing procedures addressing emergency classification, accident assessment, or protective action decision-making.

This EAL is focused on a selected subset of plant parameters associated with the key safety functions of reactivity control, core cooling and RCS heat removal. The loss of the ability to determine any of these parameters from within the Control Room is considered to be more significant than simply a reportable condition. In addition, if all indication sources for any of the listed parameters are lost, then the ability to determine the values of other SAFETY SYSTEM parameters may be impacted as well. For example, if the value for reactor vessel level cannot be determined from the indications and recorders on a main control board, the SPDS or the plant computer, the availability of other parameter values may be compromised as well.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of indication.

Escalation of the emergency classification level would be via ICs FS1 or IC RS1.

Basis Reference(s):

1. NEI 99-01 Rev 6, SA2

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MU4

Initiating Condition:

UNPLANNED loss of Control Room indications for 15 minutes or longer.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. UNPLANNED event results in the inability to monitor **ANY** Table M1 parameters from within the Control Room for **≥ 15 minutes**.

Table M1 Control Room Parameters

- Reactor Power
- PZR Level
- RCS Pressure
- In Core/Core Exit Temperature
- Level in at least one OTSG.
- OTSG Emergency Feed Water Flow

Basis:

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.

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses the difficulty associated with monitoring normal plant conditions without the ability to obtain SAFETY SYSTEM parameters from within the Control Room. This condition is a precursor to a more significant event and represents a potential degradation in the level of safety of the plant.

As used in this EAL, an “inability to monitor” means that values for any of the listed parameters cannot be determined from within the Control Room. This situation would require a loss of all of the Control Room sources for the given parameter(s). For example, the reactor power level cannot be determined from any analog, computer point, digital and recorder source within the Control Room. An event involving a loss of plant indications, annunciators and/or display systems is evaluated in accordance with 10 CFR 50.72 (and associated guidance in NUREG-1022) to determine if an NRC event report is required. The event would be reported if it significantly impaired the capability to perform emergency assessments. In particular, emergency assessments necessary to implement abnormal operating procedures, emergency operating procedures, and emergency plan implementing procedures addressing emergency classification, accident assessment, or protective action decision-making.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MU4 (cont)

Basis (cont):

This EAL is focused on a selected subset of plant parameters associated with the key safety functions of reactivity control, core cooling and RCS heat removal. The loss of the ability to determine any of these parameters from within the Control Room is considered to be more significant than simply a reportable condition. In addition, if all indication sources for any of the listed parameters are lost, then the ability to determine the values of other SAFETY SYSTEM parameters may be impacted as well. For example, if the value for reactor vessel level cannot be determined from the indications and recorders on a main control board, the SPDS or the plant computer, the availability of other parameter values may be compromised as well.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of indication.

Escalation of the emergency classification level would be via IC MA4.

Basis Reference(s):

1. NEI 99-01 Rev 6, SU2

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MA5

Initiating Condition:

Hazardous event affecting a SAFETY SYSTEM required for the current operating mode.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Note: If it is determined that the conditions of MA5 are not met then assess the event via HU3, HU4, or HU6.

1. The occurrence of **ANY** of the following hazardous events:
   - Seismic event (earthquake)
   - Internal or external flooding event
   - High winds or tornado strike
   - FIRE
   - EXPLOSION
   - Other events with similar hazard characteristics as determined by the Shift Manager

   AND

2. **EITHER** of the following:
   a. Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM required by Technical Specifications for the current operating mode.

      OR

   b. The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure required by Technical Specifications for the current operating mode.

Basis:

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.

EXPLOSION: A rapid, violent and catastrophic failure of a piece of equipment due to combustion, chemical reaction or overpressurization. A release of steam (from high energy lines or components) or an electrical component failure (caused by short circuits, grounding, arcing, etc.) should not automatically be considered an explosion. Such events may require a post-event inspection to determine if the attributes of an explosion are present.

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

VISIBLE DAMAGE: Damage to a component or structure that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected component or structure.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MA5 (cont)

Basis (cont):

This IC addresses a hazardous event that causes damage to a SAFETY SYSTEM, or a structure containing SAFETY SYSTEM components, required for the current operating mode, "required", i.e. required to be operable by Technical Specifications for the current operating mode. This condition significantly reduces the margin to a loss or potential loss of a fission product barrier, and therefore represents an actual or potential substantial degradation of the level of safety of the plant. Manual or automatic electrical isolation of safety equipment due to flooding, in and of itself, does not constitute degraded performance and is classified under HU6.

EAL #2.a Basis

This EAL addresses damage to a SAFETY SYSTEM train that is required to be operable by Technical Specifications for the current operating mode, and is in operation since indications for it will be readily available. The indications of degraded performance should be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

EAL #2.b Basis

This EAL addresses damage to a SAFETY SYSTEM component that is required to be operable by Technical Specifications for the current operating mode, and is not in operation or readily apparent through indications alone, as well as damage to a structure containing SAFETY SYSTEM components. Operators will make this determination based on the totality of available event and damage report information. This is intended to be a brief assessment not requiring lengthy analysis or quantification of the damage.

Escalation of the emergency classification level would be via IC FS1 or RS1.

If the EAL conditions of MA5 are not met then assess the event via HU3, HU4, or HU6.

Basis Reference(s):

1. NEI 99-01, Rev 6 SA9

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MU6

Initiating Condition:

RCS leakage for 15 minutes or longer.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. RCS unidentified or pressure boundary leakage **> 10 gpm** for ≥ **15 minutes**.

   OR

2. RCS identified leakage **> 25 gpm** for ≥ **15 minutes**.

   OR

3. Leakage from the RCS to a location outside containment **> 25 gpm** for ≥ **15 minutes**.

Basis:

UNISOLABLE: An open or breached system line that cannot be isolated, remotely or locally.

Failure to isolate the leak, within 15 minutes or if known that the leak cannot be isolated within 15 minutes, from the start of the leak requires immediate classification.

This IC addresses RCS leakage which may be a precursor to a more significant event. In this case, RCS leakage has been detected and operators, following applicable procedures, have been unable to promptly isolate the leak. This condition is considered to be a potential degradation of the level of safety of the plant.

EAL #1 and EAL #2 Basis

These EALs are focused on a loss of mass from the RCS due to “unidentified leakage", "pressure boundary leakage" or "identified leakage” (as these leakage types are defined in the plant Technical Specifications).

EAL #3 Basis

This EAL addresses a RCS mass loss caused by an UNISOLABLE leak through an interfacing system. These EALs thus apply to leakage into the containment, a secondary-side system (e.g., steam generator tube leakage) or a location outside of containment.

The leak rate values for each EAL were selected because they are usually observable with normal Control Room indications. Lesser values typically require time-consuming calculations to determine (e.g., a mass balance calculation). EAL #1 uses a lower value that reflects the greater significance of unidentified or pressure boundary leakage.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MU6 (cont)

Basis (cont):

The release of mass from the RCS due to the as-designed/expected operation of a relief valve does not warrant an emergency classification. An emergency classification would be required if a mass loss is caused by a relief valve that is not functioning as designed/expected (e.g., a relief valve sticks open and the line flow cannot be isolated). The 15-minute threshold duration allows sufficient time for prompt operator actions to isolate the leakage, if possible.

Escalation of the emergency classification level would be via ICs of Recognition Category R or F.

Basis Reference(s):

1. NEI 99-01 Rev 6, SU4
2. OP-TM-220-251 RCS Leak Rate Determination
3. OP-TM-220-252, Primary – To – Secondary Leakrate Determination
4. OP-TM-PRF1-0405 RB Sump Level HI
5. UFSAR 6.4.3, Bases of Leakage Estimate
6. UFSAR 6.4.4, Design Basis Leakage
7. OP-TM-AOP-050, Reactor Coolant Leakage
8. Technical Specification 3.1.6, Leakage and Table 4.1-2, Minimum Equipment Test Frequency

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MU7

Initiating Condition:

Loss of all onsite or offsite communications capabilities.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

1. Loss of **ALL** Table M3 **Onsite** communications capability affecting the ability to perform routine operations.

   OR

2. Loss of **ALL** Table M3 **Offsite** communication capability affecting the ability to perform offsite notifications.

   OR

3. Loss of **ALL** Table M3 **NRC** communication capability affecting the ability to perform NRC notifications.

Table M3 Communications Capability

System	Onsite	Offsite	NRC
Radios	X		
Plant page	X		
Plant Telephone System	X		
Commercial Telephones	X	X	X
NARS		X	
ENS		X	X
HPN		X	X
Satellite phones		X	X

Basis:

This IC addresses a significant loss of onsite, offsite, or NRC communications capabilities. While not a direct challenge to plant or personnel safety, this event warrants prompt notifications to Offsite Response Organizations (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, etc.).

EAL #1 Basis

Addresses a total loss of the communications methods used in support of routine plant operations.

EAL #2 Basis

Addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The OROs referred to here are listed in procedure EP-MA-114- 100-F-01, State / Local Event Notification Form.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MU7 (cont)

Basis (cont):

EAL #3 Basis

Addresses a total loss of the communications methods used to notify the NRC of an emergency declaration.

Basis Reference(s):

1. NEI 99-01 Rev 6, SU6
2. 1105-12 Communications System
3. FSAR Section 7.4.4, Communication

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MU8

Initiating Condition:

Failure to isolate containment or loss of containment pressure control.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

1. a. Failure of containment to isolate when required by an actuation signal.

   AND

   b. **ANY** required penetration remains open **> 15 minutes** of the actuation signal.

   OR

2. a. Reactor Building pressure **> 30 psig**.

   AND

   b. Reactor Building Emergency cooling is less than **ANY** one of the following conditions for **≥ 15 minutes**:

SPRAY	COOLERS
2	0
0	3
1	1

Basis:

This IC addresses a failure of any containment penetrations to automatically isolate (close) when required by an actuation signal. It also addresses an event that results in high containment pressure with a concurrent failure of containment pressure control systems. Absent challenges to another fission product barrier, either condition represents potential degradation of the level of safety of the plant.

EAL #1 Basis

The containment isolation signal must be generated as the result on an off- normal/accident condition (e.g., a safety injection or high containment pressure); a failure resulting from testing or maintenance does not warrant classification. The determination of containment and penetration status – isolated or not isolated – should be made in accordance with the appropriate criteria contained in the plant AOPs and EOPs. The 15-minute criterion is included to allow operators time to manually isolate the required penetrations, if possible.

EAL #2 Basis

Addresses a condition where containment pressure is greater than the setpoint at which containment energy (heat) removal systems are designed to automatically actuate, and less than one full train of equipment is capable of operating per design. The 15-minute criterion is included to allow operators time to manually start equipment that may not have automatically started, if possible. The inability to start the required equipment indicates that containment heat removal/depressurization systems (e.g., containment sprays or ice condenser fans) are either lost or performing in a degraded manner.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MU8 (cont)

Basis (cont):

This event would escalate to a Site Area Emergency in accordance with IC FS1 if there were a concurrent loss or potential loss of either the Fuel Clad or RCS fission product barriers.

Basis Reference(s):

1. NEI 99-01 Rev 6, SU7
2. FSAR Section 6.6 Reactor Building Pressure-Time Response
3. Technical Specifications 3.5.3, Engineered Safeguards Protection System Actuation Setpoints
4. FSAR Section 6.3.3, Actuation
5. FSAR Section 6.5.3, Hydrogen Generation
6. OP-TM-EOP-006, LOCA Cooldown
7. 1302-5.25 Reactor Building Sump Level
8. FSAR Section 5.2 Reactor Building
9. FSAR Section 9.2, Chemical Addition and Sampling System
10. OP-TM-EOP-002, Loss of 25°F Subcooling Margin
11. OP-TM-EOP-006, LOCA Cooldown
12. OP-TM-EOP-010, Emergency Procedure Rules, Guides and Graphs
13. OP-TM-MAP-D0301, High Make-up Flow

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CA1

Initiating Condition:

Loss of all offsite and all onsite AC power to emergency busses for 15 minutes or longer.

Operating Mode Applicability:

5, 6, D

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. Loss of **ALL** offsite AC power to Emergency 4KV buses.

   AND

2. Failure of EG-Y-1A, EG-Y-1B Emergency Diesel Generators and EG-Y-4 SBO Diesel Generator to supply power to Emergency 4KV buses.

   AND

3. Failure to restore power to at least one Emergency 4KV bus in **< 15 minutes** from the time of loss of both offsite and onsite AC power.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses a total loss of AC power that compromises the performance of all SAFETY SYSTEMS requiring electric power including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal and the ultimate heat sink.

When in the cold shutdown, refueling, or defueled mode, this condition is not classified as a Site Area Emergency because of the increased time available to restore an emergency bus to service. Additional time is available due to the reduced core decay heat load, and the lower temperatures and pressures in various plant systems. Thus, when in these modes, this condition represents an actual or potential substantial degradation of the level of safety of the plant.

If ANY mitigative strategy is effective in supplying power to ANY one Emergency 4KV bus within 15 minutes from the time of loss of both offsite and onsite AC power, escalation to Alert shall not be considered.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level would be via IC CS6 or RS1.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CA1 (cont)

Basis Reference(s):

1. NEI 99-01 Rev 6, CA2
2. FSAR Section 8.2.2, Unit Distribution System
3. FSAR Section 8.2.3, Sources of Auxiliary Power
4. Technical Specification Section 3.7, Unit Electric Power System
5. 1107-1 Normal Electrical System
6. 1107-2A Emergency Electrical - 4KV and 480 Volt
7. OP-TM-AOP-020 Loss Of Station Power
8. 1107-3 Diesel Generator
9. 1107-9 SBO Diesel Generator
10. FSAR Section 8.5, Station Blackout

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CU1

Initiating Condition:

Loss of all but one AC power source to emergency buses for 15 minutes or longer.

Operating Mode Applicability:

5, 6, D

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. AC power capability to Emergency 4KV buses reduced to only one of the following power sources for ≥ **15 minutes**.
   - Auxiliary Transformer 1A
   - Auxiliary Transformer 1B
   - Emergency Diesel Generator EG-Y-1A
   - Emergency Diesel Generator EG-Y-1B
   - SBO Diesel Generator EG-Y-4

   AND

2. **ANY** additional single power source failure will result in a loss of **ALL** AC power to SAFETY SYSTEMS.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC describes a significant degradation of offsite and onsite AC power sources such that any additional single failure would result in a loss of all AC power to SAFETY SYSTEMS. In this condition, the sole AC power source may be powering one, or more than one, train of safety-related equipment.

When in the cold shutdown, refueling, or defueled mode, this condition is not classified as an Alert because of the increased time available to restore another power source to service. Additional time is available due to the reduced core decay heat load, and the lower temperatures and pressures in various plant systems. Thus, when in these modes, this condition is considered to be a potential degradation of the level of safety of the plant.

An “AC power source” is a source recognized in AOPs and EOPs, and capable of supplying required power to an emergency bus. Some examples of this condition are presented below.

- A loss of all offsite power with a concurrent failure of all but one emergency power source (e.g., an onsite diesel generator).
- A loss of all offsite power and loss of all emergency power sources (e.g., onsite diesel generators) with a single train of emergency buses being back-fed from the unit main generator.
- A loss of emergency power sources (e.g., onsite diesel generators) with a single train of emergency buses being back-fed from an offsite power source.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CU1 (cont)

Basis (cont):

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of power.

The subsequent loss of the remaining single power source would escalate the event to an Alert in accordance with IC CA1.

Basis Reference(s):

1. NEI 99-01 Rev 6 CU2
2. FSAR Section 8.2.2, Unit Distribution System
3. FSAR Section 8.2.3, Sources of Auxiliary Power
4. Technical Specification Section 3.7, Unit Electric Power System
5. 1107-1 Normal Electrical System
6. 1107-2A Emergency Electrical - 4KV and 480 Volt
7. OP-TM-AOP-020 Loss Of Station Power
8. 1107-3 Diesel Generator
9. 1107-9 SBO Diesel Generator
10. FSAR Section 8.5, Station Blackout

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CA2

Initiating Condition:

Hazardous event affecting SAFETY SYSTEM required for the current operating mode.

Operating Mode Applicability:

5, 6

Emergency Action Level (EAL):

Note: If it is determined that the conditions of CA2 are not met then assess the event via HU3, HU4, or HU6.

1. The occurrence of **ANY** of the following hazardous events:
   - Seismic event (earthquake)
   - Internal or external flooding event
   - High winds or tornado strike
   - FIRE
   - EXPLOSION
   - Other events with similar hazard characteristics as determined by the Shift Manager

   AND

2. **EITHER** of the following:
   a. Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM required by Technical Specifications for the current operating mode.

      OR

   b. The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure required by Technical Specifications for the current operating mode.

Basis:

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.

EXPLOSION: A rapid, violent and catastrophic failure of a piece of equipment due to combustion, chemical reaction or overpressurization. A release of steam (from high energy lines or components) or an electrical component failure (caused by short circuits, grounding, arcing, etc.) should not automatically be considered an explosion. Such events may require a post-event inspection to determine if the attributes of an explosion are present.

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

VISIBLE DAMAGE: Damage to a component or structure that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected component or structure.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CA2 (cont)

Basis (cont):

This IC addresses a hazardous event that causes damage to a SAFETY SYSTEM, or a structure containing SAFETY SYSTEM components, required for the current operating mode, "required", i.e. required to be operable by Technical Specifications for the current operating mode. This condition significantly reduces the margin to a loss or potential loss of a fission product barrier, and therefore represents an actual or potential substantial degradation of the level of safety of the plant. Manual or automatic electrical isolation of safety equipment due to flooding, in and of itself, does not constitute degraded performance and is classified under HU6.

EAL #2.a Basis

Addresses damage to a SAFETY SYSTEM train that is required to be operable by Technical Specifications for the current operating mode, and is in operation since indications for it will be readily available. The indications of degraded performance should be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

EAL #2.b Basis

Addresses damage to a SAFETY SYSTEM component that is required to be operable by Technical Specifications for the current operating mode, and is not in operation or readily apparent through indications alone, or to a structure containing SAFETY SYSTEM components. Operators will make this determination based on the totality of available event and damage report information. This is intended to be a brief assessment not requiring lengthy analysis or quantification of the damage.

Escalation of the emergency classification level would be via IC CS6 or RS1.

If the EAL conditions of CA2 are not met then assess the event via HU3, HU4, or HU6.

Basis Reference(s):

1. NEI 99-01 Rev 6, CA6

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CU3

Initiating Condition:

Loss of Vital DC power for 15 minutes or longer.

Operating Mode Applicability:

5, 6

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. Indicated voltage is **< 105 VDC** on required 125 VDC Distribution System 1A and 1B for **≥ 15 minutes**.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses a loss of Vital DC power which compromises the ability to monitor and control operable SAFETY SYSTEMS when the plant is in the cold shutdown or refueling mode. In these modes, the core decay heat load has been significantly reduced, and coolant system temperatures and pressures are lower; these conditions raise the time available to restore a vital DC bus to service. Thus, this condition is considered to be a potential degradation of the level of safety of the plant.

As used in this EAL, “required” means the Vital DC buses necessary to support operation of the in-service, or operable, train or trains of SAFETY SYSTEM equipment. For example, if Train A is out-of-service (inoperable) for scheduled outage maintenance work and Train B is in-service (operable), then a loss of Vital DC power affecting Train B would require the declaration of an Unusual Event. A loss of Vital DC power to Train A would not warrant an emergency classification.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Depending upon the event, escalation of the emergency classification level would be via IC CA6 or CA5, or an IC in Recognition Category R.

Basis Reference(s):

1. NEI 99-01 Rev 6, CU4
2. FSAR Section 8.2.2.6, 250/125 VDC System
3. 1107-2C Vital DC Electrical System
4. OP-TM-AOP-023, A DC System Failure
5. OP-TM-AOP-024, B DC System Failure

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CU4

Initiating Condition:

Loss of all onsite or offsite communications capabilities.

Operating Mode Applicability:

5, 6, D

Emergency Action Level (EAL):

1. Loss of **ALL** Table C1 **Onsite** communications capability affecting the ability to perform routine operations.

   OR

2. Loss of **ALL** Table C1 **Offsite** communication capability affecting the ability to perform offsite notifications.

   OR

3. Loss of **ALL** Table C1 **NRC** communication capability affecting the ability to perform NRC notifications.

Table C1 Communications Capability

System	Onsite	Offsite	NRC
Radios	X		
Plant page	X		
Plant Telephone System	X		
Commercial Telephones	X	X	X
NARS		X	
ENS		X	X
HPN		X	X
Satellite phones		X	X

Basis:

This IC addresses a significant loss of onsite, offsite, or NRC communications capabilities. While not a direct challenge to plant or personnel safety, this event warrants prompt notifications to Offsite Response Organizations (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, etc.).

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

EAL #2 Basis

Addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The OROs referred to here are listed in procedure EP-MA-114- 100-F-01, State / Local Event Notification Form.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CU4 (cont)

Basis (cont):

EAL #3 Basis

Addresses a total loss of the communications methods used to notify the NRC of an emergency declaration.

Basis Reference(s):

1. NEI 99-01 Rev 6, CU5
2. 1105-12 Communications System
3. FSAR Section 7.4.4, Communication

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CA5

Initiating Condition:

Inability to maintain the plant in cold shutdown.

Operating Mode Applicability:

5, 6

Emergency Action Level (EAL):

Notes:

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
- A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when heat removal function is available does not warrant classification.

1. UNPLANNED rise in RCS temperature **> 200ºF** for **> Table C2 duration**.

   OR

2. UNPLANNED RCS pressure rise **> 10 psig** as a result of temperature rise. (This EAL does not apply in solid plant conditions.)

Table C2 RCS Heat-up Duration Thresholds

RCS Status	Containment Closure Status	Heat-up Duration
Intact	Not Applicable	60 minutes*
Not Intact **OR** Reduced Inventory	Established	20 minutes*
	Not Established	0 minutes
* If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced, then EAL #1 is **not** applicable.		

Basis:

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.

CONTAINMENT CLOSURE: The procedurally defined conditions or actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions.

RCS is intact when the RCS pressure boundary is in its normal condition for the Cold Shutdown mode of operation (e.g. no freeze seals, etc.).

This IC addresses conditions involving a loss of decay heat removal capability or an addition of heat to the RCS in excess of that which can currently be removed. Either condition represents an actual or potential substantial degradation of the level of safety of the plant.

A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when the heat removal function is available does not warrant a classification.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CA5 (cont)

Basis (cont):

The RCS Heat-up Duration Thresholds table addresses a rise in RCS temperature when CONTAINMENT CLOSURE is established but the RCS is not intact, or RCS inventory is reduced (e.g., mid-loop operation in PWRs). The 20-minute criterion was included to allow time for operator action to address the temperature rise.

The RCS Heat-up Duration Thresholds table also addresses a rise in RCS temperature with the RCS intact. The status of CONTAINMENT CLOSURE is not crucial in this condition since the intact RCS is providing a high pressure barrier to a fission product release. The 60-minute time frame should allow sufficient time to address the temperature rise without a substantial degradation in plant safety.

Finally, in the case where there is a rise in RCS temperature, the RCS is not intact or is at reduced inventory, and CONTAINMENT CLOSURE is not established, no heat-up duration is allowed (i.e., 0 minutes). This is because 1) the evaporated reactor coolant may be released directly into the Containment atmosphere and subsequently to the environment, and 2) there is reduced reactor coolant inventory above the top of irradiated fuel.

EAL #2 Basis

Provides a pressure-based indication of RCS heat-up.

Escalation of the emergency classification level would be via IC CS6 or RS1.

Basis Reference(s):

1. NEI 99-01 Rev 6, CA3
2. Technical Specifications sections: 1.2.1, 1.7.a and c
3. Technical Specifications sections: 3.6.12.a
4. Technical Specifications sections: 3.6.5
5. Technical Specifications sections: 3.8.6
6. 1101-3 Containment Integrity and Access Limits
7. OP-TM-EOP-030, Loss of Decay Heat Removal
8. Outage Fuel Protection Criteria Document

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CU5

Initiating Condition:

UNPLANNED rise in RCS temperature.

Operating Mode Applicability:

5, 6

Emergency Action Level (EAL):

Notes:

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
- A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when heat removal function is available does not warrant classification.

1. UNPLANNED rise in RCS temperature **> 200°F**.

   OR

2. Loss of the following for **≥ 15 minutes**.
   - **ALL** RCS temperature indications

     AND
   - **ALL** RCS level indications

Basis:

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.

CONTAINMENT CLOSURE: The procedurally defined conditions or actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions.

This IC addresses an UNPLANNED rise in RCS temperature above the Technical Specification cold shutdown temperature limit, or the inability to determine RCS temperature and level, represents a potential degradation of the level of safety of the plant. If the RCS is not intact and CONTAINMENT CLOSURE is not established during this event, the Emergency Director should also refer to IC CA5.

RCS is intact when the RCS pressure boundary is in its normal condition for the Cold Shutdown mode of operation (e.g. no freeze seals, etc.).

A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when the heat removal function is available does not warrant a classification.

EAL #1 involves a loss of decay heat removal capability, or an addition of heat to the RCS in excess of that which can currently be removed, such that reactor coolant temperature cannot be maintained below the cold shutdown temperature limit specified in Technical Specifications. During this condition, there is no immediate threat of fuel damage because the core decay heat load has been reduced since the cessation of power operation.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CU5 (cont)

Basis (cont):

During an outage, the level in the reactor vessel will normally be maintained above the reactor vessel flange. Refueling evolutions that lower water level below the reactor vessel flange are carefully planned and controlled. A loss of forced decay heat removal at reduced inventory may result in a rapid rise in reactor coolant temperature depending on the time after shutdown.

EAL #2 reflects a condition where there has been a significant loss of instrumentation capability necessary to monitor RCS conditions and operators would be unable to monitor key parameters necessary to assure core decay heat removal. During this condition, there is no immediate threat of fuel damage because the core decay heat load has been reduced since the cessation of power operation.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of indication.

Escalation to Alert would be via IC CA6 based on an inventory loss or IC CA5 based on exceeding plant configuration-specific time criteria.

Basis Reference(s):

1. NEI 99-01 Rev 6, CU3
2. 1103-11 RCS Water Level Control
3. FSAR Section 7.3.2, Non-Nuclear Instrumentation
4. 1302-6.6 RCS Temp/Press, TSAT Monitor, ATWS and DSS Calibration
5. NEI 99-01 Rev 5, CU4
6. OP-TM-EOP-030, Loss of Decay Heat Removal

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CG6

Initiating Condition:

Loss of reactor vessel/RCS inventory affecting fuel clad integrity with containment challenged.

Operating Mode Applicability:

5, 6

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. a. Reactor Vessel / RCS level **cannot** be monitored for **≥ 30 minutes**.

   AND

   b. Core uncovery is indicated by **ANY** of the following:

   - Table C3 indications of a sufficient magnitude to indicate core uncovery.

     OR

   - Erratic Source Range Neutron Monitor indication.

     OR

   - Radiation Monitor RM-G-6 or RM-G-7 reading **> 3 R/hr**.

   AND

   c. **ANY** Containment Challenge Indication (Table C4).

Table C3 Indications of RCS Leakage

• UNPLANNED Reactor Bldg Sump level rise*
• UNPLANNED Auxiliary Bldg. Sump level rise*
• UNPLANNED BWST level rise*
• UNPLANNED RCDT level rise*
• UNPLANNED rise in RCS makeup
• Observation of leakage or inventory loss
* Rise in level is attributed to a loss of reactor vessel/RCS inventory.

Table C4 Containment Challenge Indications

• Hydrogen Concentration in Containment **> 4%**
• UNPLANNED rise in containment pressure
• CONTAINMENT CLOSURE **not** established*
*if CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute core uncovery time limit, then escalation to a General Emergency is not required.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CG6 (cont)

Basis:

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.

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.

CONTAINMENT CLOSURE: The procedurally defined conditions or actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions.

This IC addresses the inability to restore and maintain reactor vessel level above the top of active fuel with containment challenged. This condition represents actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity. Releases can be reasonably expected to exceed EPA Protective Action Guidelines (PAG) exposure levels offsite for more than the immediate site area.

Following an extended loss of core decay heat removal and inventory makeup, decay heat will cause reactor coolant boiling and a further reduction in reactor vessel level. If RCS/reactor vessel level cannot be restored, fuel damage is probable.

With CONTAINMENT CLOSURE not established, there is a high potential for a direct and unmonitored release of radioactivity to the environment. If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, then declaration of a General Emergency is not required.

The existence of an explosive mixture means, at a minimum, that the containment atmospheric hydrogen concentration is sufficient to support a hydrogen burn (i.e., at the lower deflagration limit). A hydrogen burn will raise containment pressure and could result in collateral equipment damage leading to a loss of containment integrity. It therefore represents a challenge to Containment integrity.

In the early stages of a core uncovery event, it is unlikely that hydrogen buildup due to a core uncovery could result in an explosive gas mixture in containment. If all installed hydrogen gas monitors are out-of-service during an event leading to fuel cladding damage, it may not be possible to obtain a containment hydrogen gas concentration reading as ambient conditions within the containment will preclude personnel access. During periods when installed containment hydrogen gas monitors are out-of-service, operators may use the other listed indications to assess whether or not containment is challenged.

The 30-minute criterion is tied to a readily recognizable event start time (i.e., the total loss of ability to monitor level), and allows sufficient time to monitor, assess and correlate reactor and plant conditions to determine if core uncovery has actually occurred (i.e., to account for various accident progression and instrumentation uncertainties). It also allows sufficient time for performance of actions to terminate leakage, recover inventory control/makeup equipment and/or restore level monitoring.

The inability to monitor reactor vessel/RCS level may be caused by instrumentation and/or power failures, or water level dropping below the range of available instrumentation. If water level cannot be monitored, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the reactor vessel/RCS.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CG6 (cont)

Basis (cont):

These EALs address concerns raised by Generic Letter 88-17, *Loss of Decay Heat Removal*; SECY 91-283, *Evaluation of Shutdown and Low Power Risk Issues*; NUREG- 1449, *Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States*; and NUMARC 91-06, *Guidelines for Industry Actions to Assess Shutdown Management*.

Basis Reference(s):

1. NEI 99-01 Rev 6, CG1
2. 1103-11 RCS Water Level Control
3. 1101-3 Containment Integrity and Access Limits
4. OP-TM-EOP-030, Loss of Decay Heat Removal
5. FSAR Sections 5.2, Reactor Building
6. FSAR Sections 6.5.2, Hydrogen Monitoring
7. FSAR Sections 6.5.3, Hydrogen Generation
8. Technical Specifications 3.5.5, Accident Monitoring Instrumentation
9. EP-AEL-0501, Estimation of Radiation Monitor Readings Indicating Core Uncovery During Refuel
10. 1301-1 Shift and Daily Checks, Data Sheet 3

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CS6

Initiating Condition:

Loss of reactor vessel/RCS inventory affecting core decay heat removal capability.

Operating Mode Applicability:

5, 6

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. Reactor Vessel / RCS level **cannot** be monitored for **≥ 30 minutes**.

   AND

2. Core uncovery is indicated by **ANY** of the following:

   - Table C3 indications of a sufficient magnitude to indicate core uncovery.

     OR

   - Erratic Source Range Neutron Monitor indication.

     OR

   - Radiation Monitor RM-G-6 or RM-G-7 reading **> 3 R/hr**.

Table C3 Indications of RCS Leakage

• UNPLANNED Reactor Bldg Sump level rise*
• UNPLANNED Auxiliary Bldg. Sump level rise*
• UNPLANNED BWST level rise*
• UNPLANNED RCDT level rise*
• UNPLANNED rise in RCS makeup
• Observation of leakage or inventory loss
* Rise in level is attributed to a loss of reactor vessel/RCS inventory.

Basis:

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.

CONTAINMENT CLOSURE: The procedurally defined conditions or actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions.

The lost inventory may be due to a RCS component failure, a loss of configuration control or prolonged boiling of reactor coolant. These conditions entail major failures of plant functions needed for protection of the public and thus warrant a Site Area Emergency declaration.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CS6 (cont)

Basis (cont):

Following an extended loss of core decay heat removal and inventory makeup, decay heat will cause reactor coolant boiling and a further reduction in reactor vessel level. If RCS/reactor vessel level cannot be restored, fuel damage is probable.

Outage/shutdown contingency plans typically provide for re-establishing or verifying CONTAINMENT CLOSURE following a loss of heat removal or RCS inventory control functions.

The 30-minute criterion is tied to a readily recognizable event start time (i.e., the total loss of ability to monitor level), and allows sufficient time to monitor, assess and correlate reactor and plant conditions to determine if core uncovery has actually occurred (i.e., to account for various accident progression and instrumentation uncertainties). It also allows sufficient time for performance of actions to terminate leakage, recover inventory control/makeup equipment and/or restore level monitoring.

The inability to monitor reactor vessel/RCS level may be caused by instrumentation and/or power failures, or water level dropping below the range of available instrumentation. If water level cannot be monitored, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the reactor vessel/RCS.

These EALs address concerns raised by Generic Letter 88-17, *Loss of Decay Heat Removal*; SECY 91-283, *Evaluation of Shutdown and Low Power Risk Issues*; NUREG- 1449, *Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States*; and NUMARC 91-06, *Guidelines for Industry Actions to Assess Shutdown Management*.

Escalation of the emergency classification level would be via IC CG6 or RG1.

Basis Reference(s):

1. NEI 99-01 Rev 6, CS1
2. OP-TM-PRF1-0405 RB Sump Level Hi
3. 1101-3 Containment Integrity and Access Limits
4. 1301-1 Shift and Daily Checks, Data Sheet 3
5. 1103-11 RCS Water Level Control
6. OP-TM-EOP-030, Loss of Decay Heat Removal

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CA6

Initiating Condition:

Loss of reactor vessel/RCS inventory.

Operating Mode Applicability:

5, 6

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. Loss of Reactor Vessel / RCS inventory as indicated by RCS level **< 0 inches** on Draindown Level indicator.

   OR

2. a. Reactor Vessel / RCS level **cannot** be monitored for **≥ 15 minutes**.

      AND

   b. Loss of Reactor Vessel / RCS inventory per Table C3 indications.

Table C3 Indications of RCS Leakage

• UNPLANNED Reactor Bldg Sump level rise*
• UNPLANNED Auxiliary Bldg. Sump level rise*
• UNPLANNED BWST level rise*
• UNPLANNED RCDT level rise*
• UNPLANNED rise in RCS makeup
• Observation of leakage or inventory loss
* Rise in level is attributed to a loss of reactor vessel/RCS inventory.

Basis:

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.

This IC addresses conditions that are precursors to a loss of the ability to adequately cool irradiated fuel (i.e., a precursor to a challenge to the fuel clad barrier). This condition represents a potential substantial reduction in the level of plant safety.

EAL #1 Basis

A lowering of water level below 0 inches on Draindown Level indicator indicates that operator actions have not been successful in restoring and maintaining reactor vessel/RCS water level. The heat-up rate of the coolant will rise as the available water inventory is reduced. A continuing drop in water level will lead to core uncovery.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CA6 (cont)

Basis (cont):

Although related, EAL #1 is concerned with the loss of RCS inventory and not the potential concurrent effects on systems needed for decay heat removal (e.g., loss of a Residual Heat Removal suction point). A rise in RCS temperature caused by a loss of decay heat removal capability is evaluated under IC CA5.

EAL #2 Basis

The inability to monitor reactor vessel/RCS level may be caused by instrumentation and/or power failures, or water level dropping below the range of available instrumentation. If water level cannot be monitored, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the reactor vessel/RCS.

The 15-minute duration for the loss of level indication was chosen because it is half of the EAL duration specified in IC CS6.

If the reactor vessel/RCS inventory level continues to lower, then escalation to Site Area Emergency would be via IC CS6.

Basis Reference(s):

1. NEI 99-01 Rev 6, CA1
2. OP-TM-PRF1-0405 RB Sump Level Hi
3. 1301-1 Shift and Daily Checks, Data Sheet 3
4. 1103-11 RCS Water Level Control
5. OP-TM-EOP-030, Loss of Decay Heat Removal

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CU6

Initiating Condition:

UNPLANNED loss of reactor vessel/RCS inventory for 15 minutes or longer.

Operating Mode Applicability:

5, 6

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. UNPLANNED loss of reactor coolant results in the inability to restore and maintain Reactor Vessel / RCS level to **> procedurally established lower limit** for **≥ 15 minutes**.

   OR

2. a. Reactor Vessel / RCS level **cannot** be monitored.

      AND

   b. Loss of Reactor Vessel / RCS inventory per Table C3 indications.

Table C3 Indications of RCS Leakage

• UNPLANNED Reactor Bldg Sump level rise*
• UNPLANNED Auxiliary Bldg. Sump level rise*
• UNPLANNED BWST level rise*
• UNPLANNED RCDT level rise*
• UNPLANNED rise in RCS makeup
• Observation of leakage or inventory loss
* Rise in level is attributed to a loss of reactor vessel/RCS inventory.

Basis:

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.

This IC addresses the inability to restore and maintain water level to a required minimum level (or the lower limit of a level band), or a loss of the ability to monitor reactor vessel/RCS level concurrent with indications of coolant leakage. Either of these conditions is considered to be a potential degradation of the level of safety of the plant.

The procedurally established lower limit is not an operational band established above the procedural limit to allow for operator action prior to exceeding the procedural limit, but it is the procedurally established lower limit.

Refueling evolutions that lower RCS water inventory are carefully planned and controlled. An UNPLANNED event that results in water level decreasing below a procedurally required limit warrants the declaration of an Unusual Event due to the reduced water inventory that is available to keep the core covered.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CU6 (cont)

Basis (cont):

EAL #1 Basis

Recognizes that the minimum required reactor vessel/RCS level can change several times during the course of a refueling outage as different plant configurations and system lineups are implemented. This EAL is met if the minimum level, specified for the current plant conditions, cannot be maintained for 15 minutes or longer. The minimum level is typically specified in the applicable operating procedure but may be specified in another controlling document.

The 15-minute threshold duration allows sufficient time for prompt operator actions to restore and maintain the expected water level. This criterion excludes transient conditions causing a brief lowering of water level.

EAL #2 Basis

Addresses a condition where all means to determine reactor vessel/RCS level have been lost. In this condition, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the reactor vessel/RCS.

Continued loss of RCS inventory may result in escalation to the Alert emergency classification level via either IC CA6 or CA5.

Basis Reference(s):

1. NEI 99-01, Rev. 6 CU1
2. Technical Specification 3.1.6. Leakage
3. OP-TM-220-251 RCS Leak Rate Determination Using PPC
4. OP-TM-220-252, Primary – To – Secondary Leakrate Determination (OTSG Leakage): Normal Operations
5. OP-TM-MAP-C0105 RCS Draindown LVL HI/LO
6. OP-TM-PRF1-0405 RB Sump Level HI
7. UFSAR 6.4.3, Bases of Leakage Estimate
8. 1103-11 RCS Water Level Control
9. OP-TM-EOP-030, Loss of Decay Heat Removal

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HG1

Initiating Condition:

HOSTILE ACTION resulting in loss of physical control of the facility.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

1. A notification from the Security Force that a HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA.

   AND

2. a. **ANY** Table H1 safety function **cannot** be controlled or maintained.

   OR

   b. Damage to spent fuel has occurred or is IMMINENT.

Table H1 Safety Functions

- Reactivity Control (ability to shut down the reactor and keep it shutdown)
- Core Cooling (ability to cool the core)
- RCS Heat Removal (ability to maintain heat sink)

Basis:

HOSTILE ACTION: An act toward CRANE 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 site. 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).

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

PROJECTILE: An object directed toward CRANE that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA: An area that normally encompasses all controlled areas within the security protected area fence.

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.

HOSTILE FORCE: Any 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.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HG1 (cont)

Basis (cont):

This IC addresses an event in which a HOSTILE FORCE has taken physical control of the facility to the extent that the plant staff can no longer operate equipment necessary to maintain key safety functions. It also addresses a HOSTILE ACTION leading to a loss of physical control that results in actual or IMMINENT damage to spent fuel due to 1) damage to a spent fuel pool cooling system (e.g., pumps, heat exchangers, controls, etc.) or, 2) loss of spent fuel pool integrity such that sufficient water level cannot be maintained.

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, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program].*

Basis Reference(s):

1. NEI 99-01, Rev. 6 HG1
2. Security and Safeguards Contingency Plan Station Security Plan – Appendix C

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HS1

Initiating Condition:

HOSTILE ACTION within the PROTECTED AREA.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

1. A notification from the Security Force that a HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA.

Basis:

HOSTILE ACTION: An act toward CRANE 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 site. 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).

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

PROJECTILE: An object directed toward CRANE that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA: An area that normally encompasses all controlled areas within the security protected area fence.

HOSTILE FORCE: Any 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.

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

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, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]*.

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 Site Area Emergency 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.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HS1 (cont)

Basis (cont):

This IC does not apply to a HOSTILE ACTION directed at an ISFSI PROTECTED AREA located outside the plant PROTECTED AREA; such an attack should be assessed using IC HA1. It also 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.

Escalation of the emergency classification level would be via IC HG1.

Basis Reference(s):

1. NEI 99-01 Rev 6, HS1
2. Security and Safeguards Contingency Plan Station Security Plan – Appendix C

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HA1

Initiating Condition:

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

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

1. A validated notification from NRC of an aircraft attack threat **< 30 minutes** from the site.

   OR

2. Notification by the Security Force that a HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLED AREA.

Basis:

HOSTILE ACTION: An act toward CRANE 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 site. 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).

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

PROJECTILE: An object directed toward CRANE that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA: An area that normally encompasses all controlled areas within the security protected area fence.

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.

HOSTILE FORCE: Any 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.

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, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]*.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HA1 (cont)

Basis (cont):

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 Offsite Response Organizations, 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 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 OP-TM-AOP-008, Security Threat / Intrusion.

EAL #2 is applicable for any HOSTILE ACTION occurring, or that has occurred, in the OWNER CONTROLLED AREA. This includes any action directed against an ISFSI that is located outside the plant PROTECTED AREA.

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 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, FBI, 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.

Escalation of the emergency classification level would be via IC HS1.

Basis Reference(s):

1. NEI 99-01 Rev 6, HA1
2. Security and Safeguards Contingency Plan Station Security Plan – Appendix C
3. OP-TM-AOP-008, Security Threat / Intrusion

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HU1

Initiating Condition:

Confirmed SECURITY CONDITION or threat.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

1. Notification of a credible security threat directed at the site as determined per SY-AA-101-132, Security Assessment and Response to Unusual Activities.

   OR

2. A validated notification from the NRC providing information of an aircraft threat.

   OR

3. Notification by the Security Force of a SECURITY CONDITION that does **not** involve a HOSTILE ACTION.

Basis:

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

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

HOSTILE ACTION: An act toward CRANE 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 site. 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).

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

PROJECTILE: An object directed toward CRANE that could cause concern for its continued operability, reliability, or personnel safety.

This IC addresses events that pose a threat to plant personnel or SAFETY SYSTEM equipment, 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 or 10 CFR § 50.72. Security events assessed as HOSTILE ACTIONS are classifiable under ICs HA1, HS1 and HG1.

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.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HU1 (cont)

Basis (cont):

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 addresses the receipt of a credible security threat. The credibility of the threat is assessed in accordance with SY-AA-101-132.

EAL #2 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 NORAD through the NRC. Validation of the threat is performed in accordance with OP-TM- AOP-008, Security Threat / Intrusion.

EAL #3 references Security Force 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 § 2.39 information.

Escalation of the emergency classification level would be via IC HA1.

Basis Reference(s):

1. NEI 99-01 Rev 6, HU1
2. SY-AA-101-132, Security Assessment and Response to Unusual Activities
3. Security And Safeguards Contingency Plan Station Security Plan – Appendix C

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HS2

Initiating Condition:

Inability to control a key safety function from outside the Control Room.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. A Control Room evacuation has resulted in plant control being transferred from the Control Room to alternate locations per OP-TM-EOP-020, Cooldown from Outside the Control Room.

   AND

2. Control of **ANY** Table H1 key safety function is **not** reestablished in **< 15 minutes**.

Table H1 Safety Functions

- Reactivity Control (ability to shut down the reactor and keep it shutdown)
- Core Cooling (ability to cool the core)
- RCS Heat Removal (ability to maintain heat sink)

Basis:

The time period to establish control of the plant starts when either:

a. Control of the plant is no longer maintained in the Main Control Room

   OR

b. The last Operator has left the Main Control Room.

This IC addresses an evacuation of the Control Room that results in transfer of plant control to alternate locations, and the control of a key safety function cannot be reestablished in a timely manner. The failure to gain control of a key safety function following a transfer of plant control to alternate locations is a precursor to a challenge to any fission product barriers within a relatively short period of time.

The determination of whether or not “control” is established at the remote safe shutdown location(s) is based on Emergency Director judgment. The Emergency Director is expected to make a reasonable, informed judgment within 15 minutes whether or not the operating staff has control of key safety functions from the remote safe shutdown location(s).

Escalation of the emergency classification level would be via IC FG1 or CG6.

Basis Reference(s):

1. NEI 99-01, Rev 6 HS6
2. OP-TM-EOP-020, Cooldown from Outside the Control Room

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HA2

Initiating Condition:

Control Room evacuation resulting in transfer of plant control to alternate locations.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

1. A Control Room evacuation has resulted in plant control being transferred from the Control Room to alternate locations per OP-TM-EOP-020, Cooldown from Outside the Control Room.

Basis:

This IC addresses an evacuation of the Control Room that results in transfer of plant control to alternate locations outside the Control Room. The loss of the ability to control the plant from the Control Room is considered to be a potential substantial degradation in the level of plant safety.

Following a Control Room evacuation, control of the plant will be transferred to alternate shutdown locations. The necessity to control a plant shutdown from outside the Control Room, in addition to responding to the event that required the evacuation of the Control Room, will present challenges to plant operators and other on-shift personnel. Activation of the ERO and emergency response facilities will assist in responding to these challenges.

Escalation of the emergency classification level would be via IC HS2.

Basis Reference(s):

1. NEI 99-01, Rev 6 HA6
2. OP-TM-EOP-020, Cooldown from Outside the Control Room

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HU3

Initiating Condition:

FIRE potentially degrading the level of safety of the plant.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

- Escalation of the emergency classification level would be via IC CA2 or MA5

1. A FIRE in **ANY** Table H2 area is **not** extinguished in **< 15-minutes** of **ANY** of the following FIRE detection indications:
   - Report from the field (i.e., visual observation)
   - Receipt of multiple (more than 1) fire alarms or indications
   - Field verification of a single fire alarm

   OR

2. a. Receipt of a single fire alarm in **ANY** Table H2 area (i.e., no other indications of a FIRE).

      AND

   b. The existence of a FIRE is **not** verified in **< 30 minutes** of alarm receipt.

   OR

3. A FIRE within the plant PROTECTED AREA not extinguished in **< 60-minutes** of the initial report, alarm or indication.

   OR

4. A FIRE within the plant PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish.

Table H2 Vital Areas

- Reactor Building
- Intake Building
- Intermediate Building
- Control Tower
- Auxiliary and Fuel Handling Buildings
- 1A and 1B Diesel Generator Buildings
- BWST
- CST

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HU3 (cont)

Basis:

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.

PROTECTED AREA: An area that normally encompasses all controlled areas within the security protected area fence.

This IC addresses the magnitude and extent of FIRES that may be indicative of a potential degradation of the level of safety of the plant.

EAL #1 Basis

The intent of the 15-minute duration is to size the FIRE and to discriminate against small FIRES that are readily extinguished (e.g., smoldering waste paper basket). In addition to alarms, other indications of a FIRE could be a drop in fire main pressure, automatic activation of a suppression system, etc.

Upon receipt, operators will take prompt actions to confirm the validity of an initial fire alarm, indication, or report. For EAL assessment purposes, the emergency declaration clock starts at the time that the initial alarm, indication, or report was received, and not the time that a subsequent verification action was performed. Similarly, the fire duration clock also starts at the time of receipt of the initial alarms, indication or report.

EAL #2 Basis

Addresses receipt of a single fire alarm, and the existence of a FIRE is not verified (i.e., proved or disproved) within 30-minutes of the alarm. Upon receipt, operators will take prompt actions to confirm the validity of a single fire alarm. For EAL assessment purposes, the 30-minute clock starts at the time that the initial alarm was received, and not the time that a subsequent verification action was performed.

A single fire alarm, absent other indication(s) of a FIRE, may be indicative of equipment failure or a spurious activation, and not an actual FIRE. For this reason, additional time is allowed to verify the validity of the alarm. The 30-minute period is a reasonable amount of time to determine if an actual FIRE exists; however, after that time, and absent information to the contrary, it is assumed that an actual FIRE is in progress.

If an actual FIRE is verified by a report from the field, then EAL #1 is immediately applicable, and the emergency must be declared if the FIRE is not extinguished within 15-minutes of the report. If the alarm is verified to be due to an equipment failure or a spurious activation, and this verification occurs within 30-minutes of the receipt of the alarm, then this EAL is not applicable and no emergency declaration is warranted.

EAL #3 Basis

In addition to a FIRE addressed by EAL #1 or EAL #2, a FIRE within the plant PROTECTED AREA not extinguished within 60-minutes may also potentially degrade the level of plant safety.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HU3 (cont)

Basis (cont):

EAL #4 Basis

If a FIRE within the plant PROTECTED AREA is of sufficient size to require a response by an offsite firefighting agency (e.g., a local town Fire Department), then the level of plant safety is potentially degraded. The dispatch of an offsite firefighting agency to the site requires an emergency declaration only if it is needed to actively support firefighting efforts because the fire is beyond the capability of the Fire Brigade to extinguish. Declaration is not necessary if the agency resources are placed on stand-by, or supporting post-extinguishment recovery or investigation actions.

Basis-Related Requirements from Appendix R

Appendix R to 10 CFR 50, states in part:

> Criterion 3 of Appendix A to this part specifies that "Structures, systems, and components important to safety shall be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions."
>
> When considering the effects of fire, those systems associated with achieving and maintaining safe shutdown conditions assume major importance to safety because damage to them can lead to core damage resulting from loss of coolant through boil-off.
>
> Because fire may affect safe shutdown systems and because the loss of function of systems used to mitigate the consequences of design basis accidents under post-fire conditions does not per se impact public safety, the need to limit fire damage to systems required to achieve and maintain safe shutdown conditions is greater than the need to limit fire damage to those systems required to mitigate the consequences of design basis accidents.

In addition, Appendix R to 10 CFR 50, requires, among other considerations, the use of 1-hour fire barriers for the enclosure of cable and equipment and associated non-safety circuits of one redundant train (G.2.c). As used in EAL #2, the 30-minutes to verify a single alarm is well within this worst-case 1-hour time period.

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via IC CA2 or MA5.

Basis Reference(s):

1. NEI 99-01, Rev 6 HU4
2. FSAR Figure 2.1-3, Extended Plot Plan TMINS
3. FSAR Section 5.1, Class I Structures, Components, and Systems
4. OP-TM-AOP-001, Fire
5. OP-TM-EOP-020, Cooldown Outside of Control Room

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HU4

Initiating Condition:

Seismic event greater than OBE levels.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

Note: For emergency classification if EAL 2.b is not able to be confirmed, then the occurrence of a seismic event is confirmed in manner deemed appropriate by the Shift Manager or Emergency Director in ≤ 15 mins of the event.

1. Seismic event **> Operating Basis Earthquake (OBE)** as indicated by seismic Alarms **PRF-1-3** Operating Basis earthquake.

   OR

2. When Seismic Monitoring Equipment is **not** available:
   a. Control Room personnel feel an actual or potential seismic event.

      AND

   b. **ANY** one of the following confirmed in **≤ 15 mins** of the event:
      - The earthquake resulted in Modified Mercalli Intensity (MMI) **≥ VI** and occurred **≤ 3.5 miles** of the plant.
      - The earthquake was magnitude **≥ 6.0**.
      - The earthquake was magnitude **≥ 5.0** and occurred **≤ 125 miles** of the plant.

Basis:

This IC addresses a seismic event that results in accelerations at the plant site greater than those specified for an Operating Basis Earthquake (OBE)[1]. An earthquake greater than an OBE but less than a Safe Shutdown Earthquake (SSE)[2] should have no significant impact on safety-related systems, structures and components; however, some time may be required for the plant staff to ascertain the actual post-event condition of the plant (e.g., performs walk-downs and post-event inspections). Given the time necessary to perform walk-downs and inspections, and fully understand any impacts, this event represents a potential degradation of the level of safety of the plant.

Event verification with external sources should not be necessary during or following an OBE. Earthquakes of this magnitude should be readily felt by onsite personnel and recognized as a seismic event (e.g., typical lateral accelerations are in excess of 0.08g). The Shift Manager or Emergency Director may seek external verification if deemed appropriate (e.g., a call to the USGS, check internet news sources, etc.); however, the verification action must not preclude a timely emergency declaration.

[1] An OBE is vibratory ground motion for which those features of a nuclear power plant necessary for continued operation without undue risk to the health and safety of the public will remain functional.

[2] An SSE is vibratory ground motion for which certain (generally, safety-related) structures, systems, and components must be designed to remain functional.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HU4 (cont)

Basis (cont):

EAL #2.b and the accompanying note is included to ensure that a declaration does not result from felt vibrations caused by a non-seismic source (e.g., a dropped load). The Shift Manager or Emergency Director may seek external verification if deemed appropriate (e.g., call to USGS, check internet source, etc.) however, the verification action must not preclude a timely emergency declaration. This guidance recognizes that it may cause the site to declare an Unusual Event while another site, similarly affected but with readily available OBE indications in the Control Room, may not.

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via IC CA2 or MA5.

Basis Reference(s):

1. NEI 99-01, Rev 6 HU2
2. OP-TM-AOP-003, Earthquake
3. PRF 1-3 Operating Bases Earthquake
4. PRF 1-2 Threshold Seismic Event
5. US NRC Reg. Guide 1.166, Pre-Earthquake Planning and Immediate Nuclear Power Plant Operator Earthquake Actions.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HA5

Initiating Condition:

Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown.

Operating Mode Applicability:

4, 5, 6

Emergency Action Level (EAL):

Note: If the equipment in the listed room or area was already inoperable, or out of service, before the event occurred, then no emergency classification is warranted.

1. Release of a toxic, corrosive, asphyxiant or flammable gas in **ANY** Table H3 area.

   AND

2. Entry into the room or area is prohibited or impeded.

Table H3 Areas with Entry Related Mode Applicability

Area	Entry Related Mode Applicability
Auxiliary Building • 281’ shielded area • 305’ above DH Vaults	Modes 4, 5, and 6
Fuel Handling Building • 281’ 1C ES Vlvs MCC	

Basis:

This IC addresses an event involving a release of a hazardous gas that precludes or impedes access to equipment necessary to transition the plant from normal plant operation to cooldown and shutdown as specified in normal plant procedures. This condition represents an actual or potential substantial degradation of the level of safety of the plant.

Assuming all plant equipment is operating as designed, normal operation is capable from the Main Control Room (MCR). The plant is also able to transition into a hot shutdown condition from the MCR, therefore Table H3 is a list of plant rooms or areas with entry-related mode applicability that contain equipment which require a manual/local action necessary to transition the plant from normal plant operation to cooldown and shutdown as specified in normal operating procedures (establish shutdown cooling), where if this action is not completed the plant would not be able to attain and maintain cold shutdown. This Table does not include rooms or areas for which entry is required solely to perform actions of an administrative or record keeping nature (e.g., normal rounds or routine inspections).

This Table does not include the Control Room since adequate engineered safety/design features are in place to preclude a Control Room evacuation due to the release of a hazardous gas.

An Alert declaration is warranted if entry into the affected room/area is, or may be, procedurally required during the plant operating mode in effect and the gaseous release preclude the ability to place shutdown cooling in service. The emergency classification is not contingent upon whether entry is actually necessary at the time of the release.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HA5 (cont)

Basis (cont):

Evaluation of the IC and EAL do not require atmospheric sampling; it only requires the Emergency Director's judgment that the gas concentration in the affected room/area is sufficient to preclude or significantly impede procedurally required access. This judgment may be based on a variety of factors including an existing job hazard analysis, report of ill effects on personnel, advice from a subject matter expert or operating experience with the same or similar hazards. Access should be considered as impeded if extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is not routinely employed).

An emergency declaration is not warranted if any of the following conditions apply.

- The plant is in an operating mode different than the mode specified for the affected room/area (i.e., entry is not required during the operating mode in effect at the time of the gaseous release). For example, the plant is in Mode 1 when the gaseous release occurs, and the procedures used for normal operation, cooldown and shutdown do not require entry into the affected room until Mode 4.
- The gas release is a planned activity that includes compensatory measures which address the temporary inaccessibility of a room or area (e.g., fire suppression system testing).
- The action for which room/area entry is required is of an administrative or record keeping nature (e.g., normal rounds or routine inspections).
- The access control measures are of a conservative or precautionary nature, and would not actually prevent or impede a required action.

An asphyxiant is a gas capable of reducing the level of oxygen in the body to dangerous levels. Most commonly, asphyxiants work by merely displacing air in an enclosed environment. This reduces the concentration of oxygen below the normal level of around 19%, which can lead to breathing difficulties, unconsciousness or even death.

This EAL does not apply to firefighting activities that generate smoke or that automatically or manually activate a fire suppression system in an area.

The Operating Mode Applicability of this EAL has been revised from All Modes to modes 4, 5, and 6 due to the mode applicability of the areas of concern in Table H-3. In the future should the areas of concern in Table H-3 be revised then the Operating Mode Applicability of this EAL should be reevaluated.

Escalation of the emergency classification level would be via Recognition Category R, C or F ICs.

Basis Reference(s):

1. NEI 99-01, Rev 6 HA5
2. FSAR Figure 2.1-3, Extended Plot Plan TMINS
3. FSAR Section 5.1, Class I Structures, Components, and Systems
4. NEI 99-01, Rev. 5 HA3
5. OP-TM-406-901, Hazardous Material Release
6. AR-660892, Station Halon and IDLH Evaluations
7. 29CFR1910.134(b) and 29CFR1910.134(d)(2)(iii)

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HU6

Initiating Condition:

Hazardous event.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

Note: EAL #4 does not apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.

1. Tornado strike within the PROTECTED AREA.

   OR

2. Internal room or area flooding of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component required by Technical Specifications for the current operating mode.

   OR

3. 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).

   OR

4. A hazardous event that results in onsite conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles.

   OR

5. a. Abnormal river water level at the intake Pump and Screen House, as indicated by **EITHER**:

      1. **> 296 ft. el.** (high level).

         OR

      2. **< 274 ft. el.** (low level).

      OR

   b. River flow **forecasted** to exceed **900,000 CFS** within the next **12 hours**.

Basis:

PROTECTED AREA: An area that normally encompasses all controlled areas within the security protected area fence.

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses hazardous events that are considered to represent a potential degradation of the level of safety of the plant.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HU6 (cont)

Basis (cont):

EAL 1 Basis

Addresses a tornado striking (touching down) within the Protected Area.

EAL #2 Basis

Addresses flooding of a building room or area that results in operators isolating power to a SAFETY SYSTEM component due to water level or other wetting concerns. Classification is also required if the water level or related wetting causes an automatic isolation of a SAFETY SYSTEM component from its power source (e.g., a breaker or relay trip). To warrant classification, operability of the affected component must be required by Technical Specifications for the current operating mode.

EAL #3 Basis

Addresses a hazardous materials event originating at an offsite location and of sufficient magnitude to impede the movement of personnel within the PROTECTED AREA.

EAL #4 Basis

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

This EAL is not intended to 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.

EAL #5 Basis:

The level of the Susquehanna River is approaching flood stage; flood stage is defined as 307 ft el. at the Susquehanna River Gage at Harrisburg.

A low river water condition below 274 ft el. requires a Technical Specification 3.0.1 plant shutdown per OP-TM-AOP-005 and is a precursor to a more serious condition.

Escalation of the emergency classification level would be based on ICs in Recognition Categories R, F, M, H or C.

Basis Reference(s):

1. NEI 99-01, Rev 6 HU3
2. OP-TM-AOP-005 River Water System Failures
3. OP-TM-AOP-002, Flood
4. OP-TM-AOP-0021, Flood Basis Document
5. OP-TM-AOP-004, Tornado / High Winds

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HG7

Initiating Condition:

Other conditions exist which in the judgment of the Emergency Director warrant declaration of a GENERAL EMERGENCY.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

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 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 Protective Action Guideline exposure levels offsite for more than the immediate site area.

Basis:

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.

HOSTILE ACTION: An act toward CRANE 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 site. 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).

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

PROJECTILE: An object directed toward CRANE that could cause concern for its continued operability, reliability, or personnel safety.

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 emergency classification level description for a General Emergency.

Basis Reference(s):

1. NEI 99-01, Rev 6 HG7

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HS7

Initiating Condition:

Other conditions exist which in the judgment of the Emergency Director warrant declaration of a SITE AREA EMERGENCY.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

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 Protective Action Guideline exposure levels beyond the site boundary.

Basis:

HOSTILE ACTION: An act toward CRANE 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 site. 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).

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

PROJECTILE: An object directed toward CRANE that could cause concern for its continued operability, reliability, or personnel safety.

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 emergency classification level description for a Site Area Emergency.

Basis Reference(s):

1. NEI 99-01, Rev 6 HS7

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HA7

Initiating Condition:

Other conditions exist which in the judgment of the Emergency Director warrant declaration of an ALERT.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

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 Protective Action Guideline exposure levels.

Basis:

HOSTILE ACTION: An act toward CRANE 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 site. 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).

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

PROJECTILE: An object directed toward CRANE that could cause concern for its continued operability, reliability, or personnel safety.

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 emergency classification level description for an Alert.

Basis Reference(s):

1. NEI 99-01, Rev 6 HA7

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HU7

Initiating Condition:

Other conditions exist which in the judgment of the Emergency Director warrant declaration of an UNUSUAL EVENT.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

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 emergency classification level description for an UNUSUAL EVENT.

Basis Reference(s):

1. NEI 99-01, Rev 6 HU7

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Independent Spent Fuel Storage Installation

E-HU1

Initiating Condition:

Damage to a loaded cask CONFINEMENT BOUNDARY.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

1. Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by a radiation reading greater than **ANY** of the following:
   a. **240 mrem/hour** gamma on the vertical concrete surfaces.

      OR

   b. **10 mrem/hour** neutron on the vertical concrete surfaces.

      OR

   c. **900 mrem/hour** (neutron + gamma) on the top.

Basis:

CONFINEMENT BOUNDARY: The irradiated fuel dry storage cask barrier(s) between areas containing radioactive substances and the environment.

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 word cask, as used in this EAL, refers to the storage container in use at the site for dry storage of irradiated fuel. The issues of concern are the creation of a potential or actual release path to the environment, degradation of any 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 cask technical specification multiple of "2 times" is used here to distinguish between non-emergency and emergency conditions. 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 fact that the on-contact dose rate limit is exceeded may be determined based on measurement of a dose rate at some distance from the cask

Security-related events for the ISFSI is covered under ICs HU1 and HA1.

Basis Reference(s):

1. NEI 99-01, Rev 6 E-HU1
2. Certificate of Compliance 1031 NAC MAGNASTOR® Canister

ENCLOSURE 2C

Clean Version of EP-AA-1009
Addendum 3

Crane Clean Energy Center
Renewed Facility License No.
DPR-50

CONSTELLATION

EMERGENCY ACTION LEVELS
FOR CRANE CLEAN ENERGY CENTER

REVISION HISTORY

Rev. 0 December 2014		
Rev. 1 March 2016		
Rev. 2 January 2017		
Rev. 3 TBD		

Section 1: Classification of Emergencies

1.1 General

Section D of the Constellation Nuclear Standardized Emergency Plan divides the types of emergencies into four EMERGENCY CLASSIFICATION LEVELS (ECLs). The first four are the UNUSUAL EVENT (UE), ALERT, SITE AREA EMERGENCY (SAE), and GENERAL EMERGENCY (GE). These ECLs are entered by satisfying the Initiating Condition (IC) through meeting an Emergency Action Level (EAL) of the IC provided in this section of the Annex. The ECLs are escalated from least severe to most severe according to relative threat to the health and safety of the public and emergency workers. Depending on the severity of an event, prior to returning to a standard day-to-day organization, a state or phase called RECOVERY may be entered to provide dedicated resources and organization in support of restoration and communication activities following the termination of the emergency.

UNUSUAL EVENT (UE): 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.

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 EPA Protective Action Guideline exposure levels.

SITE AREA EMERGENCY (SAE): Events are in progress or have occurred which involve an 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 Protective Action Guideline exposure levels beyond the site boundary.

GENERAL EMERGENCY (GE): 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 Protective Action Guideline exposure levels offsite for more than the immediate site area.

RECOVERY: Recovery can be considered as a phase of the emergency and is entered by meeting emergency termination criteria provided in EP-AA-111 Emergency Classification and Protective Action Recommendations.

EMERGENCY CLASSIFICATION LEVEL (ECL): One of a set of names or titles established by the US Nuclear Regulatory Commission (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 emergency classification levels, in ascending order of severity, are:

- UNUSUAL EVENT (UE)
- ALERT
- SITE AREA EMERGENCY (SAE)
- GENERAL EMERGENCY (GE)

INITIATING CONDITION (IC): An event or condition that aligns with the definition of one of the four EMERGENCY CLASSIFICATION LEVELS by virtue of the potential or actual effects or consequences.

EMERGENCY ACTION LEVEL (EAL): A pre-determined, site-specific, observable threshold for an INITIATING CONDITION that, when met or exceeded, places the plant in a given EMERGENCY CLASSIFICATION LEVEL.

An emergency is classified by assessing plant conditions and comparing abnormal conditions to ICs and EALs, based on the designated Operational Condition (MODE). Modes 1 through 6 are defined in the Technical Specifications (T.S). "Defueled" Mode was established for classification purposes to reflect conditions where all fuel has been removed from the Reactor Pressure Vessel.

Mode	Description
1	**Power Operation:** The plant is in the Power Operation (PwrOps) condition when the indicated neutron power is two percent of rated power, or greater, as indicated on the power range channels.
2	**Startup / Hot Standby:** The plant shall be considered to be in the Startup (SU) mode when the shutdown margin is reduced with the intent of going critical. The plant is in the Hot Standby (HStby) condition when all of the following conditions exist: a. T_{avg} is greater than 525°F b. The reactor is critical c. Indicated neutron power on the power range channels is less than two percent of rated power.
3	**Hot Shutdown:** The plant is in the Hot Shutdown (HSD) condition when the reactor is subcritical by at least one percent delta k/k and T_{avg} is at or greater than 525°F.
4	**Heatup/Cooldown:** The plant is in the Heatup/Cooldown (HU/CD) condition when the reactor coolant temperature is greater than 200°F and less than 525°F.
5	**Cold Shutdown:** The plant is in the Cold Shutdown (CSD) Condition when the reactor is subcritical by at least one percent delta k/k and T_{avg} is no more than 200°F. Additionally the reactor coolant system pressure allowed is defined by Technical Specification 3.1.2.
6	**Refueling:** The plant is in the Refueling condition when, even with all of the control rods removed, the reactor would be subcritical by at least one percent delta k/k and the reactor coolant temperature at the decay heat removal pump suction is no more than 140°F. Additionally, the allowable reactor coolant system pressure is defined by Technical Specification 3.1.2.
D	**Defuel:** No fuel in the Reactor Vessel

Hot Matrix - applies in modes (1), (2), (3) and (4)

Cold Matrix - applies in modes (5), (6), and (D)

Individuals responsible for the classification of events will refer to the Initiating Condition and EALs on the matrix of the appropriate station Standardized Emergency Plan Annex (this document). This matrix will contain ICs, EALs, Mode Applicability Designators, appropriate EAL numbering system, and additional guidance necessary to classify events. It may be provided as a user aid.

The matrix is set up in six Recognition Categories. The first is designated as "R" and relates to Abnormal Radiological Conditions / Abnormal Radiological Effluent Releases. The second is designated as "F" and relates to Fission Product Barrier Degradation. The third is designated as "M" and relates to hot condition System Malfunctions. The fourth is designated as "C" and relates to Cold Shutdown / Refueling System Malfunctions. The fifth is designated as "H" and relates to Hazards and Other Conditions Affecting Plant Safety. The sixth is designated "E- H" and relates to ISFSI Malfunctions.

The matrix is designed to provide an evaluation of the Initiating Conditions from the worst conditions (General Emergencies) on the left to the relatively less severe conditions on the right (Unusual Events). Evaluating conditions from left to right will reduce the possibility that an event will be under classified. All Recognition Categories should be reviewed for applicability prior to classification.

The Initiating Conditions are coded with a two letter and one number code. The first letter is the Recognition Category designator, the second letter is the Classification Level, “U” for (NOTIFICATION OF) UNUSUAL EVENT, “A” for ALERT, “S” for SITE AREA EMERGENCY and “G” for GENERAL EMERGENCY.

The EAL number is a sequential number for that Recognition Category series. All ICs that are describing the severity of a common condition (series) will have the same number.

The EAL number may then be used to reference a corresponding page(s), which provides the basis information pertaining to the IC:

- EAL
- Mode Applicability
- Basis

Classification is not to be made without referencing, comparing and satisfying the specified Emergency Action Levels.

A list of definitions is provided as part of this document for terms having specific meaning to the EALs. Site specific definitions are provided for terms with the intent to be used for a particular IC/EAL and may not be applicable to other uses of that term at other sites, the Emergency Plan or procedures.

References are also included to documents that were used to develop the EALs.

References to the Emergency Director means the person in Command and Control as defined in the Emergency Plan. Classification of emergencies is a non-delegable responsibility of Command and Control for the onsite facilities with responsibility assigned to the Shift Emergency Director (Control Room Shift Manager) or the Station Emergency Director (Technical Support Center). Classification of emergencies remains the responsibility of the applicable onsite facility even after Command and Control is transferred to the Corporate Emergency Director (Emergency Operations Facility).

Although the majority of the EALs provide very specific thresholds, the Emergency Director must remain alert to events or conditions that lead to the conclusion that exceeding the EAL is IMMINENT. If, in the judgment of the Emergency Director, an IMMINENT situation is at hand, the classification should be made as if the EAL has been exceeded. While this is particularly prudent at the higher ECL (as the early classification may provide for more effective implementation of protective measures), it is nonetheless applicable to all ECLs.

1.2 Classification, Instrumentation and Transient Events

Classifications are based on evaluation of each Unit. All classifications are to be based upon valid indications, reports or conditions. Indications, reports or conditions are considered valid when they are verified by (1) an instrument channel check, or (2) indications on related or redundant indications, or (3) by direct observation by plant personnel, such that doubt related to the indication's operability, the condition's existence, or the report's accuracy is removed. Implicit in this is the need for timely assessment.

Indications used for monitoring and evaluation of plant conditions include the normally used instrumentation, backup or redundant instrumentation, and the use of other parameters that provide information that supports determination if an EAL has been reached. When an EAL refers to a specific instrument or indication that is determined to be inaccurate or unavailable, then alternate indications shall be used to monitor the specified condition.

During an event that results in changing parameters trending towards an EAL classification, and instrumentation that was available to monitor this parameter becomes unavailable or the parameter goes off scale, the parameter should be assumed to have been exceeded consistent with the trend and the classification made if there are no other direct or indirect means available to determine if the EAL has not been exceeded.

The assessment of some EALs is based on the results of analyses that are necessary to ascertain whether a specific EAL has been exceeded (e.g., dose assessments, chemistry sampling, RCS leak rate calculation, etc.); the EAL and/or the associated basis discussion will identify the necessary analysis. In these cases, the 15-minute declaration period starts with the availability of the analysis results that show the EAL to be exceeded (i.e., this is the time that the EAL information is first available).

Planned evolutions involve preplanning to address the limitations imposed by the condition, the performance of required surveillance testing, and the implementation of specific controls prior to knowingly entering the condition in accordance with the specific requirements of the site's Technical Specifications. Activities which cause the site to operate beyond that allowed by the site's Technical Specifications, planned or unplanned, may result in an EAL being met or exceeded. Planned evolutions to test, manipulate, repair, perform maintenance or modifications to systems and equipment that result in an EAL being met or exceeded are not subject to classification and activation requirements as long as the evolution proceeds as planned and is within the operational limitations imposed by the specific operating license. However, these conditions may be subject to the reporting requirements of 10 CFR 50.72.

When two or more EALs are determined, declaration will be made on the highest classification level for the Unit.

Concerning ECL Downgrading, Constellation Nuclear policy is that ECLs shall not be downgraded to a lower classification. Once declared, the event shall remain in effect until no Classification is warranted or until such time as conditions warrant classification to Recovery.

There may be cases in which a plant condition that exceeded an EAL was not recognized at the time of occurrence but is identified well after the condition has occurred (e.g., as a result of routine log or record review), and the condition no longer exists. In these cases, an emergency should not be declared. Reporting requirements of 10 CFR 50.72 are applicable, the guidance of NUREG-1022, Event Reporting Guidelines 10 CFR 50.72 and 50.73 and the Reportability Reference Manual, should be applied.

1.3 Mode Applicability

The plant-operating mode that existed at the time that the event occurred, prior to any protective system or operator action initiated in response to the condition, is compared to the mode applicability of the EALs. If an event occurs, and a lower or higher plant-operating mode is reached before the emergency classification can be made, the declaration shall be based on the mode that existed at the time the event occurred.

For events that occur in Cold Shutdown or Refueling, escalation is via EALs that have Cold Shutdown or Refueling for mode applicability, even if Hot Shutdown (or a higher mode) is entered during any subsequent heat-up. In particular, the Fission Product Barrier Matrix EALs are applicable only to events that initiate in Hot Shutdown or higher.

If there is a change in Mode following an event declaration, any subsequent events involving EALs outside of the current declaration escalation path will be evaluated on the Mode of the plant at the time the subsequent events occur.

1.4 Emergency Director Judgment

Emergency Director (ED) Judgment EALs are provided in the Hazards and Other Condition Affecting Plant Safety section and on the Fission Product Barrier (FPB) Matrix. Both of the ED Judgment EALs have specific criteria for when they should be applied.

The Hazards Section ED Judgment EALs are intended to address unanticipated conditions which are not addressed explicitly by other EALs but warrant declaration of an emergency because conditions exist which are believed by the ED to fall under specific emergency classifications (UE, Alert, SAE or GE).

The FPB Matrix ED Judgment EALs are intended to include unanticipated conditions, which are not addressed explicitly by any of the other FPB threshold values, but warrant determination because conditions exist that fall under the broader definition for a significant Loss or Potential Loss of the barrier (equal to or greater than the defined FPB threshold values).

1.5 Fission Product Barrier (FPB) Threshold

A fission product barrier threshold is a pre-determined, site-specific, observable threshold indicating the loss or potential loss of a fission product barrier.

FPB thresholds represent threats to the defense in depth design concept that precludes the release of radioactive fission products to the environment. This concept relies on multiple physical barriers, any one of which, if maintained intact, precludes the release of significant amounts of radioactive fission products to the environment. The primary FPBs are:

- Fuel Clad (FC)
- Reactor Coolant System (RCS)
- Containment (CT)

Upon determination that one or more FPB thresholds have been exceeded, the combination of barrier loss and/or potential loss thresholds is compared to the FPB IC/EAL criteria to determine the appropriate ECL.

In some accident sequences, the ICs and EALs presented in the Abnormal Radiation Levels/ Radiological Effluent (R) Recognition Category will be exceeded at the same time, or shortly after, the loss of one or more fission product barriers. This redundancy is intentional as the former ICs address radioactivity releases that result in certain offsite doses from whatever cause, including events that might not be fully encompassed by fission product barriers (e.g., spent fuel pool accidents, design containment leakage following a LOCA, etc.).

1.6 Fission Product Barrier Restoration

Fission Product Barriers are not treated the same as EAL threshold values. Conditions warranting declaration of the loss or potential loss of a FPB may occur resulting in a specific classification. The condition that caused the loss or potential loss declaration could be rectified as the result of Operator action, automatic actions, or designed plant response. Barriers will be considered re- established when there are direct verifiable indications (containment penetration or open valve has been isolated, coolant sample results, etc) that the barrier has been restored and is capable of mitigating future events.

The reestablishment of a FPB does not alter or lower the existing classification. Termination and entry into RECOVERY phase is still required for exiting the present classification. However the reestablishment of the barrier should be considered in determining future classifications should plant conditions or events change.

1.7 Definitions

CONFINEMENT BOUNDARY: The irradiated fuel dry storage cask barrier(s) between areas containing radioactive substances and the environment.

CONTAINMENT CLOSURE: The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under existing plant conditions.

EXPLOSION: A rapid, violent and catastrophic failure of a piece of equipment due to combustion, chemical reaction or overpressurization. A release of steam (from high energy lines or components) or an electrical component failure (caused by short circuits, grounding, arcing, etc.) should not automatically be considered an explosion. Such events may require a post-event inspection to determine if the attributes of an explosion are present.

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

FISSION PRODUCT BARRIER (FPB) THRESHOLD: A pre-determined, site-specific, observable threshold indicating the loss or potential loss of a fission product barrier.

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

HOSTILE ACTION: An act toward CRANE 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 site. 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).

HOSTILE FORCE: Any 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.

NORMAL LEVELS: As applied to radiological IC/EALs, the highest reading in the past twenty-four hours excluding the current peak value.

OWNER CONTROLLED AREA (OCA): The property associated with the station and owned by the company. Access is normally limited to persons entering for official business.

PROJECTILE: An object directed toward CRANE that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA: An area that normally encompasses all controlled areas within the security protected area fence.

REFUELING PATHWAY: all the cavities, tubes, canals and pools through which irradiated fuel may be moved or stored, but not including the reactor vessel below the flange.

RUPTURED: The condition of a steam generator in which primary-to-secondary leakage is of sufficient magnitude to require a safety injection.

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

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.

UNISOLABLE: An open or breached system line that cannot be isolated, remotely or locally.

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.

VISIBLE DAMAGE: Damage to a component or structure that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected component or structure.

1.8 Response to a TMI-2 Emergency

TMI-2 alarms will be monitored on a 24-hour a day basis remotely from Unit 1 or by another appropriate location in the event of a failure of the remote monitoring system. For failures of specific local alarm capabilities, local conditions will be monitored in accordance with the applicable procedures.

A TMI-2 related emergency will be reported to the CRANE Control Room. CRANE Control Room personnel will assess and evaluate the situation; classify the event as required based on impact to the site per the EALs; and provide the appropriate response.

1.9 State, County and Local Classification System

State, county and local emergency plans incorporate the same emergency classification system as that utilized in this plan annex. Since both the State and CRANE classification schemes include events which have significant potential for radioactive releases, it is imperative that specific guidance for initiating protective actions be available to the "decision-making" personnel in emergency response organizations and agencies. The Commonwealth of Pennsylvania has, for planning purposes, adopted the Environmental Protection Agency (EPA) protective action guides (PAG's).

Emergency Action Level Technical Basis Page Index

General		Site Area		Alert		Unusual Event	
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				RA3	2-47		
						RU4	2-49
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				MA5	2-93		
						MU6	2-95
						MU7	2-97
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				CA5	2-110	CU5	2-112
CG6	2-114	CS6	2-117	CA6	2-119	CU6	2-121
HG1	2-123	HS1	2-125	HA1	2-127	HU1	2-129
		HS2	2-131	HA2	2-132		
						HU3	2-133
						HU4	2-136
				HA5	2-138		
						HU6	2-140
HG7	2-142	HS7	2-143	HA7	2-144	HU7	2-145
						E-HU1	2-146

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Abnormal Rad Levels / Radiological Effluents			
Radiological Effluents **RG1** Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mRem TEDE or 5,000 mRem thyroid CDE. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** **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. • 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. • 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. 1. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for **≥ 15 minutes**. **OR** 2. Dose assessment Using actual meteorology indicates doses at or beyond the site boundary of **EITHER**: a. **> 1,000 mRem TEDE.** **OR** b. **> 5,000 mRem CDE Thyroid.** **OR** 3. Field survey results at or beyond the site boundary indicate **EITHER**: a. Gamma (closed window) dose rates **> 1,000 mR/hr** are expected to continue for **≥ 60 minutes**. **OR** b. Analyses of field survey samples indicate **> 5,000 mRem CDE Thyroid** for **60 minutes** of inhalation.	**RS1** Release of gaseous radioactivity resulting in offsite dose greater than 100 mRem TEDE or 500 mRem thyroid CDE. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** **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. • 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. • 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. 1. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for **≥ 15 minutes**. **OR** 2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of **EITHER**: a. **> 100 mRem TEDE.** **OR** b. **> 500 mRem CDE Thyroid.** **OR** 3. Field survey results at or beyond the site boundary indicate **EITHER**: a. Gamma (closed window) dose rates **> 100 mR/hr** are expected to continue for **≥ 60 minutes**. **OR** b. Analyses of field survey samples indicate **> 500 mRem CDE Thyroid** for **60 minutes** of inhalation.	**RA1** Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mRem TEDE or 50 mRem thyroid CDE. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** **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. • 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. • 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. 1. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for **≥ 15 minutes**. **OR** 2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of **EITHER**: a. **> 10 mRem TEDE.** **OR** b. **> 50 mRem CDE Thyroid.** **OR** 3. Analysis of a liquid effluent sample indicates a concentration or release that would result in doses greater than **EITHER** of the following at or beyond the site boundary a. 10 mREM TEDE for **60 minutes** of exposure OR b. 50 mREM CDE Thyroid for **60 minutes** of exposure 4. Field survey results at or beyond the site boundary indicate **EITHER**: a. Gamma (closed window) dose rates **>10 mR/hr** are expected to continue for **≥ 60 minutes**. **OR** b. Analyses of field survey samples indicate **> 50 mRem CDE Thyroid** for **60 minutes** of inhalation.	**RU1** Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** **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 60 minutes. • 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. 1. Reading on **ANY** of the following effluent monitors **> 2 times alarm setpoint** established by a current radioactive release discharge permit for **≥ 60 minutes**. • RM-L-6, Radwaste Discharge • RM-L-12, IWTS / IWFS Discharge • RM-A-7, Waste Gas Decay Tank Discharge • Discharge Permit specified monitor **OR** 2. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for **≥ 60 minutes**. **OR** 3. Confirmed sample analyses for gaseous or liquid releases indicate concentrations or release rates **> 2 times ODCM Limit** with a release duration of **≥ 60 minutes**.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT

Abnormal Rad Levels / Radiological Effluents

Table R1 Effluent Monitor Thresholds

Monitor	General Emergency	Site Area Emergency	Alert	Unusual Event
RM-G-25 (Cond Offgas)	9.50 E+06 mR/hr	1.03 E+06 mR/hr	1.03 E+05 mR/hr	1.17 E+03 mR/hr
RM-A-8GH (Station Vent)	3.20 E+05 cpm	3.20 E+04 cpm	3.23 E+03 cpm	7.15 E+01 cpm
RM-G-24 (RB Purge)	5.69 E+05 mR/hr	5.69 E+04 mR/hr	5.69 E+03 mR/hr	6.49 E+01 mR/hr
RM-A-14 (ESF Vent)	7.18 E+02 uCi/cc	7.18 E+01 uCi/cc	7.18 E+00 uCi/cc	8.18 E-02 uCi/cc

Irradiated Fuel

RG2 Spent fuel pool level cannot be restored to at least 2.050 ft. as indicated on SF-LI- 1219A(B) for 60 minutes or longer. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

1. **Note:** The Emergency Director should declare the General Emergency promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. Spent fuel pool level cannot be restored to at least **2.050 ft.** as indicated on SF-LI- 1219A(B) for **60 minutes** or longer.

RS2 Spent fuel pool level at 2.050 ft. as indicated on SF-LI-1219A(B). 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

1. Lowering of spent fuel pool level to **2.050 ft.** as indicated on SF-LI-1219A(B).

RA2 Significant lowering of water level above, or damage to, irradiated fuel. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

1. Uncovery of irradiated fuel in the REFUELING PATHWAY.

   OR

2. Damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by **ANY** Table R2 Radiation Monitor reading **> 1,000 mRem/hr**.

   OR

3. Lowering of spent fuel pool level to **10.134 ft.** as indicated on SF-LI-1219A(B).

RU2 UNPLANNED loss of water level above irradiated fuel. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

1. a. UNPLANNED water level drop in the REFUELING PATHWAY.

   AND

   b. UNPLANNED Area Radiation Monitor reading rise on **ANY** radiation monitors in Table R2.

Table R2 Radiation Monitors

RMS	Area Monitored	Mode
RM-G-9	FHB Bridge Rad Monitor	ALL
RM-G-6	RB Auxiliary Bridge Rad Monitor	5, 6
RM-G-7	RB Main Bridge Rad Monitor	5, 6

Area Rad Levels

Table R3 Areas Requiring Continuous Occupancy

- Main Control Room
- Central Alarm Station – (by survey)

Table R4
Areas with Entry Related Mode Applicability

Area	Entry Related Mode Applicability
Auxiliary Building • 281’ shielded area • 305’ above DH Vaults	Modes 4, 5, and 6
Fuel Handling Building • 281’ 1C ES Vlvs MCC	

RA3 Radiation levels that impede access to equipment necessary for normal plant operations, cooldown or shutdown. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

Note: If the equipment in the room or area listed in Table R4 was already inoperable, or out of service, before the event occurred, then no emergency classification is warranted.

1. Dose rate **> 15 mR/hr** in **ANY** of the areas contained in Table R3.

   OR

2. UNPLANNED event results in radiation levels that prohibit or significantly impede access to **ANY** of the following Table R4 plant rooms or areas.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Abnormal Rad Levels / Radiological Effluents			
Fuel Clad Degradation			**RU4** Reactor coolant activity greater than Technical Specification allowable limits. 1 2 3 4 **Emergency Action Levels (EAL):** 1. Letdown Monitor RM-L-1 **alert alarm** (high or low channel). **OR** 2. Sample analysis indicates **EITHER** of the following: a. Dose Equivalent I-131 specific coolant activity **> 60.0 uCi/gm**. **OR** b. Dose Equivalent XE-133 specific coolant activity **> 797.0 uCi/gm**.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Fission Product Barrier			
FG1 Loss of ANY Two Barriers AND Loss or Potential Loss of the third barrier. 1 2 3 4	**FS1** Loss or Potential Loss of ANY two barriers. 1 2 3 4	**FA1** ANY Loss or ANY Potential Loss of either Fuel Clad or RCS. 1 2 3 4	None

Sub-Category	FC – Fuel Clad		RC – Reactor Coolant System		CT - Containment	
	Loss	Potential Loss	Loss	Potential Loss	Loss	Potential Loss
1. RCS or SG Tube Leakage	None	1. RCITS hot leg instruments indicate **0 inches** after lowering trend. **AND** 2. In-core thermocouples are unavailable. **AND** 3. **ALL** RCP's are secured.	1. RCS leakage results in **< 25° Sub Cooling Margin**. **OR** 2. Steam Generator tube RUPTURE that requires / results in an ESAS actuation.	3. UNISOLABLE RCS leakage **> 150 gpm**. **OR** 4. a. RCS Pressure **> 2450 psig**. **AND** b. RCS Pressure not lowering.	1. SG tube leakage **> 150 gpm**. **AND** 2. UNISOLABLE steam release from the affected S/G to the environment.	None
2. Inadequate Heat Removal	1. T_{clad} **> 1400°F.**	2. **> 25°F** Superheat. **OR** 3. HPI-PORV Cooling in effect.	None	1. HPI-PORV Cooling in effect.	None	1. T_{clad} **> 1800°F**. **AND** 2. EOP restoration procedures **not** effective in **< 15 minutes**.
3. Containment Radiation / RCS Activity	1. Containment radiation monitor (RM-G-22 or RM-G-23) reading **> 1.95E+03 R/hr**. **OR** 2. Coolant activity **> 300 uCi/gm** Dose Equivalent I-131.	None	1. Containment radiation monitor (RM-G-22 or RM-G-23) reading **> 25 R/hr**.	None	None	1. Containment radiation monitor (RM-G-22 or RM-G-23) reading **> 4.40E+03 R/hr**.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT		UNUSUAL EVENT	
Fission Product Barrier					
FG1 Loss of ANY Two Barriers AND Loss or Potential Loss of the third barrier. 1 2 3 4	**FS1** Loss or Potential Loss of ANY two barriers. 1 2 3 4	**FA1** ANY Loss or ANY Potential Loss of either Fuel Clad or RCS. 1 2 3 4		None	
4. Containment Integrity or Bypass	None	None	None	None	1. Containment isolation is required and **ANY** of the following: a. UNPLANNED lowering in containment pressure following initial pressure rise. **OR** b. Containment pressure or water level response **not** consistent with LOCA conditions. **OR** c. UNISOLABLE pathway from containment to the environment exists **OR** 2. Indication of RCS leakage outside of containment.	3. Reactor Building Pressure **> 55 psig** and rising. **OR** 4. Hydrogen Concentration in Containment **≥ 4%**. **OR** 5. a. Reactor Building pressure **> 30 psig**. **AND** b. Reactor Building Emergency cooling is less than **ANY** one of the following conditions: **SPRAY / COOLERS**: 2/0; 0/3; 1/1
5. Emergency Director Judgment	1. Any Condition in the opinion of the Emergency Director that indicates Loss of the Fuel Clad Barrier.	2. Any Condition in the opinion of the Emergency Director that indicates Potential Loss of the Fuel Clad Barrier.	1. Any Condition in the opinion of the Emergency Director that indicates Loss of the RCS Barrier.	2. Any Condition in the opinion of the Emergency Director that indicates Potential Loss of the RCS Barrier.	1. Any Condition in the opinion of the Emergency Director that indicates Loss of the Containment Barrier.	2. Any Condition in the opinion of the Emergency Director that indicates Potential Loss of the Containment Barrier.

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
System Malfunction			
Loss of AC Power **MG1** Prolonged loss of all offsite and all onsite AC power to emergency busses. 1 2 3 4 **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. Loss of **ALL** offsite AC power to Emergency 4KV buses. **AND** 2. Failure of EG-Y-1A, EG-Y-1B Emergency Diesel Generators and EG-Y-4 SBO Diesel Generator to supply power to Emergency 4KV buses. **AND** 3. **EITHER** of the following: a. Restoration of at least one Emergency 4KV bus in **< 4 hours** is **not** likely. **OR** b. **> 25°F superheat.**	**MS1** Loss of all offsite and all onsite AC power to emergency busses for 15 minutes or longer. 1 2 3 4 **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. Loss of **ALL** offsite AC Power to Emergency 4KV buses. **AND** 2. Failure of EG-Y-1A, EG-Y-1B Emergency Diesel Generators and EG-Y-4 SBO Diesel Generator to supply power to Emergency 4KV buses. **AND** 3. Failure to restore power to at least one Emergency 4KV bus in **< 15 minutes** from the time of loss of both offsite and onsite AC power.	**MA1** Loss of all but one AC power source to emergency buses for 15 minutes or longer. 1 2 3 4 **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. AC power capability to Emergency 4KV buses reduced to only one of the following power sources for **≥ 15 minutes.** • Auxiliary Transformer 1A • Auxiliary Transformer 1B • Emergency Diesel Generator EG-Y-1A • Emergency Diesel Generator EG-Y-1B • SBO Diesel Generator EG-Y-4 **AND** 2. **ANY** additional single power source failure will result in a loss of **ALL** AC power to SAFETY SYSTEMS.	**MU1** Loss of all offsite AC power capability to emergency buses for 15 minutes or longer. 1 2 3 4 **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. Loss of **ALL** offsite AC power capability to Emergency 4KV busses for **≥ 15 minutes**.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
System Malfunction				
Loss of DC Power	**MG2** Loss of all AC and Vital DC power sources for 15 minutes or longer. 1 2 3 4 **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. Loss of **ALL** offsite AC power to Emergency 4KV buses. **AND** 2. Failure of EG-Y-1A, EG-Y-1B Emergency Diesel Generators and EG-Y-4 SBO Diesel Generator to supply power to Emergency 4KV buses. **AND** 3. Voltage is **< 105 VDC** on 125 VDC Distribution System 1A and 1B. **AND** 4. **ALL** AC and Vital DC power sources have been lost for **≥ 15 minutes**.	**MS2** Loss of all vital DC power for 15 minutes or longer. 1 2 3 4 **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. Voltage is **< 105 VDC** on 125 VDC Distribution System 1A and 1B for **≥ 15 minutes**.		
RPS Failure		**MS3** Inability to shutdown the reactor causing a challenge to core cooling or RCS heat removal. 1 2 **Emergency Action Levels (EAL):** 1. Automatic or Manual Trip did **not** shutdown the reactor as indicated by Reactor Power **≥ 5%**. **AND** 2. **ALL** manual actions to shutdown the reactor have been unsuccessful as indicated by Reactor Power **≥ 5%**. **AND** 3. **EITHER** of the following conditions exist: a. **T_{clad} > 1400°F**. **OR** b. HPI-PORV Cooling in effect.	**MA3** Automatic or manual trip fails to shutdown the reactor, and subsequent manual actions taken at the reactor control consoles are not successful in shutting down the reactor. 1 2 **Emergency Action Levels (EAL):** **Note:** A manual action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does not include manually driving in control rods or implementation of boron injection strategies. 1. Automatic Trip did **not** shutdown the reactor as indicated by Reactor Power **≥ 5%**. **AND** 2. Manual actions taken at the Console Center are **not** successful in shutting down the reactor as indicated by Reactor Power **≥ 5%**.	**MU3** Automatic or manual trip fails to shutdown the reactor. 1 2 **Emergency Action Levels (EAL):** **Note:** A manual action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does not include manually driving in control rods or implementation of boron injection strategies. 1. a. Automatic Trip did not shutdown the reactor as indicated by Reactor Power **≥ 5%**. **AND** b. Subsequent manual action taken at the Console Center is successful in shutting down the reactor as indicated by Reactor Power **< 5%**. **OR** 2. a. Manual Trip did not shutdown the reactor as indicated by Reactor Power **≥ 5%**. **AND** b. Subsequent automatic Trip is successful in shutting down the reactor as indicated by Reactor Power **< 5%**.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
System Malfunction				
Control Room Indications	**Table M1 Control Room Parameters** • Reactor Power • PZR Level • RCS Pressure • In Core/Core Exit Temperature • Level in at least one OTSG. • OTSG Emergency Feed Water Flow	**Table M2 Significant Transients** • Automatic Turbine Runback **> 25%** thermal reactor power • Electrical Load Rejection **> 25%** full electrical load • Reactor Trip • ESAS Actuation • Thermal Power oscillations **> 10%**	**MA4** UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress. 1 2 3 4 **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. a. UNPLANNED event results in the inability to monitor **ANY** Table M1 parameters from within the Control Room for **≥ 15 minutes**. **AND** b. **ANY** Table M2 transient in progress.	**MU4** UNPLANNED loss of Control Room indications for 15 minutes or longer. 1 2 3 4 **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. UNPLANNED event results in the inability to monitor **ANY** Table M1 parameters from within the Control Room for **≥ 15 minutes**.
Hazard affects Safety System			**MA5** Hazardous event affecting a SAFETY SYSTEM required for the current operating mode. 1 2 3 4 **Emergency Action Levels (EAL):** **Note:** If it is determined that the conditions of MA5 are not met then assess the event via HU3, HU4, or HU6. 1. The occurrence of **ANY** of the following hazardous events: • Seismic event (earthquake) • Internal or external flooding event • High winds or tornado strike • FIRE • EXPLOSION • Other events with similar hazard characteristics as determined by the Shift Manager **AND** 2. **EITHER** of the following: a. Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM required by Technical Specifications for the current operating mode. **OR** b. The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure required by Technical Specifications for the current operating mode.	

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
System Malfunction			
RCS Leak			**MU6** RCS leakage for 15 minutes or longer. 1 2 3 4 **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. RCS unidentified or pressure boundary leakage **> 10 gpm** for **≥ 15 minutes**. **OR** 2. RCS identified leakage **> 25 gpm** for **≥ 15 minutes**. **OR** 3. Leakage from the RCS to a location outside containment **> 25 gpm** for **≥ 15 minutes**.
Communications		**Table M3 Communications Capability** System / Onsite / Offsite / NRC Radios: X / / / Plant page: X / / / Plant Telephone System: X / / / Commercial Telephones: X / X / X NARS: / X / / ENS: / X / X HPN: / X / X Satellite phones: / X / X	**MU7** Loss of all onsite or offsite communications capabilities. 1 2 3 4 **Emergency Action Levels (EAL):** 1. Loss of **ALL** Table M3 **Onsite** communications capability affecting the ability to perform routine operations. **OR** 2. Loss of **ALL** Table M3 **Offsite** communication capability affecting the ability to perform offsite notifications. **OR** 3. Loss of **ALL** Table M3 **NRC** communication capability affecting the ability to perform NRC notifications.
Containment			**MU8** Failure to isolate containment or loss of containment pressure control. 1 2 3 4 **Emergency Action Levels (EAL):** 1. a. Failure of containment to isolate when required by an actuation signal. **AND** b. **ANY** required penetration remains open **> 15 minutes** of the actuation signal. **OR** 2. a. Reactor Building pressure **> 30 psig.** **AND** b. Reactor Building Emergency cooling is less than **ANY** one of the following conditions for **≥ 15 minutes**: SPRAY / COOLERS 2 / 0 0 / 3 1 / 1

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Hazards and Other conditions Affecting Plant Safety				
Hostile Action	**HG1** HOSTILE ACTION resulting in loss of physical control of the facility. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. A notification from the Security Force that a HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA. **AND** 2. a. **ANY** Table H1 safety function **cannot** be controlled or maintained. **OR** b. Damage to spent fuel has occurred or is IMMINENT.	**HS1** HOSTILE ACTION within the PROTECTED AREA. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. A notification from the Security Force that a HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA.	**HA1** HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. A validated notification from NRC of an aircraft attack threat **< 30 minutes** from the site. **OR** 2. Notification by the Security Force that a HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLED AREA.	**HU1** Confirmed SECURITY CONDITION or threat. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. Notification of a credible security threat directed at the site as determined per SY-AA-101-132, Security Assessment and Response to Unusual Activities. **OR** 2. A validated notification from the NRC providing information of an aircraft threat. **OR** 3. Notification by the Security Force of a SECURITY CONDITION that does **not** involve a HOSTILE ACTION.
Transfer of Plant Control	**Table H1 Safety Functions** • Reactivity Control (ability to shut down the reactor and keep it shutdown) • Core Cooling (ability to cool the core) • RCS Heat Removal (ability to maintain heat sink)	**HS2** Inability to control a key safety function from outside the Control Room. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. A Control Room evacuation has resulted in plant control being transferred from the Control Room to alternate locations per OP-TM-EOP-020, Cooldown from Outside the Control Room. **AND** 2. Control of **ANY** Table H1 key safety function is **not** reestablished in **< 15 minutes**.	**HA2** Control Room evacuation resulting in transfer of plant control to alternate locations. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. A Control Room evacuation has resulted in plant control being transferred from the Control Room to alternate locations per OP-TM-EOP-020, Cooldown from Outside the Control Room.	

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Hazards and Other conditions Affecting Plant Safety				
Fire			**Table H2 Vital Areas** • Reactor Building • Intake Building • Intermediate Building • Control Tower • Auxiliary and Fuel Handling Buildings • 1A and 1B Diesel Generator Buildings • BWST • CST	**HU3** FIRE potentially degrading the level of safety of the plant. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. Escalation of the emergency classification level would be via IC CA2 or MA5 1. A FIRE in **ANY** Table H2 area is **not** extinguished in **< 15-minutes** of **ANY** of the following FIRE detection indications: • Report from the field (i.e., visual observation) • Receipt of multiple (more than 1) fire alarms or indications • Field verification of a single fire alarm **OR** 2. a. Receipt of a single fire alarm in **ANY** Table H2 area (i.e., no other indications of a FIRE). **AND** b. The existence of a FIRE is **not** verified in **< 30 minutes** of alarm receipt. **OR** 3. A FIRE within the plant PROTECTED AREA not extinguished in **< 60-minutes** of the initial report, alarm or indication. **OR** 4. A FIRE within the plant PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Hazards and Other conditions Affecting Plant Safety			
Earthquake			**HU4** Seismic event greater than OBE levels. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** **Note:** For emergency classification if EAL 2.b is not able to be confirmed, then the occurrence of a seismic event is confirmed in manner deemed appropriate by the Shift Manager or Emergency Director in **≤ 15 mins** of the event. 1. Seismic event **> Operating Basis Earthquake (OBE)** as indicated by seismic Alarms **PRF-1-3** Operating Basis earthquake. **OR** 2. When Seismic Monitoring Equipment is **not** available: **OR** a. Control Room personnel feel an actual or potential seismic event. **AND** b. **ANY** one of the following confirmed in **≤ 15 mins** of the event: • The earthquake resulted in Modified Mercalli Intensity (MMI) **≥ VI** and occurred **≤ 3.5 miles** of the plant. • The earthquake was magnitude **≥ 6.0.** • The earthquake was magnitude **≥ 5.0** and occurred **≤ 125 miles** of the plant.
Toxic Gas	**Table H3** **Areas with Entry Related Mode Applicability** **Auxiliary Building** • 281’ shielded area • 305’ above DH Vaults **Fuel Handling Building** • 281’ 1C ES Vlvs MCC Entry Related Mode Applicability: Modes 4, 5, and 6	**HA5** Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown. 4 5 6 **Emergency Action Levels (EAL):** **Note:** If the equipment in the listed room or area was already inoperable, or out of service, before the event occurred, then no emergency classification is warranted. 1. Release of a toxic, corrosive, asphyxiant or flammable gas in **ANY** Table H3 area. **AND** 2. Entry into the room or area is prohibited or impeded.	

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Hazards and Other conditions Affecting Plant Safety				
Hazardous Event				**HU6** Hazardous event. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** **Note:** EAL #4 does not apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents. 1. Tornado strike within the PROTECTED AREA. **OR** 2. Internal room or area flooding of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component required by Technical Specifications for the current operating mode. **OR** 3. 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). **OR** 4. A hazardous event that results in onsite conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles. **OR** 5. a. Abnormal river water level at the intake Pump and Screen House, as indicated by **EITHER**: 1. **> 296 ft. el.** (high level). **OR** 2. **< 274 ft. el.** (low level). **OR** b. River flow forecasted to exceed **900,000 CFS** within the next **12 hours**.
Emergency Director Judgment	**HG7** Other conditions exist which in the judgment of the Emergency Director warrant declaration of a GENERAL EMERGENCY. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 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 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 Protective Action Guideline exposure levels offsite for more than the immediate site area.	**HS7** Other conditions exist which in the judgment of the Emergency Director warrant declaration of a SITE AREA EMERGENCY. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 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 Protective Action Guideline exposure levels beyond the site boundary.	**HA7** Other conditions exist which in the judgment of the Emergency Director warrant declaration of an ALERT. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 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 Protective Action Guideline exposure levels.	**HU7** Other conditions exist which in the judgment of the Emergency Director warrant declaration of an UNUSUAL EVENT. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 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.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Independent Spent Fuel Storage Facility				
Confinement Boundary				**E-HU1** Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by a radiation reading greater than **ANY** of the following: 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by a radiation reading greater than **ANY** of the following: a. **240 mrem/hour** gamma on the vertical concrete surfaces. **OR** b. **10 mrem/hour** neutron on the vertical concrete surfaces. **OR** c. **900 mrem/hour** (neutron + gamma) on the top.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

Abnormal Rad Levels / Radiological Effluents

GENERAL EMERGENCY

RG1 Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mRem TEDE or 5,000 mRem thyroid CDE. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

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.
- 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.
- 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.

Radiological Effluents

1. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for **≥ 15 minutes**.

   OR

2. Dose assessment Using actual meteorology indicates doses at or beyond the site boundary of **EITHER**:
   a. **> 1,000 mRem TEDE.**

      OR

   b. **> 5,000 mRem CDE Thyroid.**

   OR

3. Field survey results at or beyond the site boundary indicate **EITHER**:
   a. Gamma (closed window) dose rates **> 1,000 mR/hr** are expected to continue for **≥ 60 minutes**.

      OR

   b. Analyses of field survey samples indicate **> 5,000 mRem CDE Thyroid** for **60 minutes** of inhalation.

SITE AREA EMERGENCY

RS1 Release of gaseous radioactivity resulting in offsite dose greater than 100 mRem TEDE or 500 mRem thyroid CDE. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

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.
- 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.
- 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.

1. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for **≥ 15 minutes**.

   OR

2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of **EITHER**:
   a. **> 100 mRem TEDE.**

      OR

   b. **> 500 mRem CDE Thyroid.**

   OR

3. Field survey results at or beyond the site boundary indicate **EITHER**:
   a. Gamma (closed window) dose rates **>100 mR/hr** are expected to continue for **≥ 60 minutes**.

      OR

   b. Analyses of field survey samples indicate **> 500 mRem CDE Thyroid** for **60 minutes** of inhalation.

ALERT

RA1 Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mRem TEDE or 50 mRem thyroid CDE. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

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.
- 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.
- 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.

1. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for **≥ 15 minutes**.

   OR

2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of **EITHER**:
   a. **> 10 mRem TEDE.**

      OR

   b. **> 50 mRem CDE Thyroid.**

   OR

3. Analysis of a liquid effluent sample indicates a concentration or release that would result in doses greater than **EITHER** of the following at or beyond the site boundary
   c. 10 mREM TEDE for **60 minutes** of exposure

      OR

   d. 50 mREM CDE Thyroid for **60 minutes** of exposure

4. Field survey results at or beyond the site boundary indicate **EITHER**:
   a. Gamma (closed window) dose rates **>10 mR/hr** are expected to continue for **≥ 60 minutes**.

      OR

   b. Analyses of field survey samples indicate **> 50 mRem CDE Thyroid** for **60 minutes** of inhalation.

UNUSUAL EVENT

RU1 Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

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 60 minutes.
- 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.

1. Reading on **ANY** of the following effluent monitors **> 2 times alarm setpoint** established by a current radioactive release discharge permit for **≥ 60 minutes**.
   - RM-L-6, Radwaste Discharge
   - RM-L-12, IWTS / IWFS Discharge
   - RM-A-7, Waste Gas Decay Tank Discharge
   - Discharge Permit specified monitor

   OR

2. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for **≥ 60 minutes**.

   OR

3. Confirmed sample analyses for gaseous or liquid releases indicate concentrations or release rates **> 2 times ODCM Limit** with a release duration of **≥ 60 minutes**.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT

Abnormal Rad Levels / Radiological Effluents

Table R1 Effluent Monitor Thresholds

Monitor	General Emergency	Site Area Emergency	Alert	Unusual Event
RM-G-25 (Cond Offgas)	9.50 E+06 mR/hr	1.03 E+06 mR/hr	1.03 E+05 mR/hr	1.17 E+03 mR/hr
RM-A-8GH (Station Vent)	3.20 E+05 cpm	3.20 E+04 cpm	3.23 E+03 cpm	7.15 E+01 cpm
RM-G-24 (RB Purge)	5.69 E+05 mR/hr	5.69 E+04 mR/hr	5.69 E+03 mR/hr	6.49 E+01 mR/hr
RM-A-14 (ESF Vent)	7.18 E+02 uCi/cc	7.18 E+01 uCi/cc	7.18 E+00 uCi/cc	8.18 E-02 uCi/cc

Irradiated Fuel

RG2 Spent fuel pool level cannot be restored to at least 2.050 ft. as indicated on SF-LI- 1219A(B) for 60 minutes or longer. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

Note: If the equipment in the room or area listed in Table R4 was already inoperable, or out of service, before the event occurred, then no emergency classification is warranted.

1. Spent fuel pool level cannot be restored to at least **2.050 ft.** as indicated on SF-LI- 1219A(B) for **60 minutes** or longer.

RS2 Spent fuel pool level at 2.050 ft. as indicated on SF-LI-1219A(B). 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

1. Lowering of spent fuel pool level to **2.050 ft.** as indicated on SF-LI-1219A(B).

RA2 Significant lowering of water level above, or damage to, irradiated fuel. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

1. Uncovery of irradiated fuel in the REFUELING PATHWAY.

   OR

2. Damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by **ANY** Table R2 Radiation Monitor reading **> 1,000 mRem/hr**.

   OR

3. Lowering of spent fuel pool level to **10.134 ft.** as indicated on SF-LI-1219A(B).

RU2 UNPLANNED loss of water level above irradiated fuel. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

1. a. UNPLANNED water level drop in the REFUELING PATHWAY.

   AND

   b. UNPLANNED Area Radiation Monitor reading rise on **ANY** radiation monitors in Table R2.

Table R2 Radiation Monitors

RMS	Area Monitored	Mode
RM-G-9	FHB Bridge Rad Monitor	ALL
RM-G-6	RB Auxiliary Bridge Rad Monitor	5, 6
RM-G-7	RB Main Bridge Rad Monitor	5, 6

Area Rad Levels

Table R3 Areas Requiring Continuous Occupancy

- Main Control Room
- Central Alarm Station – (by survey)

Table R4
Areas with Entry Related Mode Applicability

Area	Entry Related Mode Applicability
Auxiliary Building • 281’ shielded area • 305’ above DH Vaults	Modes 4, 5, and 6
Fuel Handling Building • 281’ 1C ES Vlvs MCC	

RA3 Radiation levels that impede access to equipment necessary for normal plant operations, cooldown or shutdown. 1 2 3 4 5 6 D

Emergency Action Levels (EAL):

Note: If the equipment in the room or area listed in Table R4 was already inoperable, or out of service, before the event occurred, then no emergency classification is warranted.

1. Dose rate **> 15 mR/hr** in **ANY** of the areas contained in Table R3.

   OR

2. UNPLANNED event results in radiation levels that prohibit or significantly impede access to **ANY** of the following Table R4 plant rooms or areas.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Cold Shutdown / Refueling System Malfunctions				
Loss of AC Power			**CA1** Loss of all offsite and all onsite AC power to emergency busses for 15 minutes or longer. 5 6 D **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. Loss of **ALL** offsite AC power to Emergency 4KV buses. **AND** 2. Failure of EG-Y-1A, EG-Y-1B Emergency Diesel Generators and EG-Y-4 SBO Diesel Generator to supply power to Emergency 4KV buses. **AND** 3. Failure to restore power to at least one Emergency 4KV bus in **< 15 minutes** from the time of loss of both offsite and onsite AC power.	**CU1** Loss of all but one AC power source to emergency buses for 15 minutes or longer. 5 6 D **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. AC power capability to Emergency 4KV buses reduced to only one of the following power sources for **≥ 15 minutes**. • Auxiliary Transformer 1A • Auxiliary Transformer 1B • Emergency Diesel Generator EG-Y-1A • Emergency Diesel Generator EG-Y-1B • SBO Diesel Generator EG-Y-4 **AND** 2. **ANY** additional single power source failure will result in a loss of **ALL** AC power to SAFETY SYSTEMS.
Safety System			**CA2** Hazardous event affecting SAFETY SYSTEM required for the current operating mode. 5 6 **Emergency Action Levels (EAL):** **Note:** If it is determined that the conditions of CA2 are not met then assess the event via HU3, HU4, or HU6. 1. The occurrence of **ANY** of the following hazardous events: • Seismic event (earthquake) • Internal or external flooding event • High winds or tornado strike • FIRE • EXPLOSION • Other events with similar hazard characteristics as determined by the Shift Manager **AND** 2. **EITHER** of the following: a. Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM required by Technical Specifications for the current operating mode. **OR** b. The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure required by Technical Specifications for the current operating mode.	

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

Cold Shutdown / Refueling System Malfunctions

DC Power

UNUSUAL EVENT

CU3 Loss of Vital DC power for 15 minutes or longer. 5 6

Emergency Action Levels (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. Indicated voltage is **< 105 VDC** on required 125 VDC Distribution System 1A and 1B for **≥ 15 minutes**.

Communications

ALERT

Table C1 Communications Capability

System	Onsite	Offsite	NRC
Radios	X		
Plant page	X		
Plant Telephone System	X		
Commercial Telephones	X	X	X
NARS		X	
ENS		X	X
HPN		X	X
Satellite phones		X	X

UNUSUAL EVENT

CU4 Loss of all onsite or offsite communications capabilities. 5 6 D

Emergency Action Levels (EAL):

1. Loss of **ALL** Table C1 **Onsite** communications capability affecting the ability to perform routine operations.

   OR

2. Loss of **ALL** Table C1 **Offsite** communication capability affecting the ability to perform offsite notifications.

   OR

3. Loss of **ALL** Table C1 **NRC** communication capability affecting the ability to perform NRC notifications.

Heat Sink

SITE AREA EMERGENCY

Table C2 RCS Heat-up Duration Thresholds

RCS Status	Containment Closure Status	Heat-up Duration
Intact	Not Applicable	60 minutes*
Not Intact **OR** Reduced Inventory	Established	20 minutes*
	Not Established	0 minutes

* If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced, then EAL #1 is **not** applicable.

ALERT

CA5 Inability to maintain the plant in cold shutdown. 5 6

Emergency Action Levels (EAL):

Notes:

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
- A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when heat removal function is available does not warrant classification.

1. UNPLANNED rise in RCS temperature **> 200ºF** for **> Table C2 duration**.

   OR

2. UNPLANNED RCS pressure rise **> 10 psig** as a result of temperature rise. (This EAL does not apply in solid plant conditions.)

UNUSUAL EVENT

CU5 UNPLANNED rise in RCS temperature. 5 6

Emergency Action Levels (EAL):

Notes:

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
- A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when heat removal function is available does not warrant classification.

1. UNPLANNED rise in RCS temperature **> 200ºF**.

   OR

2. Loss of the following for **≥ 15 minutes**.
   - **ALL** RCS temperature indications

     AND
   - **ALL** RCS level indications

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Cold Shutdown / Refueling System Malfunctions				
RCS Leakage / Inventory	**CG6** Loss of reactor vessel/RCS inventory affecting fuel clad integrity with containment challenged. [5] [6] **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. a. Reactor Vessel / RCS level **cannot** be monitored for **≥ 30 minutes**. **AND** b. Core uncovery is indicated by **ANY** of the following: • Table C3 indications of a sufficient magnitude to indicate core uncover. **OR** • Erratic Source Range Neutron Monitor indication. **OR** • Radiation Monitor RM-G-6 or RM-G-7 reading **> 3 R/hr**. **AND** c. **ANY** Containment Challenge Indication (Table C4).	**CS6** Loss of reactor vessel/RCS inventory affecting core decay heat removal capability. [5] [6] **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. Reactor Vessel / RCS level **cannot** be monitored for **≥ 30 minutes**. **AND** 2. Core uncovery is indicated by **ANY** of the following: • Table C3 indications of a sufficient magnitude to indicate core uncover. **OR** • Erratic Source Range Neutron Monitor indication. **OR** • Radiation Monitor RM-G-6 or RM-G-7 reading **> 3 R/hr**.	**CA6** Loss of reactor vessel/RCS inventory. [5] [6] **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. Loss of Reactor Vessel / RCS inventory as indicated by RCS level **< 0 inches** on Draindown Level indicator. **OR** 2. a. Reactor Vessel / RCS level **cannot** be monitored for **≥ 15 minutes**. **AND** b. Loss of Reactor Vessel / RCS inventory per Table C3 indications. **Table C4 Containment Challenge Indications** • Hydrogen Concentration in Containment **> 4%** • UNPLANNED rise in containment pressure • CONTAINMENT CLOSURE **not** established* *if CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute core uncovery time limit, then escalation to a General Emergency is not required.	**CU6** UNPLANNED loss of reactor vessel/RCS inventory for 15 minutes or longer. [5] [6] **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. UNPLANNED loss of reactor coolant results in the inability to restore and maintain Reactor Vessel / RCS level to **> procedurally established lower limit** for **≥ 15 minutes**. **OR** 2. a. Reactor Vessel / RCS level **cannot** be monitored. **AND** b. Loss of Reactor Vessel / RCS inventory per Table C3 indications. **Table C3 Indications of RCS Leakage** • UNPLANNED Reactor Bldg Sump level rise* • UNPLANNED Auxiliary Bldg. Sump level rise* • UNPLANNED BWST level rise* • UNPLANNED RCDT level rise* • UNPLANNED rise in RCS makeup • Observation of leakage or inventory loss * Rise in level is attributed to a loss of reactor vessel/RCS inventory.

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Hazards and Other conditions Affecting Plant Safety				
Hostile Action	**HG1** HOSTILE ACTION resulting in loss of physical control of the facility. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. A notification from the Security Force that a HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA. **AND** 2. a. **ANY** Table H1 safety function **cannot** be controlled or maintained. **OR** b. Damage to spent fuel has occurred or is IMMINENT.	**HS1** HOSTILE ACTION within the PROTECTED AREA. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. A notification from the Security Force that a HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA.	**HA1** HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. A validated notification from NRC of an aircraft attack threat **< 30 minutes** from the site. **OR** 2. Notification by the Security Force that a HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLED AREA.	**HU1** Confirmed SECURITY CONDITION or threat. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. Notification of a credible security threat directed at the site as determined per SY-AA-101-132, Security Assessment and Response to Unusual Activities. **OR** 2. A validated notification from the NRC providing information of an aircraft threat. **OR** 3. Notification by the Security Force of a SECURITY CONDITION that does **not** involve a HOSTILE ACTION.
Transfer of Plant Control	**Table H1 Safety Functions** • Reactivity Control (ability to shut down the reactor and keep it shutdown) • Core Cooling (ability to cool the core) • RCS Heat Removal (ability to maintain heat sink)	**HS2** Other conditions exist which in the judgment of the Emergency Director warrant declaration of a SITE AREA EMERGENCY. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. A Control Room evacuation has resulted in plant control being transferred from the Control Room to alternate locations per OP-TM-EOP-020, Cooldown from Outside the Control Room. **AND** 2. Control of **ANY** Table H1 key safety function is **not** reestablished in **< 15 minutes**.	**HA2** Control Room evacuation resulting in transfer of plant control to alternate locations. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. A Control Room evacuation has resulted in plant control being transferred from the Control Room to alternate locations per OP-TM-EOP-020, Cooldown from Outside the Control Room.	

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Hazards and Other conditions Affecting Plant Safety				
Fire			**Table H2 Vital Areas** • Reactor Building • Intake Building • Intermediate Building • Control Tower • Auxiliary and Fuel Handling Buildings • 1A and 1B Diesel Generator Buildings • BWST • CST	**HU3** FIRE potentially degrading the level of safety of the plant. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** **Note:** The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. 1. A FIRE in **ANY** Table H2 area is **not** extinguished in **< 15-minutes** of **ANY** of the following FIRE detection indications: • Report from the field (i.e., visual observation) • Receipt of multiple (more than 1) fire alarms or indications • Field verification of a single fire alarm **OR** 2. a. Receipt of a single fire alarm in **ANY** Table H2 area (i.e., no other indications of a FIRE). **AND** b. The existence of a FIRE is **not** verified in **< 30 minutes** of alarm receipt. **OR** 3. A FIRE within the plant PROTECTED AREA not extinguished in **< 60-minutes** of the initial report, alarm or indication. **OR** 4. A FIRE within the plant PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish.

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Hazards and Other conditions Affecting Plant Safety				
Earthquake				**HU4** Seismic event greater than OBE levels. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** **Note:** For emergency classification if EAL 2.b is not able to be confirmed, then the occurrence of a seismic event is confirmed in manner deemed appropriate by the Shift Manager or Emergency Director in **≤** 15 mins of the event. 1. Seismic event **> Operating Basis Earthquake (OBE)** as indicated by seismic Alarms **PRF-1-3** Operating Basis earthquake. **OR** 2. When Seismic Monitoring Equipment is **not** available: **OR** a. Control Room personnel feel an actual or potential seismic event. **AND** b. **ANY** one of the following confirmed in **≤ 15 mins** of the event: • The earthquake resulted in Modified Mercalli Intensity (MMI) **≥ VI** and occurred **≤ 3.5 miles** of the plant. • The earthquake was magnitude **≥ 6.0.** • The earthquake was magnitude **≥ 5.0** and occurred **≤ 125 miles** of the plant.
Toxic Gas		**Table H3** **Areas with Entry Related Mode Applicability** **Area** / **Entry Related Mode Applicability** **Auxiliary Building** • 281’ shielded area • 305’ above DH Vaults **Fuel Handling Building** • 281’ 1C ES Vlvs MCC Modes 4, 5, and 6	**HA5** Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown. 4 5 6 **Emergency Action Levels (EAL):** **Note:** If the equipment in the listed room or area was already inoperable, or out of service, before the event occurred, then no emergency classification is warranted 1. Release of a toxic, corrosive, asphyxiant or flammable gas in **ANY** Table H3 area. **AND** 2. Entry into the room or area is prohibited or impeded.	

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Hazards and Other conditions Affecting Plant Safety				
Hazardous Event				**HU6** Hazardous event. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** **Note:** EAL #4 does not apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents. 1. Tornado strike within the PROTECTED AREA. **OR** 2. Internal room or area flooding of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component required by Technical Specifications for the current operating mode. **OR** 3. 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). **OR** 4. A hazardous event that results in onsite conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles. **OR** 5. a. Abnormal river water level at the intake Pump and Screen House, as indicated by **EITHER**: 1. **> 296 ft. el.** (high level). **OR** 2. **< 274 ft. el.** (low level). **OR** b. River flow forecasted to exceed **900,000 CFS** within the next **12 hours**.
Emergency Director Judgment	**HG7** Other conditions exist which in the judgment of the Emergency Director warrant declaration of a GENERAL EMERGENCY. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 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 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 Protective Action Guideline exposure levels offsite for more than the immediate site area.	**HS7** Other conditions exist which in the judgment of the Emergency Director warrant declaration of a SITE AREA EMERGENCY. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 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 Protective Action Guideline exposure levels beyond the site boundary.	**HA7** Other conditions exist which in the judgment of the Emergency Director warrant declaration of an ALERT. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 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 Protective Action Guideline exposure levels.	**HU7** Other conditions exist which in the judgment of the Emergency Director warrant declaration of an UNUSUAL EVENT. 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 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.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

TABLE CRANE 2-1: Emergency Action Level (EAL) Matrix

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
Independent Spent Fuel Storage Facility				
Confinement Boundary				**E-HU1** Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by a radiation reading greater than **ANY** of the following: 1 2 3 4 5 6 D **Emergency Action Levels (EAL):** 1. Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by a radiation reading greater than **ANY** of the following: a. **240 mrem/hour** gamma on the vertical concrete surfaces. **OR** b. **10 mrem/hour** neutron on the vertical concrete surfaces. **OR** c. **900 mrem/hour** (neutron + gamma) on the top.

Mode: 1 – Power Operations 2 – Startup 3 – Hot Standby 4 – Hot Shutdown 5 – Cold Shutdown 6 – Refueling D - Defueled

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RG1

Initiating Condition:

Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mRem TEDE or 5,000 mRem thyroid CDE.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

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.
- 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.
- 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.

1. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for **≥ 15 minutes**.

   OR

2. Dose assessment Using actual meteorology indicates doses at or beyond the site boundary of **EITHER**:

   a. **> 1,000 mRem TEDE**.

      OR

   b. **> 5,000 mRem CDE Thyroid**.

   OR

3. Field survey results at or beyond the site boundary indicate **EITHER**:

   a. Gamma (closed window) dose rates **> 1,000 mR/hr** are expected to continue for **≥ 60 minutes**.

      OR

   b. Analyses of field survey samples indicate **> 5,000 mRem CDE Thyroid** for **60 minutes** of inhalation.

Table R1 Effluent Monitor Thresholds

Effluent Monitor	General Emergency
RM-G-25 (Cond Offgas)	9.50 E+06 mR/hr
RM-A-8GH (Station Vent)	3.20 E+05 cpm
RM-G-24 (RB Purge)	5.69 E+05 mR/hr
RM-A-14 (ESF Vent)	7.18 E+02 uCi/cc

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RG1 (cont)

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to the EPA Protective Action Guides (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 while the 5,000 mRem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

Basis Reference(s):

1. NEI 99-01 Rev 6, AG1
2. EP-EAL-0609, Criteria for Choosing Radiological Gaseous Effluent EAL Threshold Values, Three Mile Island Unit-1 (TMI-1)
3. EP-AA-112-500 Emergency Environmental Monitoring
4. FSAR Section 11.4 Radiation Monitoring System
5. EP-AA-110-200 Dose Assessment
6. EP-AA-110-201 On Shift Dose Assessment

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RS1

Initiating Condition:

Release of gaseous radioactivity resulting in offsite dose greater than 100 mRem TEDE or 500 mRem thyroid CDE.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

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.
- 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.
- 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.

1. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for **≥ 15 minutes**.

   OR

2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of **EITHER**:

   a. **> 100 mRem TEDE**.

      OR

   b. **> 500 mRem CDE Thyroid**.

   OR

3. Field survey results at or beyond the site boundary indicate **EITHER**:

   a. Gamma (closed window) dose rates **> 100 mR/hr** are expected to continue for **≥ 60 minutes**.

      OR

   b. Analyses of field survey samples indicate **> 500 mRem CDE Thyroid** for **60 minutes** of inhalation.

Table R1 Effluent Monitor Thresholds

Effluent Monitor	Site Area Emergency
RM-G-25 (Cond Offgas)	1.03 E+06 mR/hr
RM-A-8GH (Station Vent)	3.20 E+04 cpm
RM-G-24 (RB Purge)	5.69 E+04 mR/hr
RM-A-14 (ESF Vent)	7.18 E+01 uCi/cc

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RS1 (cont)

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to 10% of the EPA Protective Action Guides (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% of the EPA PAG of 1,000 mRem while the 500 mRem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

Escalation of the emergency classification level would be via IC RG1.

Basis Reference(s):

1. NEI 99-01 Rev 6, AS1
2. EP-EAL-0609, Criteria for Choosing Radiological Gaseous Effluent EAL Threshold Values, Three Mile Island Unit-1 (TMI-1)
3. EP-AA-112-500 Emergency Environmental Monitoring
4. FSAR Section 11.4 Radiation Monitoring System
5. EP-AA-110-200 Dose Assessment
6. EP-AA-110-201 On Shift Dose Assessment

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RA1

Initiating Condition:

Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mRem TEDE or 50 mRem thyroid CDE.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

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.
- 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.
- 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.

1. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for **≥ 15 minutes**.

   OR

2. Dose assessment using actual meteorology indicates doses at or beyond the site boundary of **EITHER**:

   a. **> 10 mRem TEDE**.

      OR

   b. **> 50 mRem CDE Thyroid**.

   OR

3. Analysis of a liquid effluent sample indicates a concentration or release that would result in doses greater than **EITHER** of the following at or beyond the site boundary

   a. 10 mREM TEDE for **60 minutes** of exposure

      OR

   b. 50 mREM CDE Thyroid for **60 minutes** of exposure

4. Field survey results at or beyond the site boundary indicate **EITHER**:

   a. Gamma (closed window) dose rates **> 10 mR/hr** are expected to continue for **≥ 60 minutes**.

      OR

   b. Analyses of field survey samples indicate **> 50 mRem CDE Thyroid** for **60 minutes** of inhalation.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

Table R1 Effluent Monitor Thresholds

Effluent Monitor	Alert
RM-G-25 (Cond Offgas)	1.03 E+05 mR/hr
RM-A-8GH (Station Vent)	3.23 E+03 cpm
RM-G-24 (RB Purge)	5.69 E+03 mR/hr
RM-A-14 (ESF Vent)	7.18 E+00 uCi/cc

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RA1 (cont)

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% of the EPA Protective Action Guides (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% of the EPA PAG of 1,000 mRem while the 50 mRem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

Escalation of the emergency classification level would be via IC RS1.

Basis Reference(s):

1. NEI 99-01 Rev 6, AA1
2. OP 1101-2.1 Radiation Monitoring System Setpoints
3. FSAR Section 11.4 Radiation Monitoring System
4. OP-TM-MAP-C0101, Radiation Level HI
5. EP-EAL-0609, Criteria for Choosing Radiological Gaseous Effluent EAL Threshold Values, Three Mile Island Unit-1 (TMI-1)
6. EP-EAL-0616, Three Mile Island Criteria for Choosing Radiological Liquid Effluent EAL Threshold Values
7. EP-EAL-0622, Three Mile Island Criteria for Choosing Radiological Gaseous Effluent EAL Threshold Values for Waste Gas Decay Tanks

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RU1

Initiating Condition:

Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

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 60 minutes.
- 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.

1. Reading on **ANY** of the following effluent monitors **> 2 times alarm setpoint** established by a current radioactive release discharge permit for **≥ 60 minutes**.
   - RM-L-6, Radwaste Discharge
   - RM-L-12, IWTS / IWFS Discharge
   - RM-A-7, Waste Gas Decay Tank Discharge
   - Discharge Permit specified monitor

   OR

2. Readings on **ANY** Table R1 Effluent Monitor **> Table R1 value** for **≥ 60 minutes**.

   OR

3. Confirmed sample analyses for gaseous or liquid releases indicate concentrations or release rates **> 2 times ODCM Limit** with a release duration of **≥ 60 minutes**.

Table R1 Effluent Monitor Thresholds

Effluent Monitor	Unusual Event
RM-G-25 (Cond Offgas)	1.17 E+03 mR/hr
RM-A-8GH (Station Vent)	7.15 E+01 cpm
RM-G-24 (RB Purge)	6.49 E+01 mR/hr
RM-A-14 (ESF Vent)	8.18 E-02 uCi/cc

Basis:

This 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 un-monitored, including those for which a radioactivity discharge permit is normally prepared.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RU1 (cont)

Basis (cont):

Nuclear power plants 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 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.

Releases should not be prorated or averaged. For example, a release exceeding 4 times release limits for 30 minutes does not meet the EAL.

EAL #1 Basis

This EAL addresses radioactivity releases that cause effluent radiation monitor readings to exceed 2 times the limit established by a radioactivity discharge permit. This EAL will typically be associated with planned batch releases from non-continuous release pathways (e.g., radwaste, waste gas).

The effluent monitors listed are those normally used for planned discharges. If a discharge is performed using a different flowpath or effluent monitor other than those listed (e.g., a portable or temporary effluent monitor), then the declaration criteria will be based on the monitor specified in the Discharge Permit.

EAL #2 Basis

This EAL addresses normally occurring continuous radioactivity releases from monitored gaseous effluent pathways.

EAL #3 Basis

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, etc.).

Escalation of the emergency classification level would be via IC RA1.

Basis Reference(s):

1. NEI 99-01 Rev 6, AU1
2. OP 1101-2.1 Radiation Monitoring System Setpoints
3. FSAR Section 11.4 Radiation Monitoring System
4. Offsite Dose Calculation (ODCM)
5. OP-TM-MAP-C0101, Radiation Level HI
6. EP-EAL-0609, Criteria for Choosing Radiological Gaseous Effluent EAL Threshold Values, Three Mile Island Unit-1 (TMI-1)

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RG2

Initiating Condition:

Spent fuel pool level cannot be restored to at least 2.050 ft. as indicated on SF-LI- 1219A(B) for 60 minutes or longer.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

Note: The Emergency Director should declare the General Emergency promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. Spent fuel pool level cannot be restored to at least **2.050 ft.** as indicated on SF-LI- 1219A(B) for **60 minutes** or longer.

Basis:

This IC addresses a significant loss of spent fuel pool inventory control and makeup capability leading to a prolonged uncovery of spent fuel. This condition will lead to fuel damage and a radiological release to the environment.

It is recognized that this IC would likely not be met until well after another General Emergency IC was met; however, it is included to provide classification diversity.

Basis Reference(s):

1. NEI 99-01 Rev 6, AG2
2. EP-EAL-1009, Criteria for Choosing Spent Fuel Pool Level 3 and Level 2 EAL Threshold Values for TMI Station

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RS2

Initiating Condition:

Spent fuel pool level at 2.050 ft. as indicated on SF-LI-1219A(B).

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

1. Lowering of spent fuel pool level to **2.050 ft.** as indicated on SF-LI-1219A(B).

Basis:

This IC addresses a significant loss of spent fuel pool inventory control and makeup capability leading to IMMINENT fuel damage. This condition entails major failures of plant functions needed for protection of the public and thus warrant a Site Area Emergency declaration.

It is recognized that this IC would likely not be met until well after another Site Area Emergency IC was met; however, it is included to provide classification diversity.

Escalation of the emergency classification level would be via IC RG1 or RG2.

Basis Reference(s):

1. NEI 99-01 Rev 6, AS2
2. EP-EAL-1009, Criteria for Choosing Spent Fuel Pool Level 3 and Level 2 EAL Threshold Values for TMI Station

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RA2

Initiating Condition:

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

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

1. Uncovery of irradiated fuel in the REFUELING PATHWAY.

   OR

2. Damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by **ANY** Table R2 Radiation Monitor reading **> 1,000 mRem/hr**.

   OR

3. Lowering of spent fuel pool level to **10.134 ft.** as indicated on SF-LI-1219A(B).

Table R2 Radiation Monitors

RMS	Area Monitored	Mode
RM-G-9	FHB Bridge Rad Monitor	ALL
RM-G-6	RB Auxiliary Bridge Rad Monitor	5, 6
RM-G-7	RB Main Bridge Rad Monitor	5, 6

Basis:

REFUELING PATHWAY: all the cavities, tubes, canals and pools through which irradiated fuel may be moved or stored, but not including the reactor vessel below the flange.

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.

This IC addresses events that have caused IMMINENT or actual damage to an irradiated fuel assembly. 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 E-HU1.1.

EAL #1 Basis

This EAL escalates from RU2 in that the loss of level, in the affected portion of the REFUELING PATHWAY, is of sufficient magnitude to have resulted in uncovery of irradiated fuel.

Indications of irradiated fuel uncovery may include direct or indirect visual observation (e.g., reports from personnel or camera images), as well as significant changes in water and radiation levels, or other plant parameters. Computational aids may also be used (e.g., a boil-off curve). Classification of an event using this EAL should be based on the totality of available indications, reports and observations.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RA2 (cont)

Basis (cont):

While an area radiation monitor could detect a rise in a dose rate due to a lowering of water level in some portion of the REFUELING PATHWAY, the reading may not be a reliable indication of whether or not the fuel is actually uncovered. To the degree possible, readings should be considered in combination with other available indications of inventory loss.

A drop in water level above irradiated fuel within the reactor vessel may be classified in accordance Recognition Category C during the Cold Shutdown and Refueling modes.

EAL #2 Basis

This EAL addresses a release of radioactive material caused by mechanical damage to irradiated fuel. Damaging events may include the dropping, bumping or binding of an assembly, or dropping a heavy load onto an assembly. A rise in readings on radiation monitors should be considered in conjunction with in-plant reports or observations of a potential fuel damaging event (e.g., a fuel handling accident).

EAL #3 Basis:

Spent fuel pool 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 spent fuel pool. This condition reflects a significant loss of spent fuel pool water inventory and thus it is also a precursor to a loss of the ability to adequately cool the irradiated fuel assembles stored in the pool.

Escalation of the emergency would be based on either Recognition Category R or C ICs.

Basis Reference(s):

1. NEI 99-01 Rev 6, AA2
2. Operating Procedure OP-TM-MAP-C0105 RCS Draindown LVL HI/LO
3. OP-TM-MAP-C0101, Radiation Level HI
4. UFSAR, Section 14.2.2.1 - “Fuel Handling Accident”
5. Technical Specification 3.8.11 (Reactor Cavity Level)
6. Operating Procedure OP 1101-2.1 Radiation Monitoring System Setpoints
7. EP-EAL-1009, Criteria for Choosing Spent Fuel Pool Level 3 and Level 2 EAL Threshold Values for TMI Station

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RU2

Initiating Condition:

UNPLANNED loss of water level above irradiated fuel.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

1. a. UNPLANNED water level drop in the REFUELING PATHWAY.

   AND

   b. UNPLANNED Area Radiation Monitor reading rise on **ANY** radiation monitors in Table R2.

Table R2 Radiation Monitors

RMS	Area Monitored	Mode
RM-G-9	FHB Bridge Rad Monitor	ALL
RM-G-6	RB Auxiliary Bridge Rad Monitor	5, 6
RM-G-7	RB Main Bridge Rad Monitor	5, 6

Basis:

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.

REFUELING PATHWAY: all the cavities, tubes, canals and pools through which irradiated fuel may be moved or stored, but not including the reactor vessel below the flange.

This IC addresses a loss in water level above irradiated fuel sufficient to cause elevated radiation levels. This condition could be a precursor to a more serious event and is also indicative of a minor loss in the ability to control radiation levels within the plant. It is therefore a potential degradation in the level of safety of the plant.

A water level loss will be primarily determined by indications from available level instrumentation. Other sources of level indications may include reports from plant personnel (e.g., from a refueling crew) or video camera observations (if available) or from any other temporarily installed monitoring instrumentation. A significant drop in the water level may also cause a rise in the radiation levels of adjacent areas that can be detected by monitors in those locations.

The effects of planned evolutions should be considered. For example, a refueling bridge area radiation monitor reading may rise due to planned evolutions such as lifting of the reactor vessel head or movement of a fuel assembly. Note that this EAL is applicable only in cases where the elevated reading is due to an UNPLANNED loss of water level.

A drop in water level above irradiated fuel within the reactor vessel may be classified in accordance Recognition Category C during the Cold Shutdown and Refueling modes.

Escalation of the emergency classification level would be via IC RA2.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RU2 (cont)

Basis Reference(s):

1. NEI 99-01 Rev 6, AU2
2. UFSAR, Section 14.2.2.1 - “Fuel Handling Accident”
3. OP-TM-MAP-C0105 RCS Draindown
4. OP 1202-12, Excessive Radiation Levels
5. OP 1101-2.1 Radiation Monitoring System Setpoints
6. Technical Specification 3.8.11 (Reactor Cavity Level)

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RA3

Initiating Condition:

Radiation levels that impede access to equipment necessary for normal plant operations, cooldown or shutdown.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

Note: If the equipment in the room or area listed in Table R4 was already inoperable, or out of service, before the event occurred, then no emergency classification is warranted.

1. Dose rate **> 15 mR/hr** in **ANY** of the areas contained in Table R3.

Table R3 Areas Requiring Continuous Occupancy

• Main Control Room
• Central Alarm Station – (by survey)

OR

2. UNPLANNED event results in radiation levels that prohibit or significantly impede access to **ANY** of the following Table R4 plant rooms or areas.

Table R4 Areas with Entry Related Mode Applicability

Area	Entry Related Mode Applicability
Auxiliary Building	Modes 4, 5, and 6
• 281’ shielded area	
• 305’ above DH Vaults	
Fuel Handling Building	
• 281’ 1C ES Vlvs MCC	

Basis:

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.

This IC addresses elevated radiation levels in certain plant rooms/areas sufficient to preclude or impede personnel from performing actions necessary to transition the plant from normal plant operation to cooldown and shutdown as specified in normal plant procedures. As such, it represents an actual or potential substantial degradation of the level of safety of the plant. The Emergency Director should consider the cause of the increased radiation levels and determine if another IC may be applicable.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RA3 (cont)

Basis (cont):

Assuming all plant equipment is operating as designed, normal operation is capable from the Main Control Room (MCR). The plant is also able to transition into a hot shutdown condition from the MCR, therefore Table R4 is a list of plant rooms or areas with entry- related mode applicability that contain equipment which require a manual/local action necessary to transition the plant from normal plant operation to cooldown and shutdown as specified in normal operating procedures (establish shutdown cooling), where if this action is not completed the plant would not be able to attain and maintain cold shutdown. This Table does not include rooms or areas for which entry is required solely to perform actions of an administrative or record keeping nature (e.g., normal rounds or routine inspections).

Rooms and areas listed in EAL #1 do not need to be included in EAL #2, including the Control Room.

For EAL #2, an Alert declaration is warranted if entry into the affected room/area is, or may be, procedurally required during the plant operating mode in effect and the elevated radiation levels preclude the ability to place shutdown cooling in service. The emergency classification is not contingent upon whether entry is actually necessary at the time of the increased radiation levels. Access should be considered as impeded if extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., installing temporary shielding beyond that required by procedures, requiring use of non- routine protective equipment, requesting an extension in dose limits beyond normal administrative limits).

An emergency declaration is not warranted if any of the following conditions apply.

- The plant is in an operating mode different than the mode specified for the affected room/area (i.e., entry is not required during the operating mode in effect at the time of the elevated radiation levels). For example, the plant is in Mode 1 when the radiation rise occurs, and the procedures used for normal operation, cooldown and shutdown do not require entry into the affected room until Mode 4.
- The increased radiation levels are a result of a planned activity that includes compensatory measures which address the temporary inaccessibility of a room or area (e.g., radiography, spent filter or resin transfer, etc.).
- The action for which room/area entry is required is of an administrative or record keeping nature (e.g., normal rounds or routine inspections).
- The access control measures are of a conservative or precautionary nature, and would not actually prevent or impede a required action.

Escalation of the emergency classification level would be via Recognition Category R, C or F ICs.

Basis Reference(s):

1. NEI 99-01 Rev 6, AA3
2. FSAR Section 5.01 Class I Structures, Components, and Systems
3. OP-TM-MAP-C0101, Radiation Level HI

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Abnormal Rad Levels / Radiological Effluents

RU4

Initiating Condition:

Reactor coolant activity greater than Technical Specification allowable limits.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

1. Letdown Monitor RM-L-1 **alert alarm** (high or low channel).

   OR

2. Sample analysis indicates **EITHER** of the following:
   a. Dose Equivalent I-131 specific coolant activity **> 60.0 uCi/gm**.

      OR

   b. Dose Equivalent XE-133 specific coolant activity **> 797.0 uCi/gm**.

Basis:

This IC addresses a reactor coolant activity value that exceeds an allowable limit specified in Technical Specifications. This condition is a precursor to a more significant event and represents a potential degradation of the level of safety of the plant.

Conditions that cause the specified monitor to alarm that are not related to fuel clad degradation should not result in the declaration of an Unusual Event.

This EAL addresses site-specific radiation monitor readings that provide indication of a degradation of fuel clad integrity.

Escalation of the emergency classification level would be via ICs FA1 or the Recognition Category R ICs.

Basis Reference(s):

1. NEI 99-01 Rev 6, SU3
2. Operating Procedure 1101-2.1 Radiation Monitoring System Setpoints
3. FSAR Section 11.4.4, Liquid Monitoring Subsystem
4. OP-TM-MAP-C0101, Radiation Level HI
5. Technical Specifications 3.1.4, Reactor Coolant System Activity

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

FG1

Initiating Condition:

Loss of ANY Two Barriers AND Loss or Potential Loss of the third barrier.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Refer to Fission Product Barrier Loss and Potential Loss threshold values to determine barrier status.

Basis:

Fuel Cladding, RCS and Containment comprise the fission product barriers.

At the General Emergency classification level each barrier is weighted equally.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

FS1

Initiating Condition:

Loss or Potential Loss of ANY two barriers.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Refer to Fission Product Barrier Loss and Potential Loss threshold values to determine barrier status.

Basis:

Fuel Cladding, RCS and Containment comprise the fission product barriers.

At the Site Area Emergency classification level, each barrier is weighted equally.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

FA1

Initiating Condition:

ANY Loss or ANY Potential Loss of either Fuel Clad or RCS.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Refer to Fission Product Barrier Loss and Potential Loss threshold values to determine barrier status.

Basis:

Fuel Cladding, RCS and Containment comprise the fission product barriers.

At the Alert classification level, Fuel Cladding and RCS barriers are weighted more heavily than the Containment barrier. Unlike the Containment barrier, loss or potential loss of either the Fuel Cladding or RCS barrier may result in the relocation of radioactive materials or degradation of core cooling capability. Note that the loss or potential loss of Containment barrier in combination with loss or potential loss of either Fuel Cladding or RCS barrier results in declaration of a Site Area Emergency under EAL FS1.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

FC1

Sub-Category:

RCS or SG Tube Leakage

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

POTENTIAL LOSS

1. RCITS hot leg instruments indicate **0 inches** after lowering trend.

   AND

2. In-core thermocouples are unavailable.

   AND

3. **ALL** RCP's are secured.

Basis:

There is no Loss threshold associated with RCS or SG Tube Leakage.

Potential Loss Threshold #1 Basis:

This reading indicates a reduction in reactor vessel water level sufficient to allow the onset of heat-induced cladding damage.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3
2. FSAR 7.3.2.2.c.10.d
3. OP-TM-EOP-008, RCS Superheated
4. OP-TM-EOP-010, Emergency Procedure Rules Guides and Graphs

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

FC2

Sub-Category:

Inadequate Heat Removal

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

LOSS

1. **T_{clad} > 1400°F**.

POTENTIAL LOSS

2. **> 25°F** Superheat.

   OR

3. HPI-PORV Cooling in effect.

Basis:

Loss Threshold #1 Basis

This reading indicates temperatures within the core are sufficient to cause significant superheating of reactor coolant.

Potential Loss Threshold #2 Basis

This reading indicates temperatures within the core are sufficient to allow the onset of heat-induced cladding damage.

Potential Loss Threshold #3 Basis

This condition indicates an extreme challenge to the ability to remove RCS heat using the steam generators (i.e., loss of an effective secondary-side heat sink). This condition represents a potential loss of the Fuel Clad Barrier. In accordance with EOPs, there may be unusual accident conditions during which operators intentionally reduce the heat removal capability of the steam generators; during these conditions, classification using threshold is not warranted.

Meeting this threshold results in a Site Area Emergency because this threshold is identical to RCS Barrier RC2 Potential Loss threshold; both will be met. This condition warrants a Site Area Emergency declaration because inadequate RCS heat removal may result in fuel heat-up sufficient to damage the cladding and raise RCS pressure to the point where mass will be lost from the system.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

FC2 (cont)

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3
2. OS-24 Attachment D
3. OP-TM-EOP-004, Lack of Primary to Secondary Heat Transfer
4. OP-TM-EOP-008, RCS Superheated
5. OP-TM-EOP-010, Emergency Procedure Rules, Guides And Graphs
6. OS-24, Conduct of Operations during Abnormal and Emergency Events

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

FC3

Sub-Category:

Containment Radiation / RCS Activity

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

LOSS

1. Containment radiation monitor (RM-G-22 or RM-G-23) reading **> 1.95E+03 R/hr**.

   OR

2. Coolant activity **> 300 uCi/gm** Dose Equivalent I-131.

Basis:

Loss Threshold #1 Basis:

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that reactor coolant activity equals 300 uCi/gm dose equivalent I-131. Reactor coolant activity above this level is greater than that expected for iodine spikes and corresponds to an approximate range of 2% to 5% fuel clad damage. Since this condition indicates that a significant amount of fuel clad damage has occurred, it represents a loss of the Fuel Clad Barrier.

The radiation monitor reading in this threshold is higher than that specified for RCS Barrier RC3 Loss Threshold since it indicates a loss of both the Fuel Clad Barrier and the RCS Barrier. Note that a combination of the two monitor readings appropriately escalates the emergency classification level to a Site Area Emergency.

Loss Threshold #2 Basis:

This threshold indicates that RCS radioactivity concentration is greater than 300 uCi/gm dose equivalent I-131. Reactor coolant activity above this level is greater than that expected for iodine spikes and corresponds to an approximate range of 2% to 5% fuel clad damage. Since this condition indicates that a significant amount of fuel clad damage has occurred, it represents a loss of the Fuel Clad Barrier.

It is recognized that sample collection and analysis of reactor coolant with highly elevated activity levels could require several hours to complete. Nonetheless, a sample-related threshold is included as a backup to other indications.

There is no Fuel Clad Barrier Potential Loss threshold associated with RCS Activity / Containment Radiation.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3
2. OP-TM-MAP-C0101, Radiation Level HI
3. FSAR Section 11.4.4, Liquid Monitoring System Description
4. Calculation C3640-98-034, Prediction of the Response of RM-G-6 and 7 to Fuel Damage
5. Core Damage Assessment Methodology (CDAM)

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

FC5

Sub-Category:

Emergency Director Judgment.

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

LOSS

1. Any condition in the opinion of the Emergency Director that indicates Loss of the Fuel Clad Barrier.

POTENTIAL LOSS

2. Any condition in the opinion of the Emergency Director that indicates Potential Loss of the Fuel Clad Barrier.

Basis:

Loss Threshold #1 Basis

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the Fuel Clad Barrier is lost.

Potential Loss Threshold #2 Basis

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the Fuel Clad Barrier is potentially lost. The Emergency Director should also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

RC1

Sub-Category:

RCS or SG Tube Leakage

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

LOSS

1. RCS leakage results in **< 25º Sub Cooling Margin**.

   OR

2. Steam Generator tube RUPTURE that requires / results in an ESAS actuation.

POTENTIAL LOSS

3. UNISOLABLE RCS leakage **> 150 gpm**.

   OR

4. a. RCS Pressure **> 2450 psig**.

      AND

   b. RCS Pressure not lowering.

Basis:

UNISOLABLE: An open or breached system line that cannot be isolated, remotely or locally.

RUPTURE(D): The condition of a steam generator in which primary-to-secondary leakage is of sufficient magnitude to require a safety injection.

Failure to isolate the leak, within 15 minutes or if known that the leak cannot be isolated within 15 minutes, from the start of the leak requires immediate classification.

Loss Threshold #1 Basis

This threshold is based on an UNISOLABLE RCS leak of sufficient size to require an automatic or manual actuation of the Emergency Core Cooling System (ECCS). This condition clearly represents a loss of the RCS Barrier.

This threshold is applicable to unidentified and pressure boundary leakage, as well as identified leakage. It is also applicable to UNISOLABLE RCS leakage through an interfacing system. The mass loss may be into any location – inside containment, to the secondary-side (i.e., steam generator tube leakage) or outside of containment.

A steam generator with primary-to-secondary leakage of sufficient magnitude to require a safety injection is considered to be RUPTURED. If a RUPTURED steam generator also has an UNISOLABLE steam release outside of containment, the declaration escalates to a Site Area Emergency since the Containment Barrier CT1 Loss threshold will also be met.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

RC1 (cont)

Basis (cont):

Potential Loss Threshold #2 Basis

This threshold is based on an UNISOLABLE RCS leak that results in the inability to maintain pressurizer level within specified limits by operation of a normally used charging (makeup) pump, but an ESAS actuation has not occurred. The threshold is met when an operating procedure, or operating crew supervision, directs that a standby charging (makeup) pump be placed in service to restore and maintain pressurizer level.

This threshold is applicable to unidentified and pressure boundary leakage, as well as identified leakage. It is also applicable to UNISOLABLE RCS leakage through an interfacing system. The mass loss may be into any location – inside containment, to the secondary-side (i.e., steam generator tube leakage) or outside of containment.

If a leaking steam generator also has an UNISOLABLE steam release outside of containment, the declaration escalates to a Site Area Emergency since the Containment Barrier Loss threshold CT1 will also be met.

Potential Loss Threshold #3 Basis

This condition indicates an extreme challenge to the integrity of the RCS pressure boundary.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3
2. OP-TM-EOP-010 Emergency Procedure Rules, Guides And Graphs
3. OP-TM-EOP-002 Loss of 25°F Subcooled Margin
4. OP-TM-MAP-D031, MU Flow HI
5. OP-TM-EOP-005, OTSG Tube Leakage

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

RC2

Sub-Category:

Inadequate Heat Removal

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

POTENTIAL LOSS

1. HPI-PORV Cooling in effect.

Basis:

There is no Loss threshold associated with Inadequate Heat Removal.

Potential Loss Threshold Basis

HPI-PORV Cooling in effect indicates a Lack of Primary to Secondary Heat Transfer capability.

This condition indicates an extreme challenge to the ability to remove RCS heat using the steam generators (i.e., loss of an effective secondary-side heat sink). This condition represents a potential loss of the RCS Barrier. In accordance with EOPs, there may be unusual accident conditions during which operators intentionally reduce the heat removal capability of the steam generators; during these conditions, classification using threshold is not warranted.

Meeting this threshold results in a Site Area Emergency because this threshold is identical to Fuel Clad Barrier FC2 Potential Loss Threshold #3; both will be met. This condition warrants a Site Area Emergency declaration because inadequate RCS heat removal may result in fuel heat-up sufficient to damage the cladding and raise RCS pressure to the point where mass will be lost from the system.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3
2. OP-TM-EOP-004, Lack of Primary to Secondary Heat Transfer

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

RC3

Sub-Category:

Containment Radiation / RCS Activity

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

LOSS

1. Containment radiation monitor (RM-G-22 or RM-G-23) reading **> 25 R/hr**.

Basis:

Loss Threshold Basis

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that reactor coolant activity equals Technical Specification allowable limits. This value is lower than that specified for Fuel Clad Barrier FC3 Loss threshold #1 since it indicates a loss of the RCS Barrier only.

There is no RCS Potential Loss threshold associated with RCS Activity / Containment Radiation.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3
2. EP-EAL-0611, Criteria for Choosing Containment Radiation Monitor Reading Indicative of Loss of RCS Barrier

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

RC5

Sub-Category:

Emergency Director Judgment.

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

LOSS

1. Any condition in the opinion of the Emergency Director that indicates Loss of the RCS Barrier.

POTENTIAL LOSS

2. Any condition in the opinion of the Emergency Director that indicates Potential Loss of the RCS Barrier.

Basis:

Loss Threshold #1 Basis

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the RCS Barrier is lost.

Potential Loss Threshold #2 Basis

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the RCS Barrier is potentially lost. The Emergency Director should also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

CT1

Sub-Category:

RCS or SG Tube Leakage

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

LOSS

1. SG tube leakage **> 150 gpm**.

   AND

2. UNISOLABLE steam release from the affected S/G to the environment.

Basis:

UNISOLABLE: An open or breached system line that cannot be isolated, remotely or locally.

RUPTURE(D): The condition of a steam generator in which primary-to-secondary leakage is of sufficient magnitude to require a safety injection.

Loss Threshold Basis

This threshold addresses a leaking or RUPTURED Steam Generator (SG) that also has an UNISOLABLE steam release to the environment. The condition of the SG, whether leaking or RUPTURED, is determined in accordance with the thresholds for RCS Barrier RC1 Potential Loss Threshold 3 and Loss Threshold 2, respectively. This condition represents a bypass of the containment barrier.

The determination of UNISOLABLE steam release is not necessarily dependent upon entry into, or diagnostic steps within, a procedure. For example, if the pressure in a steam generator is decreasing uncontrollably and the affected steam generator isolation procedure is not entered because procedure use rules are dictating implementation of another procedure to address a higher priority condition, the steam generator is still considered to have an UNISOLABLE steam release for emergency classification purposes.

The UNISOLABLE steam release criterion establishes an appropriate lower bound on the size of a steam release that may require an emergency classification. Steam releases of this size are readily observable with normal Control Room indications. The lower bound for this aspect of the containment barrier is analogous to the lower bound criteria specified in IC RU3 for the fuel clad barrier (i.e., RCS activity values) and IC MU6 for the RCS barrier (i.e., RCS leak rate values).

This threshold also applies to prolonged steam releases necessitated by operational considerations such as the forced steaming of a leaking or RUPTURED steam generator directly to atmosphere to cooldown the plant, or to drive an auxiliary (emergency) feed water pump. These types of conditions will result in a significant and sustained release of radioactive steam to the environment (and are thus similar to an UNISOLABLE steam release condition). The inability to isolate the steam flow without an adverse effect on plant cooldown meets the intent of a loss of containment.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

CT1 (cont)

Basis (cont):

Steam releases associated with the expected operation of a SG power operated relief valve or safety relief valve do not meet the intent of this threshold. Such releases may occur intermittently for a short period of time following a reactor trip as operators process through emergency operating procedures to bring the plant to a stable condition and prepare to initiate a plant cooldown. Steam releases associated with the unexpected operation of a valve (e.g., a stuck-open safety valve) meets this threshold.

Following an SG tube leak or rupture, there may be minor radiological releases through a secondary-side system component (e.g., air ejectors, glad seal exhausters, valve packing, etc.). These types of releases do not constitute a loss or potential loss of containment but should be evaluated using the Recognition Category R ICs.

The emergency classification levels resulting from primary-to-secondary leakage, with or without a steam release from the affected SG, are summarized below.

Primary to Secondary Leak Rate	**Affected SG has UNISOLABLE steam release Outside of Containment?**	
	Yes	**No**
Less than or equal to 25 gpm	No classification	No classification
Greater than 25 gpm	Unusual Event per MU6	Unusual Event per MU6
Greater than 150 gpm. The capacity of one makeup pump in the normal charging mode is exceeded. *(RCS Barrier Potential Loss)*	Site Area Emergency per FS1	Alert per FA1
Requires an automatic or manual ESAS actuation. *(RCS Barrier Loss)*	Site Area Emergency per FS1	Alert per FA1

There is no Potential Loss threshold associated with RCS or SG Tube Leakage.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3
2. OP-TM-EOP-010, Emergency Procedure Rules, Guides And Graphs
3. OP-TM-EOP-005, OTSG Tube Leakage
4. OP-TM-EOP-001, Reactor Trip

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

CT2

Sub-Category:

Inadequate Heat Removal

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

POTENTIAL LOSS

1. **T_{clad} > 1800°F**.

   AND

2. EOP restoration procedures **not** effective in **< 15 minutes**.

Basis:

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.

There is no Loss threshold associated with Inadequate Heat Removal.

Potential Loss Threshold Basis

This condition represents an IMMINENT core melt sequence which, if not corrected, could lead to vessel failure and an increased potential for containment failure. For this condition to occur, there must already have been a loss of the RCS Barrier and the Fuel Clad Barrier. If implementation of a procedure(s) to restore adequate core cooling is not effective (successful) within 15 minutes, it is assumed that the event trajectory will likely lead to core melting and a subsequent challenge of the Containment Barrier.

The restoration procedure is considered “effective” if core exit thermocouple readings are decreasing and/or if reactor vessel level is increasing. Whether or not the procedure(s) will be effective should be apparent within 15 minutes. The Emergency Director should escalate the emergency classification level as soon as it is determined that the procedure(s) will not be effective.

Severe accident analyses (e.g., NUREG-1150) have concluded that function restoration procedures can arrest core degradation in a significant fraction of core damage scenarios, and that the likelihood of containment failure is very small in these events. Given this, it is appropriate to provide 15 minutes beyond the required entry point to determine if procedural actions can reverse the core melt sequence.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3
2. OP-TM-EOP-008, RCS Superheated
3. OP-TM-EOP-010, Emergency Procedure Rules, Guides And Graphs
4. OP-TM-EOP-006, LOCA Cooldown

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

CT3

Sub-Category:

Containment Radiation / RCS Activity

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

POTENTIAL LOSS

1. Containment radiation monitor (RM-G-22 or RM-G-23) reading **> 4.40E+03 R/hr**.

Basis:

There is no Loss threshold associated with RCS Activity / Containment Radiation.

Potential Loss Threshold Basis

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that 20% of the fuel cladding has failed. This level of fuel clad failure is well above that used to determine the analogous Fuel Clad Barrier Loss and RCS Barrier Loss thresholds.

NUREG-1228, *Source Estimations During Incident Response to Severe Nuclear Power Plant Accidents*, indicates the fuel clad failure must be greater than approximately 20% in order for there to be a major release of radioactivity requiring offsite protective actions. For this condition to exist, there must already have been a loss of the RCS Barrier and the Fuel Clad Barrier. It is therefore prudent to treat this condition as a potential loss of containment which would then escalate the emergency classification level to a General Emergency.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3
2. Core Damage Assessment Methodology (CDAM)

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

CT4

Sub-Category:

Containment Integrity or Bypass

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

LOSS

1. Containment isolation is required and **ANY** of the following:
   a. UNPLANNED lowering in containment pressure following initial pressure rise.

      OR

   b. Containment pressure or water level response **not** consistent with LOCA conditions.

      OR

   c. UNISOLABLE pathway from containment to the environment exists.

   OR
2. Indication of RCS leakage outside of containment.

POTENTIAL LOSS

3. Reactor Building Pressure **> 55 psig** and rising.

   OR
4. Hydrogen Concentration in Containment **≥ 4%**.

   OR
5. a. Reactor Building pressure **> 30 psig**.

      AND

   b. Reactor Building Emergency cooling is less than **ANY** one of the following conditions:

SPRAY	COOLERS
2	0
0	3
1	1

Basis:

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.

UNISOLABLE: An open or breached system line that cannot be isolated, remotely or locally.

Failure to isolate the leak, within 15 minutes or if known that the leak cannot be isolated within 15 minutes, from the start of the leak requires immediate classification.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

CT4 (cont)

Basis (cont):

Loss Threshold #1 Basis:

These thresholds address a situation where containment isolation is required and one of three conditions exists as discussed below. Users are reminded that there may be accident and release conditions that simultaneously meet ALL loss thresholds 1.a, 1.b, and 1.c.

1.a and 1.b – Containment integrity has been lost, i.e., the actual containment atmospheric leak rate likely exceeds that associated with allowable leakage (or sometimes referred to as design leakage). Following the release of RCS mass into containment, containment pressure will fluctuate based on a variety of factors; a loss of containment integrity condition may (or may not) be accompanied by a noticeable drop in containment pressure. Recognizing the inherent difficulties in determining a containment leak rate during accident conditions, it is expected that the Emergency Director will assess this threshold using judgment, and with due consideration given to current plant conditions, and available operational and radiological data (e.g., containment pressure, readings on radiation monitors outside containment, operating status of containment pressure control equipment, etc.).

Refer to the middle piping run of Figure 3-F-1. Two simplified examples are provided. One is leakage from a penetration and the other is leakage from an in-service system valve. Depending upon radiation monitor locations and sensitivities, the leakage could be detected by any of the four monitors depicted in the figure.

Another example would be a loss or potential loss of the RCS barrier, and the simultaneous occurrence of two faulted locations on a steam generator where one fault is located inside containment (e.g., on a steam or feedwater line) and the other outside of containment. In this case, the associated steam line provides a pathway for the containment atmosphere to escape to an area outside the containment.

Following the leakage of RCS mass into containment and a rise in containment pressure, there may be minor radiological releases associated with allowable (design) containment leakage through various penetrations or system components. These releases do not constitute a loss or potential loss of containment but should be evaluated using the Recognition Category R ICs.

1.c – Conditions are such that there is an UNISOLABLE pathway for the migration of radioactive material from the containment atmosphere to the environment. As used here, the term “environment” includes the atmosphere of a room or area, outside the containment, that may, in turn, communicate with the outside-the-plant atmosphere (e.g., through discharge of a ventilation system or atmospheric leakage). Depending upon a variety of factors, this condition may or may not be accompanied by a noticeable drop in containment pressure.

Refer to the top piping run of Figure 3-F-1. In this simplified example, the inboard and outboard isolation valves remained open after a containment isolation was required (i.e., containment isolation was not successful). There is now an UNISOLABLE pathway from the containment to the environment.

The existence of a filter is not considered in the threshold assessment. Filters do not remove fission product noble gases. In addition, a filter could become ineffective due to iodine and/or particulate loading beyond design limits (i.e., retention ability has been exceeded) or water saturation from steam/high humidity in the release stream.

Leakage between two interfacing liquid systems, by itself, does not meet this threshold.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

CT4 (cont)

Basis (cont):

Refer to the bottom piping run of Figure 3-F-1. In this simplified example, leakage in an RCP seal cooler is allowing radioactive material to enter the Auxiliary Building. The radioactivity would be detected by the Process Monitor. If there is no leakage from the closed water cooling system to the Auxiliary Building, then no threshold has been met. If the pump or system piping developed a leak that allowed steam/water to enter the Auxiliary Building, then loss threshold 2 would be met. Depending upon radiation monitor locations and sensitivities, this leakage could be detected by any of the four monitors depicted in the figure.

Following the leakage of RCS mass into containment and a rise in containment pressure, there may be minor radiological releases associated with allowable (design) containment leakage through various penetrations or system components. Minor releases may also occur if a containment isolation valve(s) fails to close but the containment atmosphere escapes to a closed system. These releases do not constitute a loss or potential loss of containment but should be evaluated using the Recognition Category R ICs.

The status of the containment barrier during an event involving steam generator tube leakage is assessed using Containment Barrier CT1 Loss threshold.

Loss Threshold #2 Basis:

Containment sump, temperature, pressure and/or radiation levels will rise if reactor coolant mass is leaking into the containment. If these parameters have not increased, then the reactor coolant mass may be leaking outside of containment (i.e., a containment bypass sequence). Raises in sump, temperature, pressure, flow and/or radiation level readings outside of the containment may indicate that the RCS mass is being lost outside of containment.

Unexpected elevated readings and alarms on radiation monitors with detectors outside containment should be corroborated with other available indications to confirm that the source is a loss of RCS mass outside of containment. If the fuel clad barrier has not been lost, radiation monitor readings outside of containment may not rise significantly; however, other unexpected changes in sump levels, area temperatures or pressures, flow rates, etc. should be sufficient to determine if RCS mass is being lost outside of the containment.

Refer to the middle piping run of Figure 3-F-1. In this simplified example, a leak has occurred at a reducer on a pipe carrying reactor coolant in the Auxiliary Building. Depending upon radiation monitor locations and sensitivities, the leakage could be detected by any of the four monitors depicted in the figure.

To ensure proper escalation of the emergency classification, the RCS leakage outside of containment must be related to the mass loss that is causing the RCS Barrier RC1 Loss Threshold 1 and/or Potential Loss threshold 3 to be met.

Potential Loss Threshold #3 Basis

If containment pressure exceeds the design pressure, there exists a potential to lose the Containment Barrier. To reach this level, there must be an inadequate core cooling condition for an extended period of time; therefore, the RCS and Fuel Clad barriers would already be lost. Thus, this threshold is a discriminator between a Site Area Emergency and General Emergency since there is now a potential to lose the third barrier.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

CT4 (cont)

Basis (cont):

Potential Loss Threshold #4 Basis

The existence of an explosive mixture means, at a minimum, that the containment atmospheric hydrogen concentration is sufficient to support a hydrogen burn (i.e., at the lower deflagration limit). A hydrogen burn will raise containment pressure and could result in collateral equipment damage leading to a loss of containment integrity. It therefore represents a potential loss of the Containment Barrier.

Potential Loss Threshold #5 Basis

This threshold describes a condition where containment pressure is greater than the setpoint at which containment energy (heat) removal systems are designed to automatically actuate, and less than one full train of equipment is capable of operating per design. The 15-minute criterion is included to allow operators time to manually start equipment that may not have automatically started, if possible. This threshold represents a potential loss of containment in that containment heat removal/depressurization systems (e.g., containment sprays, ice condenser fans, etc., but not including containment venting strategies) are either lost or performing in a degraded manner.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3
2. FSAR Section 6.6 Reactor Building Pressure-Time Response
3. Technical Specifications 3.5.3, Engineered Safeguards Protection System Actuation Setpoints
4. FSAR Section 6.3.3, Actuation
5. FSAR Section 6.5.3, Hydrogen Generation
6. OP-TM-EOP-006, LOCA Cooldown
7. 1302-5.25 Reactor Building Sump Level
8. FSAR Section 5.2 Reactor Building
9. FSAR Section 9.2, Chemical Addition and Sampling System
10. OP-TM-EOP-002, Loss of 25^{o}F Subcooling Margin
11. OP-TM-EOP-006, LOCA Cooldown
12. OP-TM-EOP-010, Emergency Procedure Rules, Guides and Graphs
13. OP-TM-MAP-D0301, High Make-up Flow

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

Figure 3-F-1: PWR Containment Integrity or Bypass Examples

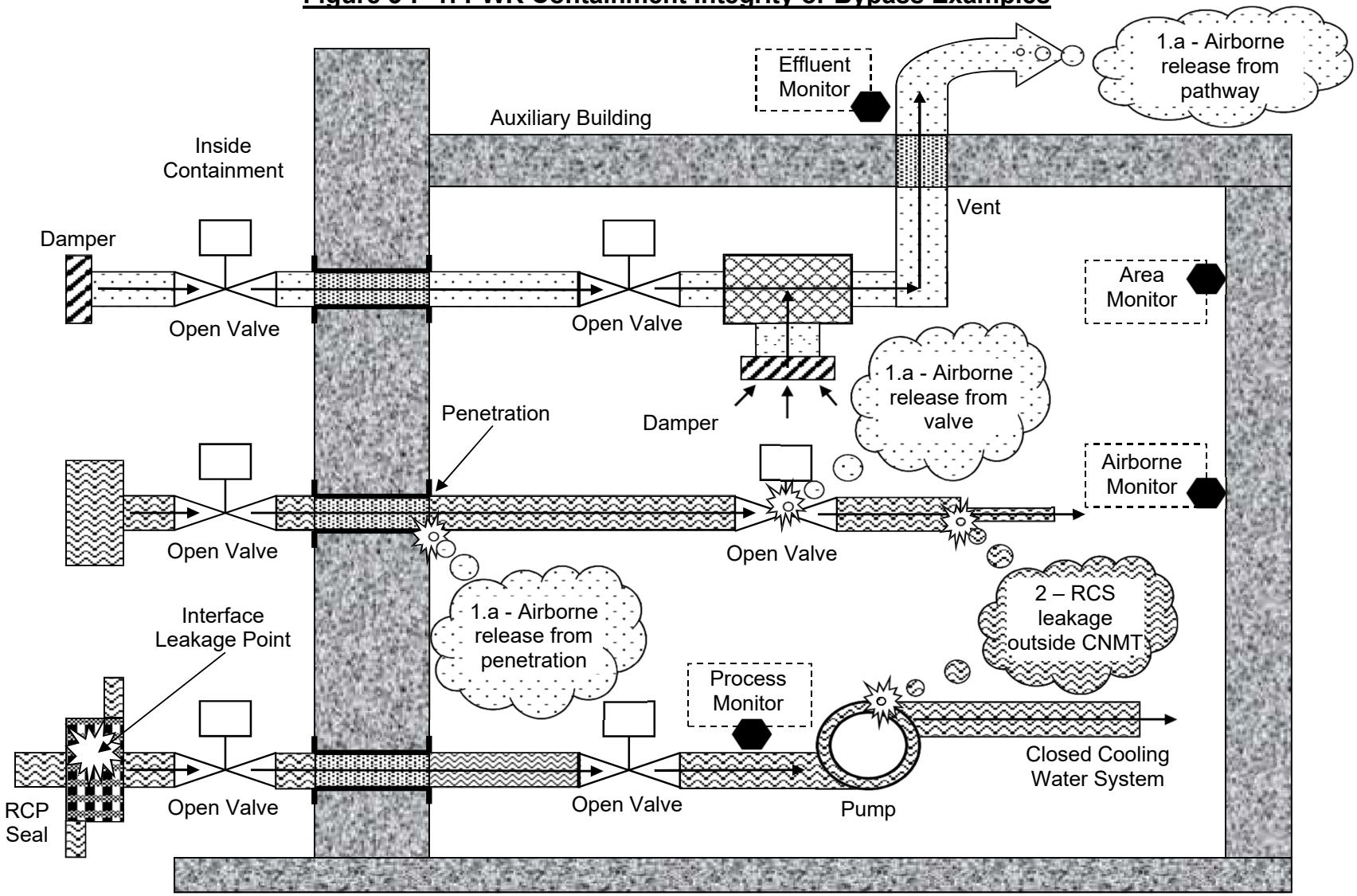


Table CRANE 2-2: EAL Technical Basis

Recognition Category: Fission Product Barrier Degradation

CT5

Sub-Category:

Emergency Director Judgment.

Operating Mode Applicability:

1, 2, 3, 4

Fission Product Barrier (FPB) Threshold:

LOSS

1. Any condition in the opinion of the Emergency Director that indicates Loss of the Containment Barrier.

POTENTIAL LOSS

2. Any condition in the opinion of the Emergency Director that indicates Potential Loss of the Containment Barrier.

Basis:

Loss Threshold #1 Basis

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the Containment Barrier is lost.

Potential Loss Threshold #2 Basis

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the Containment Barrier is potentially lost. The Emergency Director should also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

Basis Reference(s):

1. NEI 99-01 Rev 6, Table 9-F-3

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MG1

Initiating Condition:

Prolonged loss of all offsite and all onsite AC power to emergency busses.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. Loss of **ALL** offsite AC power to Emergency 4KV buses.

   AND

2. Failure of EG-Y-1A, EG-Y-1B Emergency Diesel Generators and EG-Y-4 SBO Diesel Generator to supply power to Emergency 4KV buses.

   AND

3. **EITHER** of the following:

   a. Restoration of at least one Emergency 4KV bus in **< 4 hours** is **not** likely.

      OR

   b. **> 25°F superheat**.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses a prolonged loss of all power sources to AC emergency buses. A loss of all AC power compromises the performance of all SAFETY SYSTEMS requiring electric power including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal and the ultimate heat sink. A prolonged loss of these buses will lead to a loss of any fission product barriers. In addition, fission product barrier monitoring capabilities may be degraded under these conditions.

The EAL should require declaration of a General Emergency prior to meeting the thresholds for IC FG1. This will allow additional time for implementation of offsite protective actions.

Escalation of the emergency classification from Site Area Emergency will occur if it is projected that power cannot be restored to at least one AC emergency bus by the end of the analyzed station blackout coping period. Beyond this time, plant responses and event trajectory are subject to greater uncertainty, and there is an increased likelihood of challenges to multiple fission product barriers.

The estimate for restoring at least one emergency bus should be based on a realistic appraisal of the situation. Mitigation actions with a low probability of success should not be used as a basis for delaying a classification upgrade. The goal is to maximize the time available to prepare for, and implement, protective actions for the public.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MG1 (cont)

Basis (cont):

If ANY mitigative strategy is effective in supplying power to ANY one Emergency 4KV bus in < 4 hours, escalation to General Emergency shall not be considered.

The EAL will also require a General Emergency declaration if the loss of AC power results in parameters that indicate an inability to adequately remove decay heat from the core.

Basis Reference(s):

1. NEI 99-01 Rev 6, SG1
2. OP-TM-EOP-010 Emergency Procedure Rules, Guides And Graphs
3. FSAR Section 8.2.2 Unit Distribution System
4. FSAR Section 8.2.3 Sources of Auxiliary Power
5. FSAR Section 8.5 Station Blackout
6. Technical Specification Section 3.7, Unit Electric Power System
7. 1107-1 Normal Electrical System
8. 1107-2A Emergency Electrical - 4KV and 480 Volt
9. OP-TM-AOP-020 Loss Of Station Power
10. 1107-3 Diesel Generator
11. 1107-9 SBO Diesel Generator
12. OP-TM-EOP-008 RCS Superheated
13. OS-24, Conduct of Operation during Abnormal and Emergency Events

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MS1

Initiating Condition:

Loss of all offsite and all onsite AC power to emergency busses for 15 minutes or longer.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. Loss of **ALL** offsite AC Power to Emergency 4KV buses.

   AND

2. Failure of EG-Y-1A, EG-Y-1B Emergency Diesel Generators and EG-Y-4 SBO Diesel Generator to supply power to Emergency 4KV buses.

   AND

3. Failure to restore power to at least one Emergency 4KV bus in **< 15 minutes** from the time of loss of both offsite and onsite AC power.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses a total loss of AC power that compromises the performance of all SAFETY SYSTEMS requiring electric power including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal and the ultimate heat sink. In addition, fission product barrier monitoring capabilities may be degraded under these conditions. This IC represents a condition that involves actual or likely major failures of plant functions needed for the protection of the public.

If ANY mitigative strategy is effective in supplying power to ANY one Emergency 4KV bus within 15 minutes from the time of loss of both offsite and onsite AC power, escalation to Site Area Emergency shall not be considered.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level would be via ICs RG1, FG1, MG1, or MG2.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MS1 (cont)

Basis Reference(s):

1. NEI 99-01 Rev 6, SS1
2. FSAR Section 8.2.3, Sources of Auxiliary Power
3. Technical Specification Section 3.7, Unit Electric Power System
4. 1107-1 Normal Electrical System
5. 1107-2A Emergency Electrical - 4KV and 480 Volt
6. OP-TM-AOP-020 Loss Of Station Power
7. 1107-3 Diesel Generator
8. 1107-9 SBO Diesel Generator
9. FSAR Section 8.2.2, Unit Distribution System
10. FSAR Section 8.5, Station Blackout

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MA1

Initiating Condition:

Loss of all but one AC power source to emergency buses for 15 minutes or longer.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. AC power capability to Emergency 4KV buses reduced to only one of the following power sources for **≥ 15 minutes.**
   - Auxiliary Transformer 1A
   - Auxiliary Transformer 1B
   - Emergency Diesel Generator EG-Y-1A
   - Emergency Diesel Generator EG-Y-1B
   - SBO Diesel Generator EG-Y-4

   AND

2. **ANY** additional single power source failure will result in a loss of **ALL** AC power to SAFETY SYSTEMS.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC describes a significant degradation of offsite and onsite AC power sources such that any additional single failure would result in a loss of all AC power to SAFETY SYSTEMS. In this condition, the sole AC power source may be powering one, or more than one, train of safety-related equipment. This IC provides an escalation path from IC MU1.

An “AC power source” is a source recognized in AOPs and EOPs, and capable of supplying required power to an emergency bus. Some examples of this condition are presented below.

- A loss of all offsite power with a concurrent failure of all but one emergency power source (e.g., an onsite diesel generator).
- A loss of all offsite power and loss of all emergency power sources (e.g., onsite diesel generators) with a single train of emergency buses being back-fed from the unit main generator.
- A loss of emergency power sources (e.g., onsite diesel generators) with a single train of emergency buses being back-fed from an offsite power source.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of power.

Escalation of the emergency classification level would be via IC MS1.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MA1 (cont)

Basis Reference(s):

1. NEI 99-01 Rev 6, SA1
2. FSAR Section 8.2.3, Sources of Auxiliary Power
3. FSAR Section 8.5, Station Blackout
4. Technical Specification Section 3.7, Unit Electric Power System
5. 1107-1 Normal Electrical System
6. 1107-2A Emergency Electrical - 4KV and 480 Volt
7. OP-TM-AOP-020 Loss Of Station Power
8. 1107-3 Diesel Generator
9. 1107-9 SBO Diesel Generator
10. FSAR Section 8.2.2, Unit Distribution System

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MU1

Initiating Condition:

Loss of all offsite AC power capability to emergency buses for 15 minutes or longer.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. Loss of **ALL** offsite AC power capability to Emergency 4KV busses for **≥ 15 minutes**.

Basis:

This IC addresses a prolonged loss of offsite power. The loss of offsite power sources renders the plant more vulnerable to a complete loss of power to AC emergency buses. This condition represents a potential reduction in the level of safety of the plant.

For emergency classification purposes, “capability” means that an offsite AC power source(s) is available to the emergency buses, whether or not the buses are powered from it.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of offsite power.

Escalation of the emergency classification level would be via IC MA1.

Basis Reference(s):

1. NEI 99-01 Rev 6, SU1
2. FSAR Section 8.2.3, Sources of Auxiliary Power
3. Technical Specification Section 3.7, Unit Electric Power System
4. 1107-1 Normal Electrical System
5. 1107-2A Emergency Electrical - 4KV and 480 Volt
6. OP-TM-AOP-020 Loss Of Station Power
7. 1107-3 Diesel Generator
8. 1107-9 SBO Diesel Generator
9. FSAR Section 8.2.2, Unit Distribution System

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MG2

Initiating Condition:

Loss of all AC and Vital DC power sources for 15 minutes or longer.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. Loss of **ALL** offsite AC power to Emergency 4KV buses.

   AND

2. Failure of EG-Y-1A, EG-Y-1B Emergency Diesel Generators and EG-Y-4 SBO Diesel Generator to supply power to Emergency 4KV buses.

   AND

3. Voltage is **< 105 VDC** on 125 VDC Distribution System 1A and 1B.

   AND

4. **ALL** AC and Vital DC power sources have been lost for **≥ 15 minutes**.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses a concurrent and prolonged loss of both AC and Vital DC power. A loss of all AC power compromises the performance of all SAFETY SYSTEMS requiring electric power including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal and the ultimate heat sink. A loss of Vital DC power compromises the ability to monitor and control SAFETY SYSTEMS. A sustained loss of both AC and DC power will lead to multiple challenges to fission product barriers.

If ANY mitigative strategy is effective in supplying power to ANY one Emergency 4KV bus AND ANY one Vital DC bus (voltage >105 VDC) within 15 minutes, escalation to General Emergency shall not be considered.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses. The 15-minute emergency declaration clock begins at the point when all EALs are met.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MG2 (cont)

Basis Reference(s):

1. NEI 99-01 Rev 6, SG8
2. FSAR Section 8.2.2.6, 250/125 VDC System
3. 1107-2C Vital DC Electrical System
4. OP-TM-AOP-023, A DC System Failure
5. OP-TM-AOP-024, B DC System Failure
6. FSAR Section 8.2.2, Unit Distribution System
7. FSAR Section 8.2.3, Sources of Auxiliary Power
8. Technical Specification Section 3.7, Unit Electric Power System
9. 1107-1 Normal Electrical System
10. 1107-2A Emergency Electrical - 4KV and 480 Volt
11. OP-TM-AOP-020 Loss Of Station Power
12. 1107-3 Diesel Generator
13. 1107-9 SBO Diesel Generator
14. FSAR Section 8.5, Station Blackout

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MS2

Initiating Condition:

Loss of all vital DC power for 15 minutes or longer.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. Voltage is **< 105 VDC** on 125 VDC Distribution System 1A and 1B for **≥ 15 minutes**.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses a loss of Vital DC power which compromises the ability to monitor and control SAFETY SYSTEMS. In modes above Cold Shutdown, this condition involves a major failure of plant functions needed for the protection of the public.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level would be via ICs RG1, FG1 or MG3.

Basis Reference(s):

1. NEI 99-01 Rev 6, SS8
2. FSAR Section 8.2.2.6, 250/125 VDC System
3. 1107-2C Vital DC Electrical System
4. OP-TM-AOP-023, A DC System Failure
5. OP-TM-AOP-024, B DC System Failure

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MS3

Initiating Condition:

Inability to shutdown the reactor causing a challenge to core cooling or RCS heat removal.

Operating Mode Applicability:

1, 2

Emergency Action Level (EAL):

1. Automatic or Manual Trip did **not** shutdown the reactor as indicated by Reactor Power **≥ 5%**.

   AND

2. **ALL** manual actions to shutdown the reactor have been unsuccessful as indicated by Reactor Power **≥ 5%**.

   AND

3. **EITHER** of the following conditions exist:

   a. **T_{clad} > 1400°F**.

      OR

   b. HPI-PORV Cooling in effect.

Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor trip that results in a reactor shutdown, all subsequent operator manual actions, both inside and outside the Control Room including driving in control rods and boron injection, are unsuccessful, and continued power generation is challenging the capability to adequately remove heat from the core and/or the RCS. This condition will lead to fuel damage if additional mitigation actions are unsuccessful and thus warrants the declaration of a Site Area Emergency.

In some instances, the emergency classification resulting from this IC/EAL may be higher than that resulting from an assessment of the plant responses and symptoms against the Recognition Category F ICs/EALs. This is appropriate in that the Recognition Category F ICs/EALs do not address the additional threat posed by a failure to shutdown the reactor. The inclusion of this IC and EAL ensures the timely declaration of a Site Area Emergency in response to prolonged failure to shutdown the reactor.

A reactor shutdown is determined in accordance with applicable Emergency Operating Procedure criteria.

Escalation of the emergency classification level would be via IC RG1 or FG1.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MS3 (cont)

Basis Reference(s):

1. NEI 99-01 Rev 6, SS5
2. OP-TM-EOP-004, Lack of Primary-to-Secondary Heat Transfer
3. OP-TM-EOP-010, Emergency Procedure Rules, Guides And Graphs
4. OP-TM-EOP-001, Reactor Trip
5. 1102-4 Power Operation
6. OP-TM-641-000- Reactor Protection System (RPS/DSS)

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MA3

Initiating Condition:

Automatic or manual trip fails to shutdown the reactor, and subsequent manual actions taken at the reactor control consoles are not successful in shutting down the reactor.

Operating Mode Applicability:

1, 2

Emergency Action Level (EAL):

Note: A manual action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does not include manually driving in control rods or implementation of boron injection strategies.

1. Automatic Trip did **not** shutdown the reactor as indicated by Reactor Power **≥ 5%**.

   AND

2. Manual actions taken at the Console Center are **not** successful in shutting down the reactor as indicated by Reactor Power **≥ 5%**.

Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic reactor trip that results in a reactor shutdown, and subsequent operator manual actions taken at the Console Center to shutdown the reactor are also unsuccessful. This condition represents an actual or potential substantial degradation of the level of safety of the plant. An emergency declaration is required even if the reactor is subsequently shutdown by an action taken away from the Console Center since this event entails a significant failure of the RPS.

A manual action at the Console Center is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor trip. This action does not include manually driving in control rods or implementation of boron injection strategies. If this action(s) is unsuccessful, operators would immediately pursue additional manual actions at locations away from the Console Center (e.g., locally opening breakers). Actions taken at back-panels or other locations within the Control Room, or any location outside the Control Room, are not considered to be “at the Console Center”.

The plant response to the failure of an automatic reactor trip will vary based upon several factors including the reactor power level prior to the event, availability of the condenser, performance of mitigation equipment and actions, other concurrent plant conditions, etc. If the failure to shutdown the reactor is prolonged enough to cause a challenge to the core cooling or RCS heat removal safety functions, the emergency classification level will escalate to a Site Area Emergency via IC MS3. Depending upon plant responses and symptoms, escalation is also possible via IC FS1. Absent the plant conditions needed to meet either IC MS3 or FS1, an Alert declaration is appropriate for this event.

It is recognized that plant responses or symptoms may also require an Alert declaration in accordance with the Recognition Category F ICs; however, this IC and EAL are included to ensure a timely emergency declaration.

A reactor shutdown is determined in accordance with applicable Emergency Operating Procedure criteria.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MA3 (cont)

Basis Reference(s):

1. NEI 99-01 Rev 6, SA5
2. OP-TM-EOP-004, Lack of Primary-to-Secondary Heat Transfer
3. OP-TM-EOP-010, Emergency Procedure Rules, Guides And Graphs
4. OP-TM-EOP-001, Reactor Trip
5. 1102-4 Power Operation
6. OP-TM-641-000- Reactor Protection System (RPS/DSS)

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MU3

Initiating Condition:

Automatic or manual trip fails to shutdown the reactor.

Operating Mode Applicability:

1, 2

Emergency Action Level (EAL):

Note: A manual action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does not include manually driving in control rods or implementation of boron injection strategies.

1. a. Automatic Trip did not shutdown the reactor as indicated by Reactor Power **≥ 5%**.

   AND

   b. Subsequent manual action taken at the Console Center is successful in shutting down the reactor as indicated by Reactor Power **< 5%**.

   OR

2. a. Manual Trip did not shutdown the reactor as indicated by Reactor Power **≥ 5%**.

   AND

   b. Subsequent automatic Trip is successful in shutting down the reactor as indicated by Reactor Power **< 5%**.

Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor trip that results in a reactor shutdown, and either a subsequent operator manual action taken at the Console Center or an automatic trip is successful in shutting down the reactor. This event is a precursor to a more significant condition and thus represents a potential degradation of the level of safety of the plant.

EAL #1 Basis

Following the failure on an automatic reactor trip, operators will promptly initiate manual actions at the Console Center to shutdown the reactor (e.g., initiate a manual reactor trip). If these manual actions are successful in shutting down the reactor, core heat generation will quickly fall to a level within the capabilities of the plant's decay heat removal systems.

EAL #2 Basis

If an initial manual reactor trip is unsuccessful, a concurrent plant condition, may lead to the generation of an automatic reactor trip signal. If a subsequent automatic trip is successful in shutting down the reactor, core heat generation will quickly fall to a level within the capabilities of the plant's decay heat removal systems.

A manual action at the Console Center is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor trip). This action does not include manually driving in control rods or implementation of boron injection strategies. Actions taken at back-panels or other locations within the Control Room, or any location outside the Control Room, are not considered to be "at the Console Center".

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MU3 (cont)

Basis (cont):

The plant response to the failure of an automatic or manual reactor trip will vary based upon several factors including the reactor power level prior to the event, availability of the condenser, performance of mitigation equipment and actions, other concurrent plant conditions, etc. If subsequent operator manual actions taken at the Console Center are also unsuccessful in shutting down the reactor, then the emergency classification level will escalate to an Alert via IC MA3. Depending upon the plant response, escalation is also possible via IC FA1. Absent the plant conditions needed to meet either IC MA3 or FA1, an Unusual Event declaration is appropriate for this event.

A reactor shutdown is determined in accordance with applicable Emergency Operating Procedure criteria.

Should a reactor trip signal be generated as a result of plant work (e.g., RPS setpoint testing), the following classification guidance should be applied.

- If the signal generated as a result of plant work causes a plant transient that creates a real condition that should have included an automatic reactor trip and the RPS fails to automatically shutdown the reactor, then this IC and the EALs are applicable, and should be evaluated.
- If the signal generated as a result of plant work does not cause a plant transient but should have generated an RPS trip signal and the trip failure is determined through other means (e.g., assessment of test results), then this IC and the EALs are not applicable and no classification is warranted.

Basis Reference(s):

1. NEI 99-01 Rev 6, SU5
2. OP-TM-EOP-010, Emergency Procedure Rules, Guides And Graphs
3. OP-TM-EOP-001, Reactor Trip
4. 1102-4 Power Operation
5. OP-TM-641-000- Reactor Protection System (RPS/DSS)

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MA4

Initiating Condition:

UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. a. UNPLANNED event results in the inability to monitor **ANY** Table M1 parameters from within the Control Room for **≥ 15 minutes**.

Table M1 Control Room Parameters

- Reactor Power
- PZR Level
- RCS Pressure
- In Core/Core Exit Temperature
- Level in at least one OTSG.
- OTSG Emergency Feed Water Flow

AND

b. **ANY** Table M2 transient in progress.

Table M2 Significant Transients

- Automatic Turbine Runback **> 25%** thermal reactor power
- Electrical Load Rejection **> 25%** full electrical load
- Reactor Trip
- ESAS Actuation
- Thermal Power oscillations **> 10%**

Basis:

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.

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses the difficulty associated with monitoring rapidly changing plant conditions during a transient without the ability to obtain SAFETY SYSTEM parameters from within the Control Room. During this condition, the margin to a potential fission product barrier challenge is reduced. It thus represents a potential substantial degradation in the level of safety of the plant.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MA4 (cont)

Basis (cont):

As used in this EAL, an “inability to monitor” means that values for any of the listed parameters cannot be determined from within the Control Room. This situation would require a loss of all of the Control Room sources for the given parameter(s). For example, the reactor power level cannot be determined from any analog, computer point, digital and recorder source within the Control Room.

An event involving a loss of plant indications, annunciators and/or display systems is evaluated in accordance with 10 CFR 50.72 (and associated guidance in NUREG-1022) to determine if an NRC event report is required. The event would be reported if it significantly impaired the capability to perform emergency assessments. In particular, emergency assessments necessary to implement abnormal operating procedures, emergency operating procedures, and emergency plan implementing procedures addressing emergency classification, accident assessment, or protective action decision-making.

This EAL is focused on a selected subset of plant parameters associated with the key safety functions of reactivity control, core cooling and RCS heat removal. The loss of the ability to determine any of these parameters from within the Control Room is considered to be more significant than simply a reportable condition. In addition, if all indication sources for any of the listed parameters are lost, then the ability to determine the values of other SAFETY SYSTEM parameters may be impacted as well. For example, if the value for reactor vessel level cannot be determined from the indications and recorders on a main control board, the SPDS or the plant computer, the availability of other parameter values may be compromised as well.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of indication.

Escalation of the emergency classification level would be via ICs FS1 or IC RS1.

Basis Reference(s):

1. NEI 99-01 Rev 6, SA2

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MU4

Initiating Condition:

UNPLANNED loss of Control Room indications for 15 minutes or longer.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. UNPLANNED event results in the inability to monitor **ANY** Table M1 parameters from within the Control Room for **≥ 15 minutes**.

Table M1 Control Room Parameters

- Reactor Power
- PZR Level
- RCS Pressure
- In Core/Core Exit Temperature
- Level in at least one OTSG.
- OTSG Emergency Feed Water Flow

Basis:

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.

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses the difficulty associated with monitoring normal plant conditions without the ability to obtain SAFETY SYSTEM parameters from within the Control Room. This condition is a precursor to a more significant event and represents a potential degradation in the level of safety of the plant.

As used in this EAL, an “inability to monitor” means that values for any of the listed parameters cannot be determined from within the Control Room. This situation would require a loss of all of the Control Room sources for the given parameter(s). For example, the reactor power level cannot be determined from any analog, computer point, digital and recorder source within the Control Room. An event involving a loss of plant indications, annunciators and/or display systems is evaluated in accordance with 10 CFR 50.72 (and associated guidance in NUREG-1022) to determine if an NRC event report is required. The event would be reported if it significantly impaired the capability to perform emergency assessments. In particular, emergency assessments necessary to implement abnormal operating procedures, emergency operating procedures, and emergency plan implementing procedures addressing emergency classification, accident assessment, or protective action decision-making.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MU4 (cont)

Basis (cont):

This EAL is focused on a selected subset of plant parameters associated with the key safety functions of reactivity control, core cooling and RCS heat removal. The loss of the ability to determine any of these parameters from within the Control Room is considered to be more significant than simply a reportable condition. In addition, if all indication sources for any of the listed parameters are lost, then the ability to determine the values of other SAFETY SYSTEM parameters may be impacted as well. For example, if the value for reactor vessel level cannot be determined from the indications and recorders on a main control board, the SPDS or the plant computer, the availability of other parameter values may be compromised as well.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of indication.

Escalation of the emergency classification level would be via IC MA4.

Basis Reference(s):

1. NEI 99-01 Rev 6, SU2

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MA5

Initiating Condition:

Hazardous event affecting a SAFETY SYSTEM required for the current operating mode.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Note: If it is determined that the conditions of MA5 are not met then assess the event via HU3, HU4, or HU6.

1. The occurrence of **ANY** of the following hazardous events:
   - Seismic event (earthquake)
   - Internal or external flooding event
   - High winds or tornado strike
   - FIRE
   - EXPLOSION
   - Other events with similar hazard characteristics as determined by the Shift Manager

   AND

2. **EITHER** of the following:
   a. Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM required by Technical Specifications for the current operating mode.

      OR

   b. The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure required by Technical Specifications for the current operating mode.

Basis:

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.

EXPLOSION: A rapid, violent and catastrophic failure of a piece of equipment due to combustion, chemical reaction or overpressurization. A release of steam (from high energy lines or components) or an electrical component failure (caused by short circuits, grounding, arcing, etc.) should not automatically be considered an explosion. Such events may require a post-event inspection to determine if the attributes of an explosion are present.

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

VISIBLE DAMAGE: Damage to a component or structure that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected component or structure.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MA5 (cont)

Basis (cont):

This IC addresses a hazardous event that causes damage to a SAFETY SYSTEM, or a structure containing SAFETY SYSTEM components, required for the current operating mode, "required", i.e. required to be operable by Technical Specifications for the current operating mode. This condition significantly reduces the margin to a loss or potential loss of a fission product barrier, and therefore represents an actual or potential substantial degradation of the level of safety of the plant. Manual or automatic electrical isolation of safety equipment due to flooding, in and of itself, does not constitute degraded performance and is classified under HU6.

EAL #2.a Basis

This EAL addresses damage to a SAFETY SYSTEM train that is required to be operable by Technical Specifications for the current operating mode, and is in operation since indications for it will be readily available. The indications of degraded performance should be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

EAL #2.b Basis

This EAL addresses damage to a SAFETY SYSTEM component that is required to be operable by Technical Specifications for the current operating mode, and is not in operation or readily apparent through indications alone, as well as damage to a structure containing SAFETY SYSTEM components. Operators will make this determination based on the totality of available event and damage report information. This is intended to be a brief assessment not requiring lengthy analysis or quantification of the damage.

Escalation of the emergency classification level would be via IC FS1 or RS1.

If the EAL conditions of MA5 are not met then assess the event via HU3, HU4, or HU6.

Basis Reference(s):

1. NEI 99-01, Rev 6 SA9

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MU6

Initiating Condition:

RCS leakage for 15 minutes or longer.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. RCS unidentified or pressure boundary leakage **> 10 gpm** for **≥ 15 minutes**.

   OR

2. RCS identified leakage **> 25 gpm** for **≥ 15 minutes**.

   OR

3. Leakage from the RCS to a location outside containment **> 25 gpm** for **≥ 15 minutes**.

Basis:

UNISOLABLE: An open or breached system line that cannot be isolated, remotely or locally.

Failure to isolate the leak, within 15 minutes or if known that the leak cannot be isolated within 15 minutes, from the start of the leak requires immediate classification.

This IC addresses RCS leakage which may be a precursor to a more significant event. In this case, RCS leakage has been detected and operators, following applicable procedures, have been unable to promptly isolate the leak. This condition is considered to be a potential degradation of the level of safety of the plant.

EAL #1 and EAL #2 Basis

These EALs are focused on a loss of mass from the RCS due to “unidentified leakage", "pressure boundary leakage" or "identified leakage” (as these leakage types are defined in the plant Technical Specifications).

EAL #3 Basis

This EAL addresses a RCS mass loss caused by an UNISOLABLE leak through an interfacing system. These EALs thus apply to leakage into the containment, a secondary-side system (e.g., steam generator tube leakage) or a location outside of containment.

The leak rate values for each EAL were selected because they are usually observable with normal Control Room indications. Lesser values typically require time-consuming calculations to determine (e.g., a mass balance calculation). EAL #1 uses a lower value that reflects the greater significance of unidentified or pressure boundary leakage.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MU6 (cont)

Basis (cont):

The release of mass from the RCS due to the as-designed/expected operation of a relief valve does not warrant an emergency classification. An emergency classification would be required if a mass loss is caused by a relief valve that is not functioning as designed/expected (e.g., a relief valve sticks open and the line flow cannot be isolated). The 15-minute threshold duration allows sufficient time for prompt operator actions to isolate the leakage, if possible.

Escalation of the emergency classification level would be via ICs of Recognition Category R or F.

Basis Reference(s):

1. NEI 99-01 Rev 6, SU4
2. OP-TM-220-251 RCS Leak Rate Determination
3. OP-TM-220-252, Primary – To – Secondary Leakrate Determination
4. OP-TM-PRF1-0405 RB Sump Level HI
5. UFSAR 6.4.3, Bases of Leakage Estimate
6. UFSAR 6.4.4, Design Basis Leakage
7. OP-TM-AOP-050, Reactor Coolant Leakage
8. Technical Specification 3.1.6, Leakage and Table 4.1-2, Minimum Equipment Test Frequency

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MU7

Initiating Condition:

Loss of all onsite or offsite communications capabilities.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

1. Loss of **ALL** Table M3 **Onsite** communications capability affecting the ability to perform routine operations.

   OR

2. Loss of **ALL** Table M3 **Offsite** communication capability affecting the ability to perform offsite notifications.

   OR

3. Loss of **ALL** Table M3 **NRC** communication capability affecting the ability to perform NRC notifications.

Table M3 Communications Capability

System	Onsite	Offsite	NRC
Radios	X		
Plant page	X		
Plant Telephone System	X		
Commercial Telephones	X	X	X
NARS		X	
ENS		X	X
HPN		X	X
Satellite phones		X	X

Basis:

This IC addresses a significant loss of onsite, offsite, or NRC communications capabilities. While not a direct challenge to plant or personnel safety, this event warrants prompt notifications to Offsite Response Organizations (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, etc.).

EAL #1 Basis

Addresses a total loss of the communications methods used in support of routine plant operations.

EAL #2 Basis

Addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The OROs referred to here are listed in procedure EP-MA-114- 100-F-01, State / Local Event Notification Form.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MU7 (cont)

Basis (cont):

EAL #3 Basis

Addresses a total loss of the communications methods used to notify the NRC of an emergency declaration.

Basis Reference(s):

1. NEI 99-01 Rev 6, SU6
2. 1105-12 Communications System
3. FSAR Section 7.4.4, Communication

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MU8

Initiating Condition:

Failure to isolate containment or loss of containment pressure control.

Operating Mode Applicability:

1, 2, 3, 4

Emergency Action Level (EAL):

1. a. Failure of containment to isolate when required by an actuation signal.

   AND

   b. **ANY** required penetration remains open **> 15 minutes** of the actuation signal.

   OR

2. a. Reactor Building pressure **> 30 psig**.

   AND

   b. Reactor Building Emergency cooling is less than **ANY** one of the following conditions for **≥ 15 minutes**:

SPRAY	COOLERS
2	0
0	3
1	1

Basis:

This IC addresses a failure of any containment penetrations to automatically isolate (close) when required by an actuation signal. It also addresses an event that results in high containment pressure with a concurrent failure of containment pressure control systems. Absent challenges to another fission product barrier, either condition represents potential degradation of the level of safety of the plant.

EAL #1 Basis

The containment isolation signal must be generated as the result on an off- normal/accident condition (e.g., a safety injection or high containment pressure); a failure resulting from testing or maintenance does not warrant classification. The determination of containment and penetration status – isolated or not isolated – should be made in accordance with the appropriate criteria contained in the plant AOPs and EOPs. The 15-minute criterion is included to allow operators time to manually isolate the required penetrations, if possible.

EAL #2 Basis

Addresses a condition where containment pressure is greater than the setpoint at which containment energy (heat) removal systems are designed to automatically actuate, and less than one full train of equipment is capable of operating per design. The 15-minute criterion is included to allow operators time to manually start equipment that may not have automatically started, if possible. The inability to start the required equipment indicates that containment heat removal/depressurization systems (e.g., containment sprays or ice condenser fans) are either lost or performing in a degraded manner.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: System Malfunctions

MU8 (cont)

Basis (cont):

This event would escalate to a Site Area Emergency in accordance with IC FS1 if there were a concurrent loss or potential loss of either the Fuel Clad or RCS fission product barriers.

Basis Reference(s):

1. NEI 99-01 Rev 6, SU7
2. FSAR Section 6.6 Reactor Building Pressure-Time Response
3. Technical Specifications 3.5.3, Engineered Safeguards Protection System Actuation Setpoints
4. FSAR Section 6.3.3, Actuation
5. FSAR Section 6.5.3, Hydrogen Generation
6. OP-TM-EOP-006, LOCA Cooldown
7. 1302-5.25 Reactor Building Sump Level
8. FSAR Section 5.2 Reactor Building
9. FSAR Section 9.2, Chemical Addition and Sampling System
10. OP-TM-EOP-002, Loss of 25^{o}F Subcooling Margin
11. OP-TM-EOP-006, LOCA Cooldown
12. OP-TM-EOP-010, Emergency Procedure Rules, Guides and Graphs
13. OP-TM-MAP-D0301, High Make-up Flow

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CA1

Initiating Condition:

Loss of all offsite and all onsite AC power to emergency busses for 15 minutes or longer.

Operating Mode Applicability:

5, 6, D

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. Loss of **ALL** offsite AC power to Emergency 4KV buses.

   AND

2. Failure of EG-Y-1A, EG-Y-1B Emergency Diesel Generators and EG-Y-4 SBO Diesel Generator to supply power to Emergency 4KV buses.

   AND

3. Failure to restore power to at least one Emergency 4KV bus in **< 15 minutes** from the time of loss of both offsite and onsite AC power.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses a total loss of AC power that compromises the performance of all SAFETY SYSTEMS requiring electric power including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal and the ultimate heat sink.

When in the cold shutdown, refueling, or defueled mode, this condition is not classified as a Site Area Emergency because of the increased time available to restore an emergency bus to service. Additional time is available due to the reduced core decay heat load, and the lower temperatures and pressures in various plant systems. Thus, when in these modes, this condition represents an actual or potential substantial degradation of the level of safety of the plant.

If ANY mitigative strategy is effective in supplying power to ANY one Emergency 4KV bus within 15 minutes from the time of loss of both offsite and onsite AC power, escalation to Alert shall not be considered.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level would be via IC CS6 or RS1.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CA1 (cont)

Basis Reference(s):

1. NEI 99-01 Rev 6, CA2
2. FSAR Section 8.2.2, Unit Distribution System
3. FSAR Section 8.2.3, Sources of Auxiliary Power
4. Technical Specification Section 3.7, Unit Electric Power System
5. 1107-1 Normal Electrical System
6. 1107-2A Emergency Electrical - 4KV and 480 Volt
7. OP-TM-AOP-020 Loss Of Station Power
8. 1107-3 Diesel Generator
9. 1107-9 SBO Diesel Generator
10. FSAR Section 8.5, Station Blackout

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CU1

Initiating Condition:

Loss of all but one AC power source to emergency buses for 15 minutes or longer.

Operating Mode Applicability:

5, 6, D

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. AC power capability to Emergency 4KV buses reduced to only one of the following power sources for **≥ 15 minutes**.
   - Auxiliary Transformer 1A
   - Auxiliary Transformer 1B
   - Emergency Diesel Generator EG-Y-1A
   - Emergency Diesel Generator EG-Y-1B
   - SBO Diesel Generator EG-Y-4

   AND

2. **ANY** additional single power source failure will result in a loss of **ALL** AC power to SAFETY SYSTEMS.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC describes a significant degradation of offsite and onsite AC power sources such that any additional single failure would result in a loss of all AC power to SAFETY SYSTEMS. In this condition, the sole AC power source may be powering one, or more than one, train of safety-related equipment.

When in the cold shutdown, refueling, or defueled mode, this condition is not classified as an Alert because of the increased time available to restore another power source to service. Additional time is available due to the reduced core decay heat load, and the lower temperatures and pressures in various plant systems. Thus, when in these modes, this condition is considered to be a potential degradation of the level of safety of the plant.

An “AC power source” is a source recognized in AOPs and EOPs, and capable of supplying required power to an emergency bus. Some examples of this condition are presented below.

- A loss of all offsite power with a concurrent failure of all but one emergency power source (e.g., an onsite diesel generator).
- A loss of all offsite power and loss of all emergency power sources (e.g., onsite diesel generators) with a single train of emergency buses being back-fed from the unit main generator.
- A loss of emergency power sources (e.g., onsite diesel generators) with a single train of emergency buses being back-fed from an offsite power source.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CU1 (cont)

Basis (cont):

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of power.

The subsequent loss of the remaining single power source would escalate the event to an Alert in accordance with IC CA1.

Basis Reference(s):

1. NEI 99-01 Rev 6 CU2
2. FSAR Section 8.2.2, Unit Distribution System
3. FSAR Section 8.2.3, Sources of Auxiliary Power
4. Technical Specification Section 3.7, Unit Electric Power System
5. 1107-1 Normal Electrical System
6. 1107-2A Emergency Electrical - 4KV and 480 Volt
7. OP-TM-AOP-020 Loss Of Station Power
8. 1107-3 Diesel Generator
9. 1107-9 SBO Diesel Generator
10. FSAR Section 8.5, Station Blackout

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CA2

Initiating Condition:

Hazardous event affecting SAFETY SYSTEM required for the current operating mode.

Operating Mode Applicability:

5, 6

Emergency Action Level (EAL):

Note: If it is determined that the conditions of CA2 are not met then assess the event via HU3, HU4, or HU6.

1. The occurrence of **ANY** of the following hazardous events:
   - Seismic event (earthquake)
   - Internal or external flooding event
   - High winds or tornado strike
   - FIRE
   - EXPLOSION
   - Other events with similar hazard characteristics as determined by the Shift Manager

   AND

2. **EITHER** of the following:
   a. Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM required by Technical Specifications for the current operating mode.

      OR

   b. The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure required by Technical Specifications for the current operating mode.

Basis:

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.

EXPLOSION: A rapid, violent and catastrophic failure of a piece of equipment due to combustion, chemical reaction or overpressurization. A release of steam (from high energy lines or components) or an electrical component failure (caused by short circuits, grounding, arcing, etc.) should not automatically be considered an explosion. Such events may require a post-event inspection to determine if the attributes of an explosion are present.

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

VISIBLE DAMAGE: Damage to a component or structure that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected component or structure.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CA2 (cont)

Basis (cont):

This IC addresses a hazardous event that causes damage to a SAFETY SYSTEM, or a structure containing SAFETY SYSTEM components, required for the current operating mode, "required", i.e. required to be operable by Technical Specifications for the current operating mode. This condition significantly reduces the margin to a loss or potential loss of a fission product barrier, and therefore represents an actual or potential substantial degradation of the level of safety of the plant. Manual or automatic electrical isolation of safety equipment due to flooding, in and of itself, does not constitute degraded performance and is classified under HU6.

EAL #2.a Basis

Addresses damage to a SAFETY SYSTEM train that is required to be operable by Technical Specifications for the current operating mode, and is in operation since indications for it will be readily available. The indications of degraded performance should be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

EAL #2.b Basis

Addresses damage to a SAFETY SYSTEM component that is required to be operable by Technical Specifications for the current operating mode, and is not in operation or readily apparent through indications alone, or to a structure containing SAFETY SYSTEM components. Operators will make this determination based on the totality of available event and damage report information. This is intended to be a brief assessment not requiring lengthy analysis or quantification of the damage.

Escalation of the emergency classification level would be via IC CS6 or RS1.

If the EAL conditions of CA2 are not met then assess the event via HU3, HU4, or HU6.

Basis Reference(s):

1. NEI 99-01 Rev 6, CA6

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CU3

Initiating Condition:

Loss of Vital DC power for 15 minutes or longer.

Operating Mode Applicability:

5, 6

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. Indicated voltage is **< 105 VDC** on required 125 VDC Distribution System 1A and 1B for **≥ 15 minutes**.

Basis:

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses a loss of Vital DC power which compromises the ability to monitor and control operable SAFETY SYSTEMS when the plant is in the cold shutdown or refueling mode. In these modes, the core decay heat load has been significantly reduced, and coolant system temperatures and pressures are lower; these conditions raise the time available to restore a vital DC bus to service. Thus, this condition is considered to be a potential degradation of the level of safety of the plant.

As used in this EAL, “required” means the Vital DC buses necessary to support operation of the in-service, or operable, train or trains of SAFETY SYSTEM equipment. For example, if Train A is out-of-service (inoperable) for scheduled outage maintenance work and Train B is in-service (operable), then a loss of Vital DC power affecting Train B would require the declaration of an Unusual Event. A loss of Vital DC power to Train A would not warrant an emergency classification.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Depending upon the event, escalation of the emergency classification level would be via IC CA6 or CA5, or an IC in Recognition Category R.

Basis Reference(s):

1. NEI 99-01 Rev 6, CU4
2. FSAR Section 8.2.2.6, 250/125 VDC System
3. 1107-2C Vital DC Electrical System
4. OP-TM-AOP-023, A DC System Failure
5. OP-TM-AOP-024, B DC System Failure

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CU4

Initiating Condition:

Loss of all onsite or offsite communications capabilities.

Operating Mode Applicability:

5, 6, D

Emergency Action Level (EAL):

1. Loss of **ALL** Table C1 **Onsite** communications capability affecting the ability to perform routine operations.

   OR

2. Loss of **ALL** Table C1 **Offsite** communication capability affecting the ability to perform offsite notifications.

   OR

3. Loss of **ALL** Table C1 **NRC** communication capability affecting the ability to perform NRC notifications.

Table C1 Communications Capability

System	Onsite	Offsite	NRC
Radios	X		
Plant page	X		
Plant Telephone System	X		
Commercial Telephones	X	X	X
NARS		X	
ENS		X	X
HPN		X	X
Satellite phones		X	X

Basis:

This IC addresses a significant loss of onsite, offsite, or NRC communications capabilities. While not a direct challenge to plant or personnel safety, this event warrants prompt notifications to Offsite Response Organizations (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, etc.).

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

EAL #2 Basis

Addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The OROs referred to here are listed in procedure EP-MA-114- 100-F-01, State / Local Event Notification Form.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CU4 (cont)

Basis (cont):

EAL #3 Basis

Addresses a total loss of the communications methods used to notify the NRC of an emergency declaration.

Basis Reference(s):

1. NEI 99-01 Rev 6, CU5
2. 1105-12 Communications System
3. FSAR Section 7.4.4, Communication

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CA5

Initiating Condition:

Inability to maintain the plant in cold shutdown.

Operating Mode Applicability:

5, 6

Emergency Action Level (EAL):

Notes:

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
- A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when heat removal function is available does not warrant classification.

1. UNPLANNED rise in RCS temperature **> 200ºF** for **> Table C2 duration**.

   OR

2. UNPLANNED RCS pressure rise **> 10 psig** as a result of temperature rise. (This EAL does not apply in solid plant conditions.)

Table C2 RCS Heat-up Duration Thresholds

RCS Status	Containment Closure Status	Heat-up Duration
Intact	Not Applicable	60 minutes*
Not Intact **OR** Reduced Inventory	Established	20 minutes*
	Not Established	0 minutes
* If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced, then EAL #1 is **not** applicable.		

Basis:

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.

CONTAINMENT CLOSURE: The procedurally defined conditions or actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions.

RCS is intact when the RCS pressure boundary is in its normal condition for the Cold Shutdown mode of operation (e.g. no freeze seals, etc.).

This IC addresses conditions involving a loss of decay heat removal capability or an addition of heat to the RCS in excess of that which can currently be removed. Either condition represents an actual or potential substantial degradation of the level of safety of the plant.

A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when the heat removal function is available does not warrant a classification.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CA5 (cont)

Basis (cont):

The RCS Heat-up Duration Thresholds table addresses a rise in RCS temperature when CONTAINMENT CLOSURE is established but the RCS is not intact, or RCS inventory is reduced (e.g., mid-loop operation in PWRs). The 20-minute criterion was included to allow time for operator action to address the temperature rise.

The RCS Heat-up Duration Thresholds table also addresses a rise in RCS temperature with the RCS intact. The status of CONTAINMENT CLOSURE is not crucial in this condition since the intact RCS is providing a high pressure barrier to a fission product release. The 60-minute time frame should allow sufficient time to address the temperature rise without a substantial degradation in plant safety.

Finally, in the case where there is a rise in RCS temperature, the RCS is not intact or is at reduced inventory, and CONTAINMENT CLOSURE is not established, no heat-up duration is allowed (i.e., 0 minutes). This is because 1) the evaporated reactor coolant may be released directly into the Containment atmosphere and subsequently to the environment, and 2) there is reduced reactor coolant inventory above the top of irradiated fuel.

EAL #2 Basis

Provides a pressure-based indication of RCS heat-up.

Escalation of the emergency classification level would be via IC CS6 or RS1.

Basis Reference(s):

1. NEI 99-01 Rev 6, CA3
2. Technical Specifications sections: 1.2.1, 1.7.a and c
3. Technical Specifications sections: 3.6.12.a
4. Technical Specifications sections: 3.6.5
5. Technical Specifications sections: 3.8.6
6. 1101-3 Containment Integrity and Access Limits
7. OP-TM-EOP-030, Loss of Decay Heat Removal
8. Outage Fuel Protection Criteria Document

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CU5

Initiating Condition:

UNPLANNED rise in RCS temperature.

Operating Mode Applicability:

5, 6

Emergency Action Level (EAL):

Notes:

- The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
- A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when heat removal function is available does not warrant classification.

1. UNPLANNED rise in RCS temperature **> 200ºF**.

   OR

2. Loss of the following for **≥ 15 minutes**.
   - **ALL** RCS temperature indications

     AND

   - **ALL** RCS level indications

Basis:

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.

CONTAINMENT CLOSURE: The procedurally defined conditions or actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions.

This IC addresses an UNPLANNED rise in RCS temperature above the Technical Specification cold shutdown temperature limit, or the inability to determine RCS temperature and level, represents a potential degradation of the level of safety of the plant. If the RCS is not intact and CONTAINMENT CLOSURE is not established during this event, the Emergency Director should also refer to IC CA5.

RCS is intact when the RCS pressure boundary is in its normal condition for the Cold Shutdown mode of operation (e.g. no freeze seals, etc.).

A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when the heat removal function is available does not warrant a classification.

EAL #1 involves a loss of decay heat removal capability, or an addition of heat to the RCS in excess of that which can currently be removed, such that reactor coolant temperature cannot be maintained below the cold shutdown temperature limit specified in Technical Specifications. During this condition, there is no immediate threat of fuel damage because the core decay heat load has been reduced since the cessation of power operation.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CU5 (cont)

Basis (cont):

During an outage, the level in the reactor vessel will normally be maintained above the reactor vessel flange. Refueling evolutions that lower water level below the reactor vessel flange are carefully planned and controlled. A loss of forced decay heat removal at reduced inventory may result in a rapid rise in reactor coolant temperature depending on the time after shutdown.

EAL #2 reflects a condition where there has been a significant loss of instrumentation capability necessary to monitor RCS conditions and operators would be unable to monitor key parameters necessary to assure core decay heat removal. During this condition, there is no immediate threat of fuel damage because the core decay heat load has been reduced since the cessation of power operation.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of indication.

Escalation to Alert would be via IC CA6 based on an inventory loss or IC CA5 based on exceeding plant configuration-specific time criteria.

Basis Reference(s):

1. NEI 99-01 Rev 6, CU3
2. 1103-11 RCS Water Level Control
3. FSAR Section 7.3.2, Non-Nuclear Instrumentation
4. 1302-6.6 RCS Temp/Press, TSAT Monitor, ATWS and DSS Calibration
5. NEI 99-01 Rev 5, CU4
6. OP-TM-EOP-030, Loss of Decay Heat Removal

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CG6

Initiating Condition:

Loss of reactor vessel/RCS inventory affecting fuel clad integrity with containment challenged.

Operating Mode Applicability:

5, 6

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. a. Reactor Vessel / RCS level **cannot** be monitored for **≥ 30 minutes**.

   AND

   b. Core uncovery is indicated by **ANY** of the following:

   - Table C3 indications of a sufficient magnitude to indicate core uncovery.

     OR

   - Erratic Source Range Neutron Monitor indication.

     OR

   - Radiation Monitor RM-G-6 or RM-G-7 reading **> 3 R/hr**.

   AND

   c. **ANY** Containment Challenge Indication (Table C4).

Table C3 Indications of RCS Leakage

• UNPLANNED Reactor Bldg Sump level rise* • UNPLANNED Auxiliary Bldg. Sump level rise* • UNPLANNED BWST level rise* • UNPLANNED RCDT level rise* • UNPLANNED rise in RCS makeup • Observation of leakage or inventory loss
* Rise in level is attributed to a loss of reactor vessel/RCS inventory.

Table C4 Containment Challenge Indications

• Hydrogen Concentration in Containment **> 4%** • UNPLANNED rise in containment pressure • CONTAINMENT CLOSURE **not** established*
*if CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute core uncovery time limit, then escalation to a General Emergency is not required.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CG6 (cont)

Basis:

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.

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.

CONTAINMENT CLOSURE: The procedurally defined conditions or actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions.

This IC addresses the inability to restore and maintain reactor vessel level above the top of active fuel with containment challenged. This condition represents actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity. Releases can be reasonably expected to exceed EPA Protective Action Guidelines (PAG) exposure levels offsite for more than the immediate site area.

Following an extended loss of core decay heat removal and inventory makeup, decay heat will cause reactor coolant boiling and a further reduction in reactor vessel level. If RCS/reactor vessel level cannot be restored, fuel damage is probable.

With CONTAINMENT CLOSURE not established, there is a high potential for a direct and unmonitored release of radioactivity to the environment. If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, then declaration of a General Emergency is not required.

The existence of an explosive mixture means, at a minimum, that the containment atmospheric hydrogen concentration is sufficient to support a hydrogen burn (i.e., at the lower deflagration limit). A hydrogen burn will raise containment pressure and could result in collateral equipment damage leading to a loss of containment integrity. It therefore represents a challenge to Containment integrity.

In the early stages of a core uncovery event, it is unlikely that hydrogen buildup due to a core uncovery could result in an explosive gas mixture in containment. If all installed hydrogen gas monitors are out-of-service during an event leading to fuel cladding damage, it may not be possible to obtain a containment hydrogen gas concentration reading as ambient conditions within the containment will preclude personnel access. During periods when installed containment hydrogen gas monitors are out-of-service, operators may use the other listed indications to assess whether or not containment is challenged.

The 30-minute criterion is tied to a readily recognizable event start time (i.e., the total loss of ability to monitor level), and allows sufficient time to monitor, assess and correlate reactor and plant conditions to determine if core uncovery has actually occurred (i.e., to account for various accident progression and instrumentation uncertainties). It also allows sufficient time for performance of actions to terminate leakage, recover inventory control/makeup equipment and/or restore level monitoring.

The inability to monitor reactor vessel/RCS level may be caused by instrumentation and/or power failures, or water level dropping below the range of available instrumentation. If water level cannot be monitored, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the reactor vessel/RCS.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CG6 (cont)

Basis (cont):

These EALs address concerns raised by Generic Letter 88-17, *Loss of Decay Heat Removal*; SECY 91-283, *Evaluation of Shutdown and Low Power Risk Issues*; NUREG- 1449, *Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States*; and NUMARC 91-06, *Guidelines for Industry Actions to Assess Shutdown Management*.

Basis Reference(s):

1. NEI 99-01 Rev 6, CG1
2. 1103-11 RCS Water Level Control
3. 1101-3 Containment Integrity and Access Limits
4. OP-TM-EOP-030, Loss of Decay Heat Removal
5. FSAR Sections 5.2, Reactor Building
6. FSAR Sections 6.5.2, Hydrogen Monitoring
7. FSAR Sections 6.5.3, Hydrogen Generation
8. Technical Specifications 3.5.5, Accident Monitoring Instrumentation
9. EP-AEL-0501, Estimation of Radiation Monitor Readings Indicating Core Uncovery During Refuel
10. 1301-1 Shift and Daily Checks, Data Sheet 3

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CS6

Initiating Condition:

Loss of reactor vessel/RCS inventory affecting core decay heat removal capability.

Operating Mode Applicability:

5, 6

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. Reactor Vessel / RCS level **cannot** be monitored for **≥ 30 minutes**.

   AND

2. Core uncovery is indicated by **ANY** of the following:

   - Table C3 indications of a sufficient magnitude to indicate core uncovery.

     OR

   - Erratic Source Range Neutron Monitor indication.

     OR

   - Radiation Monitor RM-G-6 or RM-G-7 reading **> 3 R/hr**.

Table C3 Indications of RCS Leakage

• UNPLANNED Reactor Bldg Sump level rise*
• UNPLANNED Auxiliary Bldg. Sump level rise*
• UNPLANNED BWST level rise*
• UNPLANNED RCDT level rise*
• UNPLANNED rise in RCS makeup
• Observation of leakage or inventory loss
* Rise in level is attributed to a loss of reactor vessel/RCS inventory.

Basis:

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.

CONTAINMENT CLOSURE: The procedurally defined conditions or actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions.

The lost inventory may be due to a RCS component failure, a loss of configuration control or prolonged boiling of reactor coolant. These conditions entail major failures of plant functions needed for protection of the public and thus warrant a Site Area Emergency declaration.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CS6 (cont)

Basis (cont):

Following an extended loss of core decay heat removal and inventory makeup, decay heat will cause reactor coolant boiling and a further reduction in reactor vessel level. If RCS/reactor vessel level cannot be restored, fuel damage is probable.

Outage/shutdown contingency plans typically provide for re-establishing or verifying CONTAINMENT CLOSURE following a loss of heat removal or RCS inventory control functions.

The 30-minute criterion is tied to a readily recognizable event start time (i.e., the total loss of ability to monitor level), and allows sufficient time to monitor, assess and correlate reactor and plant conditions to determine if core uncovery has actually occurred (i.e., to account for various accident progression and instrumentation uncertainties). It also allows sufficient time for performance of actions to terminate leakage, recover inventory control/makeup equipment and/or restore level monitoring.

The inability to monitor reactor vessel/RCS level may be caused by instrumentation and/or power failures, or water level dropping below the range of available instrumentation. If water level cannot be monitored, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the reactor vessel/RCS.

These EALs address concerns raised by Generic Letter 88-17, *Loss of Decay Heat Removal*; SECY 91-283, *Evaluation of Shutdown and Low Power Risk Issues*; NUREG- 1449, *Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States*; and NUMARC 91-06, *Guidelines for Industry Actions to Assess Shutdown Management*.

Escalation of the emergency classification level would be via IC CG6 or RG1.

Basis Reference(s):

1. NEI 99-01 Rev 6, CS1
2. OP-TM-PRF1-0405 RB Sump Level Hi
3. 1101-3 Containment Integrity and Access Limits
4. 1301-1 Shift and Daily Checks, Data Sheet 3
5. 1103-11 RCS Water Level Control
6. OP-TM-EOP-030, Loss of Decay Heat Removal

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CA6

Initiating Condition:

Loss of reactor vessel/RCS inventory.

Operating Mode Applicability:

5, 6

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. Loss of Reactor Vessel / RCS inventory as indicated by RCS level **< 0 inches** on Draindown Level indicator.

   OR

2. a. Reactor Vessel / RCS level **cannot** be monitored for **≥ 15 minutes**.

      AND

   b. Loss of Reactor Vessel / RCS inventory per Table C3 indications.

Table C3 Indications of RCS Leakage

• UNPLANNED Reactor Bldg Sump level rise*
• UNPLANNED Auxiliary Bldg. Sump level rise*
• UNPLANNED BWST level rise*
• UNPLANNED RCDT level rise*
• UNPLANNED rise in RCS makeup
• Observation of leakage or inventory loss
* Rise in level is attributed to a loss of reactor vessel/RCS inventory.

Basis:

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.

This IC addresses conditions that are precursors to a loss of the ability to adequately cool irradiated fuel (i.e., a precursor to a challenge to the fuel clad barrier). This condition represents a potential substantial reduction in the level of plant safety.

EAL #1 Basis

A lowering of water level below 0 inches on Draindown Level indicator indicates that operator actions have not been successful in restoring and maintaining reactor vessel/RCS water level. The heat-up rate of the coolant will rise as the available water inventory is reduced. A continuing drop in water level will lead to core uncovery.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CA6 (cont)

Basis (cont):

Although related, EAL #1 is concerned with the loss of RCS inventory and not the potential concurrent effects on systems needed for decay heat removal (e.g., loss of a Residual Heat Removal suction point). A rise in RCS temperature caused by a loss of decay heat removal capability is evaluated under IC CA5.

EAL #2 Basis

The inability to monitor reactor vessel/RCS level may be caused by instrumentation and/or power failures, or water level dropping below the range of available instrumentation. If water level cannot be monitored, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the reactor vessel/RCS.

The 15-minute duration for the loss of level indication was chosen because it is half of the EAL duration specified in IC CS6.

If the reactor vessel/RCS inventory level continues to lower, then escalation to Site Area Emergency would be via IC CS6.

Basis Reference(s):

1. NEI 99-01 Rev 6, CA1
2. OP-TM-PRF1-0405 RB Sump Level Hi
3. 1301-1 Shift and Daily Checks, Data Sheet 3
4. 1103-11 RCS Water Level Control
5. OP-TM-EOP-030, Loss of Decay Heat Removal

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CU6

Initiating Condition:

UNPLANNED loss of reactor vessel/RCS inventory for 15 minutes or longer.

Operating Mode Applicability:

5, 6

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. UNPLANNED loss of reactor coolant results in the inability to restore and maintain Reactor Vessel / RCS level to **> procedurally established lower limit** for **≥ 15 minutes**.

   OR

2. a. Reactor Vessel / RCS level **cannot** be monitored.

      AND

   b. Loss of Reactor Vessel / RCS inventory per Table C3 indications.

Table C3 Indications of RCS Leakage

• UNPLANNED Reactor Bldg Sump level rise*
• UNPLANNED Auxiliary Bldg. Sump level rise*
• UNPLANNED BWST level rise*
• UNPLANNED RCDT level rise*
• UNPLANNED rise in RCS makeup
• Observation of leakage or inventory loss
* Rise in level is attributed to a loss of reactor vessel/RCS inventory.

Basis:

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.

This IC addresses the inability to restore and maintain water level to a required minimum level (or the lower limit of a level band), or a loss of the ability to monitor reactor vessel/RCS level concurrent with indications of coolant leakage. Either of these conditions is considered to be a potential degradation of the level of safety of the plant.

The procedurally established lower limit is not an operational band established above the procedural limit to allow for operator action prior to exceeding the procedural limit, but it is the procedurally established lower limit.

Refueling evolutions that lower RCS water inventory are carefully planned and controlled. An UNPLANNED event that results in water level decreasing below a procedurally required limit warrants the declaration of an Unusual Event due to the reduced water inventory that is available to keep the core covered.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Cold Shutdown / Refueling System Malfunctions

CU6 (cont)

Basis (cont):

EAL #1 Basis

Recognizes that the minimum required reactor vessel/RCS level can change several times during the course of a refueling outage as different plant configurations and system lineups are implemented. This EAL is met if the minimum level, specified for the current plant conditions, cannot be maintained for 15 minutes or longer. The minimum level is typically specified in the applicable operating procedure but may be specified in another controlling document.

The 15-minute threshold duration allows sufficient time for prompt operator actions to restore and maintain the expected water level. This criterion excludes transient conditions causing a brief lowering of water level.

EAL #2 Basis

Addresses a condition where all means to determine reactor vessel/RCS level have been lost. In this condition, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the reactor vessel/RCS.

Continued loss of RCS inventory may result in escalation to the Alert emergency classification level via either IC CA6 or CA5.

Basis Reference(s):

1. NEI 99-01, Rev. 6 CU1
2. Technical Specification 3.1.6. Leakage
3. OP-TM-220-251 RCS Leak Rate Determination Using PPC
4. OP-TM-220-252, Primary – To – Secondary Leakrate Determination (OTSG Leakage): Normal Operations
5. OP-TM-MAP-C0105 RCS Draindown LVL HI/LO
6. OP-TM-PRF1-0405 RB Sump Level HI
7. UFSAR 6.4.3, Bases of Leakage Estimate
8. 1103-11 RCS Water Level Control
9. OP-TM-EOP-030, Loss of Decay Heat Removal

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HG1

Initiating Condition:

HOSTILE ACTION resulting in loss of physical control of the facility.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

1. A notification from the Security Force that a HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA.

   AND

2. a. **ANY** Table H1 safety function **cannot** be controlled or maintained.

   OR

   b. Damage to spent fuel has occurred or is IMMINENT.

Table H1 Safety Functions

- Reactivity Control (ability to shut down the reactor and keep it shutdown)
- Core Cooling (ability to cool the core)
- RCS Heat Removal (ability to maintain heat sink)

Basis:

HOSTILE ACTION: An act toward CRANE 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 site. 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).

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

PROJECTILE: An object directed toward CRANE that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA: An area that normally encompasses all controlled areas within the security protected area fence.

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.

HOSTILE FORCE: Any 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.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HG1 (cont)

Basis (cont):

This IC addresses an event in which a HOSTILE FORCE has taken physical control of the facility to the extent that the plant staff can no longer operate equipment necessary to maintain key safety functions. It also addresses a HOSTILE ACTION leading to a loss of physical control that results in actual or IMMINENT damage to spent fuel due to 1) damage to a spent fuel pool cooling system (e.g., pumps, heat exchangers, controls, etc.) or, 2) loss of spent fuel pool integrity such that sufficient water level cannot be maintained.

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, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program].*

Basis Reference(s):

1. NEI 99-01, Rev. 6 HG1
2. Security and Safeguards Contingency Plan Station Security Plan – Appendix C

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HS1

Initiating Condition:

HOSTILE ACTION within the PROTECTED AREA.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

1. A notification from the Security Force that a HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA.

Basis:

HOSTILE ACTION: An act toward CRANE 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 site. 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).

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

PROJECTILE: An object directed toward CRANE that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA: An area that normally encompasses all controlled areas within the security protected area fence.

HOSTILE FORCE: Any 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.

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

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, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]*.

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 Site Area Emergency 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.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HS1 (cont)

Basis (cont):

This IC does not apply to a HOSTILE ACTION directed at an ISFSI PROTECTED AREA located outside the plant PROTECTED AREA; such an attack should be assessed using IC HA1. It also 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.

Escalation of the emergency classification level would be via IC HG1.

Basis Reference(s):

1. NEI 99-01 Rev 6, HS1
2. Security and Safeguards Contingency Plan Station Security Plan – Appendix C

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HA1

Initiating Condition:

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

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

1. A validated notification from NRC of an aircraft attack threat **< 30 minutes** from the site.

   OR

2. Notification by the Security Force that a HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLED AREA.

Basis:

HOSTILE ACTION: An act toward CRANE 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 site. 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).

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

PROJECTILE: An object directed toward CRANE that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA: An area that normally encompasses all controlled areas within the security protected area fence.

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.

HOSTILE FORCE: Any 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.

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, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]*.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HA1 (cont)

Basis (cont):

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 Offsite Response Organizations, 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 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 OP-TM-AOP-008, Security Threat / Intrusion.

EAL #2 is applicable for any HOSTILE ACTION occurring, or that has occurred, in the OWNER CONTROLLED AREA. This includes any action directed against an ISFSI that is located outside the plant PROTECTED AREA.

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 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, FBI, 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.

Escalation of the emergency classification level would be via IC HS1.

Basis Reference(s):

1. NEI 99-01 Rev 6, HA1
2. Security and Safeguards Contingency Plan Station Security Plan – Appendix C
3. OP-TM-AOP-008, Security Threat / Intrusion

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HU1

Initiating Condition:

Confirmed SECURITY CONDITION or threat.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

1. Notification of a credible security threat directed at the site as determined per SY-AA-101-132, Security Assessment and Response to Unusual Activities.

   OR

2. A validated notification from the NRC providing information of an aircraft threat.

   OR

3. Notification by the Security Force of a SECURITY CONDITION that does **not** involve a HOSTILE ACTION.

Basis:

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

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

HOSTILE ACTION: An act toward CRANE 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 site. 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).

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

PROJECTILE: An object directed toward CRANE that could cause concern for its continued operability, reliability, or personnel safety.

This IC addresses events that pose a threat to plant personnel or SAFETY SYSTEM equipment, 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 or 10 CFR § 50.72. Security events assessed as HOSTILE ACTIONS are classifiable under ICs HA1, HS1 and HG1.

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.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HU1 (cont)

Basis (cont):

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 addresses the receipt of a credible security threat. The credibility of the threat is assessed in accordance with SY-AA-101-132.

EAL #2 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 NORAD through the NRC. Validation of the threat is performed in accordance with OP-TM- AOP-008, Security Threat / Intrusion.

EAL #3 references Security Force 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 § 2.39 information.

Escalation of the emergency classification level would be via IC HA1.

Basis Reference(s):

1. NEI 99-01 Rev 6, HU1
2. SY-AA-101-132, Security Assessment and Response to Unusual Activities
3. Security And Safeguards Contingency Plan Station Security Plan – Appendix C

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HS2

Initiating Condition:

Inability to control a key safety function from outside the Control Room.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. A Control Room evacuation has resulted in plant control being transferred from the Control Room to alternate locations per OP-TM-EOP-020, Cooldown from Outside the Control Room.

   AND

2. Control of **ANY** Table H1 key safety function is **not** reestablished in **< 15 minutes**.

Table H1 Safety Functions

- Reactivity Control (ability to shut down the reactor and keep it shutdown)
- Core Cooling (ability to cool the core)
- RCS Heat Removal (ability to maintain heat sink)

Basis:

The time period to establish control of the plant starts when either:

a. Control of the plant is no longer maintained in the Main Control Room

   OR

b. The last Operator has left the Main Control Room.

This IC addresses an evacuation of the Control Room that results in transfer of plant control to alternate locations, and the control of a key safety function cannot be reestablished in a timely manner. The failure to gain control of a key safety function following a transfer of plant control to alternate locations is a precursor to a challenge to any fission product barriers within a relatively short period of time.

The determination of whether or not “control” is established at the remote safe shutdown location(s) is based on Emergency Director judgment. The Emergency Director is expected to make a reasonable, informed judgment within 15 minutes whether or not the operating staff has control of key safety functions from the remote safe shutdown location(s).

Escalation of the emergency classification level would be via IC FG1 or CG6.

Basis Reference(s):

1. NEI 99-01, Rev 6 HS6
2. OP-TM-EOP-020, Cooldown from Outside the Control Room

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HA2

Initiating Condition:

Control Room evacuation resulting in transfer of plant control to alternate locations.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

1. A Control Room evacuation has resulted in plant control being transferred from the Control Room to alternate locations per OP-TM-EOP-020, Cooldown from Outside the Control Room.

Basis:

This IC addresses an evacuation of the Control Room that results in transfer of plant control to alternate locations outside the Control Room. The loss of the ability to control the plant from the Control Room is considered to be a potential substantial degradation in the level of plant safety.

Following a Control Room evacuation, control of the plant will be transferred to alternate shutdown locations. The necessity to control a plant shutdown from outside the Control Room, in addition to responding to the event that required the evacuation of the Control Room, will present challenges to plant operators and other on-shift personnel. Activation of the ERO and emergency response facilities will assist in responding to these challenges.

Escalation of the emergency classification level would be via IC HS2.

Basis Reference(s):

1. NEI 99-01, Rev 6 HA6
2. OP-TM-EOP-020, Cooldown from Outside the Control Room

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HU3

Initiating Condition:

FIRE potentially degrading the level of safety of the plant.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

Note: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

1. A FIRE in **ANY** Table H2 area is **not** extinguished in **< 15-minutes** of **ANY** of the following FIRE detection indications:
   - Report from the field (i.e., visual observation)
   - Receipt of multiple (more than 1) fire alarms or indications
   - Field verification of a single fire alarm

   OR

2. a. Receipt of a single fire alarm in **ANY** Table H2 area (i.e., no other indications of a FIRE).

   AND

   b. The existence of a FIRE is **not** verified in **< 30 minutes** of alarm receipt.

   OR

3. A FIRE within the plant PROTECTED AREA not extinguished in **< 60-minutes** of the initial report, alarm or indication.

   OR

4. A FIRE within the plant PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish.

Table H2 Vital Areas

- Reactor Building
- Intake Building
- Intermediate Building
- Control Tower
- Auxiliary and Fuel Handling Buildings
- 1A and 1B Diesel Generator Buildings
- BWST
- CST

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HU3 (cont)

Basis:

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.

PROTECTED AREA: An area that normally encompasses all controlled areas within the security protected area fence.

This IC addresses the magnitude and extent of FIRES that may be indicative of a potential degradation of the level of safety of the plant.

EAL #1 Basis

The intent of the 15-minute duration is to size the FIRE and to discriminate against small FIRES that are readily extinguished (e.g., smoldering waste paper basket). In addition to alarms, other indications of a FIRE could be a drop in fire main pressure, automatic activation of a suppression system, etc.

Upon receipt, operators will take prompt actions to confirm the validity of an initial fire alarm, indication, or report. For EAL assessment purposes, the emergency declaration clock starts at the time that the initial alarm, indication, or report was received, and not the time that a subsequent verification action was performed. Similarly, the fire duration clock also starts at the time of receipt of the initial alarms, indication or report.

EAL #2 Basis

Addresses receipt of a single fire alarm, and the existence of a FIRE is not verified (i.e., proved or disproved) within 30-minutes of the alarm. Upon receipt, operators will take prompt actions to confirm the validity of a single fire alarm. For EAL assessment purposes, the 30-minute clock starts at the time that the initial alarm was received, and not the time that a subsequent verification action was performed.

A single fire alarm, absent other indication(s) of a FIRE, may be indicative of equipment failure or a spurious activation, and not an actual FIRE. For this reason, additional time is allowed to verify the validity of the alarm. The 30-minute period is a reasonable amount of time to determine if an actual FIRE exists; however, after that time, and absent information to the contrary, it is assumed that an actual FIRE is in progress.

If an actual FIRE is verified by a report from the field, then EAL #1 is immediately applicable, and the emergency must be declared if the FIRE is not extinguished within 15-minutes of the report. If the alarm is verified to be due to an equipment failure or a spurious activation, and this verification occurs within 30-minutes of the receipt of the alarm, then this EAL is not applicable and no emergency declaration is warranted.

EAL #3 Basis

In addition to a FIRE addressed by EAL #1 or EAL #2, a FIRE within the plant PROTECTED AREA not extinguished within 60-minutes may also potentially degrade the level of plant safety.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HU3 (cont)

Basis (cont):

EAL #4 Basis

If a FIRE within the plant PROTECTED AREA is of sufficient size to require a response by an offsite firefighting agency (e.g., a local town Fire Department), then the level of plant safety is potentially degraded. The dispatch of an offsite firefighting agency to the site requires an emergency declaration only if it is needed to actively support firefighting efforts because the fire is beyond the capability of the Fire Brigade to extinguish. Declaration is not necessary if the agency resources are placed on stand-by, or supporting post-extinguishment recovery or investigation actions.

Basis-Related Requirements from Appendix R

Appendix R to 10 CFR 50, states in part:

> Criterion 3 of Appendix A to this part specifies that "Structures, systems, and components important to safety shall be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions."
>
> When considering the effects of fire, those systems associated with achieving and maintaining safe shutdown conditions assume major importance to safety because damage to them can lead to core damage resulting from loss of coolant through boil-off.
>
> Because fire may affect safe shutdown systems and because the loss of function of systems used to mitigate the consequences of design basis accidents under post-fire conditions does not per se impact public safety, the need to limit fire damage to systems required to achieve and maintain safe shutdown conditions is greater than the need to limit fire damage to those systems required to mitigate the consequences of design basis accidents.

In addition, Appendix R to 10 CFR 50, requires, among other considerations, the use of 1-hour fire barriers for the enclosure of cable and equipment and associated non-safety circuits of one redundant train (G.2.c). As used in EAL #2, the 30-minutes to verify a single alarm is well within this worst-case 1-hour time period.

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via IC CA2 or MA5.

Basis Reference(s):

1. NEI 99-01, Rev 6 HU4
2. FSAR Figure 2.1-3, Extended Plot Plan TMINS
3. FSAR Section 5.1, Class I Structures, Components, and Systems
4. OP-TM-AOP-001, Fire
5. OP-TM-EOP-020, Cooldown Outside of Control Room

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HU4

Initiating Condition:

Seismic event greater than OBE levels.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

Note: For emergency classification if EAL 2.b is not able to be confirmed, then the occurrence of a seismic event is confirmed in manner deemed appropriate by the Shift Manager or Emergency Director in ≤ 15 mins of the event.

1. Seismic event **> Operating Basis Earthquake (OBE)** as indicated by seismic Alarms **PRF-1-3** Operating Basis earthquake.

   OR

2. When Seismic Monitoring Equipment is **not** available:
   a. Control Room personnel feel an actual or potential seismic event.

      AND

   b. **ANY** one of the following confirmed in **≤ 15 mins** of the event:
      - The earthquake resulted in Modified Mercalli Intensity (MMI) **≥ VI** and occurred **≤ 3.5 miles** of the plant.
      - The earthquake was magnitude **≥ 6.0**.
      - The earthquake was magnitude **≥ 5.0** and occurred **≤ 125 miles** of the plant.

Basis:

This IC addresses a seismic event that results in accelerations at the plant site greater than those specified for an Operating Basis Earthquake (OBE)[1]. An earthquake greater than an OBE but less than a Safe Shutdown Earthquake (SSE)[2] should have no significant impact on safety-related systems, structures and components; however, some time may be required for the plant staff to ascertain the actual post-event condition of the plant (e.g., performs walk-downs and post-event inspections). Given the time necessary to perform walk-downs and inspections, and fully understand any impacts, this event represents a potential degradation of the level of safety of the plant.

Event verification with external sources should not be necessary during or following an OBE. Earthquakes of this magnitude should be readily felt by onsite personnel and recognized as a seismic event (e.g., typical lateral accelerations are in excess of 0.08g). The Shift Manager or Emergency Director may seek external verification if deemed appropriate (e.g., a call to the USGS, check internet news sources, etc.); however, the verification action must not preclude a timely emergency declaration.

[1] An OBE is vibratory ground motion for which those features of a nuclear power plant necessary for continued operation without undue risk to the health and safety of the public will remain functional.

[2] An SSE is vibratory ground motion for which certain (generally, safety-related) structures, systems, and components must be designed to remain functional.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HU4 (cont)

Basis (cont):

EAL #2.b and the accompanying note is included to ensure that a declaration does not result from felt vibrations caused by a non-seismic source (e.g., a dropped load). The Shift Manager or Emergency Director may seek external verification if deemed appropriate (e.g., call to USGS, check internet source, etc.) however, the verification action must not preclude a timely emergency declaration. This guidance recognizes that it may cause the site to declare an Unusual Event while another site, similarly affected but with readily available OBE indications in the Control Room, may not.

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via IC CA2 or MA5.

Basis Reference(s):

1. NEI 99-01, Rev 6 HU2
2. OP-TM-AOP-003, Earthquake
3. PRF 1-3 Operating Bases Earthquake
4. PRF 1-2 Threshold Seismic Event
5. US NRC Reg. Guide 1.166, Pre-Earthquake Planning and Immediate Nuclear Power Plant Operator Earthquake Actions.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HA5

Initiating Condition:

Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown.

Operating Mode Applicability:

4, 5, 6

Emergency Action Level (EAL):

Note: If the equipment in the listed room or area was already inoperable, or out of service, before the event occurred, then no emergency classification is warranted.

1. Release of a toxic, corrosive, asphyxiant or flammable gas in **ANY** Table H3 area.

   AND

2. Entry into the room or area is prohibited or impeded.

Table H3 Areas with Entry Related Mode Applicability

Area	Entry Related Mode Applicability
Auxiliary Building • 281’ shielded area • 305’ above DH Vaults	Modes 4, 5, and 6
Fuel Handling Building • 281’ 1C ES Vlvs MCC	

Basis:

This IC addresses an event involving a release of a hazardous gas that precludes or impedes access to equipment necessary to transition the plant from normal plant operation to cooldown and shutdown as specified in normal plant procedures. This condition represents an actual or potential substantial degradation of the level of safety of the plant.

Assuming all plant equipment is operating as designed, normal operation is capable from the Main Control Room (MCR). The plant is also able to transition into a hot shutdown condition from the MCR, therefore Table H3 is a list of plant rooms or areas with entry-related mode applicability that contain equipment which require a manual/local action necessary to transition the plant from normal plant operation to cooldown and shutdown as specified in normal operating procedures (establish shutdown cooling), where if this action is not completed the plant would not be able to attain and maintain cold shutdown. This Table does not include rooms or areas for which entry is required solely to perform actions of an administrative or record keeping nature (e.g., normal rounds or routine inspections).

This Table does not include the Control Room since adequate engineered safety/design features are in place to preclude a Control Room evacuation due to the release of a hazardous gas.

An Alert declaration is warranted if entry into the affected room/area is, or may be, procedurally required during the plant operating mode in effect and the gaseous release preclude the ability to place shutdown cooling in service. The emergency classification is not contingent upon whether entry is actually necessary at the time of the release.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HA5 (cont)

Basis (cont):

Evaluation of the IC and EAL do not require atmospheric sampling; it only requires the Emergency Director's judgment that the gas concentration in the affected room/area is sufficient to preclude or significantly impede procedurally required access. This judgment may be based on a variety of factors including an existing job hazard analysis, report of ill effects on personnel, advice from a subject matter expert or operating experience with the same or similar hazards. Access should be considered as impeded if extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is not routinely employed).

An emergency declaration is not warranted if any of the following conditions apply.

- The plant is in an operating mode different than the mode specified for the affected room/area (i.e., entry is not required during the operating mode in effect at the time of the gaseous release). For example, the plant is in Mode 1 when the gaseous release occurs, and the procedures used for normal operation, cooldown and shutdown do not require entry into the affected room until Mode 4.
- The gas release is a planned activity that includes compensatory measures which address the temporary inaccessibility of a room or area (e.g., fire suppression system testing).
- The action for which room/area entry is required is of an administrative or record keeping nature (e.g., normal rounds or routine inspections).
- The access control measures are of a conservative or precautionary nature, and would not actually prevent or impede a required action.

An asphyxiant is a gas capable of reducing the level of oxygen in the body to dangerous levels. Most commonly, asphyxiants work by merely displacing air in an enclosed environment. This reduces the concentration of oxygen below the normal level of around 19%, which can lead to breathing difficulties, unconsciousness or even death.

This EAL does not apply to firefighting activities that generate smoke or that automatically or manually activate a fire suppression system in an area.

The Operating Mode Applicability of this EAL has been revised from All Modes to modes 4, 5, and 6 due to the mode applicability of the areas of concern in Table H-3. In the future should the areas of concern in Table H-3 be revised then the Operating Mode Applicability of this EAL should be reevaluated.

Escalation of the emergency classification level would be via Recognition Category R, C or F ICs.

Basis Reference(s):

1. NEI 99-01, Rev 6 HA5
2. FSAR Figure 2.1-3, Extended Plot Plan TMINS
3. FSAR Section 5.1, Class I Structures, Components, and Systems
4. NEI 99-01, Rev. 5 HA3
5. OP-TM-406-901, Hazardous Material Release
6. AR-660892, Station Halon and IDLH Evaluations
7. 29CFR1910.134(b) and 29CFR1910.134(d)(2)(iii)

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HU6

Initiating Condition:

Hazardous event.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

Note: EAL #4 does not apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.

1. Tornado strike within the PROTECTED AREA.

   OR

2. Internal room or area flooding of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component required by Technical Specifications for the current operating mode.

   OR

3. 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).

   OR

4. A hazardous event that results in onsite conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles.

   OR

5. a. Abnormal river water level at the intake Pump and Screen House, as indicated by **EITHER**:

      1. **> 296 ft. el.** (high level).

         OR

      2. **< 274 ft. el.** (low level).

      OR

   b. River flow **forecasted** to exceed **900,000 CFS** within the next **12 hours**.

Basis:

PROTECTED AREA: An area that normally encompasses all controlled areas within the security protected area fence.

SAFETY SYSTEM: A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related.

This IC addresses hazardous events that are considered to represent a potential degradation of the level of safety of the plant.

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HU6 (cont)

Basis (cont):

EAL 1 Basis

Addresses a tornado striking (touching down) within the Protected Area.

EAL #2 Basis

Addresses flooding of a building room or area that results in operators isolating power to a SAFETY SYSTEM component due to water level or other wetting concerns. Classification is also required if the water level or related wetting causes an automatic isolation of a SAFETY SYSTEM component from its power source (e.g., a breaker or relay trip). To warrant classification, operability of the affected component must be required by Technical Specifications for the current operating mode.

EAL #3 Basis

Addresses a hazardous materials event originating at an offsite location and of sufficient magnitude to impede the movement of personnel within the PROTECTED AREA.

EAL #4 Basis

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

This EAL is not intended to 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.

EAL #5 Basis:

The level of the Susquehanna River is approaching flood stage; flood stage is defined as 307 ft el. at the Susquehanna River Gage at Harrisburg.

A low river water condition below 274 ft el. requires a Technical Specification 3.0.1 plant shutdown per OP-TM-AOP-005 and is a precursor to a more serious condition.

Escalation of the emergency classification level would be based on ICs in Recognition Categories R, F, M, H or C.

Basis Reference(s):

1. NEI 99-01, Rev 6 HU3
2. OP-TM-AOP-005 River Water System Failures
3. OP-TM-AOP-002, Flood
4. OP-TM-AOP-0021, Flood Basis Document
5. OP-TM-AOP-004, Tornado / High Winds

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HG7

Initiating Condition:

Other conditions exist which in the judgment of the Emergency Director warrant declaration of a GENERAL EMERGENCY.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

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 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 Protective Action Guideline exposure levels offsite for more than the immediate site area.

Basis:

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.

HOSTILE ACTION: An act toward CRANE 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 site. 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).

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

PROJECTILE: An object directed toward CRANE that could cause concern for its continued operability, reliability, or personnel safety.

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 emergency classification level description for a General Emergency.

Basis Reference(s):

1. NEI 99-01, Rev 6 HG7

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HS7

Initiating Condition:

Other conditions exist which in the judgment of the Emergency Director warrant declaration of a SITE AREA EMERGENCY.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

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 Protective Action Guideline exposure levels beyond the site boundary.

Basis:

HOSTILE ACTION: An act toward CRANE 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 site. 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).

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

PROJECTILE: An object directed toward CRANE that could cause concern for its continued operability, reliability, or personnel safety.

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 emergency classification level description for a Site Area Emergency.

Basis Reference(s):

1. NEI 99-01, Rev 6 HS7

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HA7

Initiating Condition:

Other conditions exist which in the judgment of the Emergency Director warrant declaration of an ALERT.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

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 Protective Action Guideline exposure levels.

Basis:

HOSTILE ACTION: An act toward CRANE 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 site. 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).

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

PROJECTILE: An object directed toward CRANE that could cause concern for its continued operability, reliability, or personnel safety.

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 emergency classification level description for an Alert.

Basis Reference(s):

1. NEI 99-01, Rev 6 HA7

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Hazards and Other Conditions Affecting Plant Safety

HU7

Initiating Condition:

Other conditions exist which in the judgment of the Emergency Director warrant declaration of an UNUSUAL EVENT.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

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 emergency classification level description for an UNUSUAL EVENT.

Basis Reference(s):

1. NEI 99-01, Rev 6 HU7

Table CRANE 2-2: EAL Technical Basis

Recognition Category: Independent Spent Fuel Storage Installation

E-HU1

Initiating Condition:

Damage to a loaded cask CONFINEMENT BOUNDARY.

Operating Mode Applicability:

1, 2, 3, 4, 5, 6, D

Emergency Action Level (EAL):

1. Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by a radiation reading greater than **ANY** of the following:
   a. **240 mrem/hour** gamma on the vertical concrete surfaces.

      OR

   b. **10 mrem/hour** neutron on the vertical concrete surfaces.

      OR

   c. **900 mrem/hour** (neutron + gamma) on the top.

Basis:

CONFINEMENT BOUNDARY: The irradiated fuel dry storage cask barrier(s) between areas containing radioactive substances and the environment.

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 word cask, as used in this EAL, refers to the storage container in use at the site for dry storage of irradiated fuel. The issues of concern are the creation of a potential or actual release path to the environment, degradation of any 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 cask technical specification multiple of "2 times" is used here to distinguish between non-emergency and emergency conditions. 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 fact that the on-contact dose rate limit is exceeded may be determined based on measurement of a dose rate at some distance from the cask

Security-related events for the ISFSI is covered under ICs HU1 and HA1.

Basis Reference(s):

1. NEI 99-01, Rev 6 E-HU1
2. Certificate of Compliance 1031 NAC MAGNASTOR® Canister

ENCLOSURE 3

Change Summary

Crane Clean Energy Center
Renewed Facility License No.
DPR-50

Enclosure 3:
Three Mile Island Unit #1 to Crane Clean Energy Center
Change Summary

Purpose of Enclosure 3: This enclosure is provided to support a review of the proposed Emergency Plan for the Crane Clean Energy Center.

- Changes listed in **Part A** of this enclosure are the result of the RAI responses discussed in Attachement 1 to the parent letter.

- Changes listed in **Part B** of this enclosure are provided to capture changes that were included in the Reference 1 LAR and are included for context.

Part A: New Changes Associated with RAI Responses:

RAI 1: The following has been added to Section H.2 of EP-CR-1000

> *"The EOF in the MA region is capable of responding to events occurring simultaneously at more than one nuclear power reactor site since the emergency operations facility serves more than one site."*

RAI 2 and RAI 3: The following changes were made to EP-CR-1000 Appendix 5

- App 5 Table 5-1: On Shift "Radiation Protection Personnel" revised to state "Shift Radiation Protection Technician" to align with the OSSA.
- App 5 Note 1: Note 1 updated to be clear that one of the designated On-Shift RP Techs will be performing Dose Assessment.
- App 5 Note 4: Note 4: Note 4 updated to ensure alignment with the OSSA and qualification records for Shift RP Tech and qualified Radiation Protection Personnel.

RAI 4: The following change was made to EP-CR-1000 Section O.4.h

Medical Support Personnel training description changed from "Onsite" to "Offsite" to clarify and align with other training received.

RAI 5: No Changes – Justification added with RAI Response

RAI 6: No Changes

RAI 7: Final MOUs and LOAs for Crane Clean Energy Center have been added to EP-AA-1009 Appendix 2.

RAI 8:

a) The following was added to EP-CR-1000 Section E.6:
> *The use of IPAWS, WEA, and EAS strengthens the ability to alert populations, including residents, visitors, commuters, and individuals with access and functional needs. Counties also apply a whole community approach by identifying and addressing the communication needs of diverse*

populations and community groups, including individuals with limited access to technology, to help ensure emergency information reaches all segments of the public.

b) Responsibility for maintenance and administration of the ANS system has been deleted from EP-CR-1000 Section P.3

RAI 9: No Changes

RAI 10: The following change was made to EP-CR-1000 Section N-2 to clarify that Monthly testing includes contact with the Region.

a) Communication Drills

- *Monthly - The capability of the Nuclear Accident Reporting System (NARS) to notify the state and local government warning points and EOCs within the plume exposure pathway EPZ are demonstrated. Also, the capability to notify the NRC Region is demonstrated using the Emergency Notification System (ENS) and the Health Physics Network (HPN) where available.*

RAI 11 Justifications: The following justifications are provided in support of previous changes to EP-AA-1009 Addendum 3

- **(RAI Part a)** Definition of the confinement boundary was added between revisions 2 and 3 in order to align with fleet procedures and NEI 99-01 rev 6. (Justification only
- **(RAI Part b)** RG1/RS1/RA1 ‘using actual meteorology are available’ was been added to the NOTES and the associated basis statements to align with the Constellation fleet and NEI 99-01 Rev 6.
- **(RAI Part c)** RU3 changed to RU4 to align with Fleet procedures and remove the human performance error trap of assuming elevation to RA3 is possible.
- **(RAI Part g)** Containment Integrity Fission Product Boundary, Row 4, EAL 1.c was updated to match the basis.

RAI 11 Changes: The following changes were made to EP-AA-1009 Addendum 3 as a result of the RAI:

- **(RAI Part d)** RA1, EAL #3 was omitted erroneously, it has been returned to the EAL summary and the basis statement.
- **(RAI Part e)** RG2 Note was not updated and is no longer marked as a change.
- **(RAI Part f)** FS1 has been changed to FA1 in the correct location and corrected.
- **(CGS RAI-1)** MA4 Note was changed in error. Corrected to previous language *"The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded or will likely be exceeded."*
- **(RAI Part h)** HS2 was not updated and is no longer marked as a change.
- **(RAI Part i)** CAS was not updated and is no longer marked as a change.

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- **(CGS RAI-2)** CT4 Basis corrected to add 1.a to begin the second paragraph.
- **(RAI Part j)** HU3 Note should not have been deleted and has been added back in.
- **(RAI Part k)** HU4 Note changes to less than or equal to 15 minutes.

RAI 12: No Changes

RAI 13: No Changes

RAI 14: The following changes are made to EP-AA-1009 Addendum 3

- MG1 Basis: Statement added to assist Emergency Directors in not classifying this event if a power supply can be restored in the requisite amount of time.
- MG2 Basis: Statement added to assist Emergency Directors in not classifying this event if a power supply can be restored in the requisite amount of time.
- MS1 Basis: Statement added to assist Emergency Directors in not classifying this event if a power supply can be restored in the requisite amount of time.
- CA1 Basis: Statement added to assist Emergency Directors in not classifying this event if a power supply can be restored in the requisite amount of time.

RAI 15: The following editorial corrections are made to EP-AA-1009 Addendum 3

- **(RAI Part a)** FC3 units of measure corrected to remove superscript ‘2’.
- **(RAI Part b)** CT4 and MU8 References to OP-TM-EOP-002 are corrected to replace “0” with superscript “o” to reflect “25^{o}F” Subcooling Margin as opposed to “250F”.
- **(RAI Part c)** MA3 Basis spacing has been corrected to eliminate confusion.

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Part B: Changes included in the Reference 1 LAR (for context only).

EP-CR-1000: Radiological Emergency Response Plan (Enclosures 1A/2A):

- Pg 6. Appendices: Appendix 5: Emergency Response Organization (ERO) Staffing and Augmentation Plan 5-1. Added to table of contents as section 5-1 and was added to the Emergency Plan to demonstrate minimum on shift staffing.
- Pg 11. Section I: Federal Response, last sentence was removed as it was redundant and explained reference(s) to other Emergency Response Organizations throughout the document.
- Pg 25. Transition of 'Non-Delegable' Responsibilities table updated to reflect a change in formatting.
- Pg 25. Explanation added to the plan discussing the requirements of minimum staff personnel and augmented staff with the differences explained. It discusses definitions and response times while referencing the newly added Appendix 5.
- Pg 26. Continued from the previous page, edits to be more concise on minimum staffing requirements versus augmented staff.
- Pg 27. Removed description of responsibilities for the Station Emergency Director as they are redundant and defined in their respective section.
- Pg 27. Removed second half of the last bullet as it was redundant to those established as the control room crew.
- Pg 28. Removed first bullet under Station Emergency Director as not all functions are taken by the EOF and added facility activation.
- Pg 28. Removed b) bullet as it is redundant to the other definitions of responsibility.
- Pg 29. Removed discussion of TSC Director as it is redundant now to functions and location of the Station Emergency Director.
- Pg 29. Addition of ENS to the communicator description and removal of the OSC as they are no longer located there.
- Pg 30. Removed references to other activities not now being performed by the ENS communicator. Also removed references that would have been applicable if the EOF had an ENS communicator.
- Pg 32. Technical Manager position references and responsibilities removed for applicability.
- Pg 33. Logistics Coordinator position reference and responsibilities removed for applicability.
- Pg 33. Updated description of the Radiation Protection Manager for applicability to positions.
- Pg 34. Radiation Controls and Radiation Controls Coordinator reference and responsibilities removed for applicability.
- Pg 35. Maintenance Manager position references and responsibilities removed for applicability and changes subsequent reporting chain.

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- Pg 37. Assistant OSC Director position references and responsibilities removed for applicability.
- Pg 38. Nuclear Duty officer position references and responsibilities removed for applicability, this is a Fleet EP function and is defined in Fleet procedures.
- Pg 40. EOF Director position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg 41. Technical Support Manager position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg 41. Operations Advisor position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg 42. ENS Communicator position references and responsibilities removed for applicability; this is performed from the control room and TSC and not in the EOF.
- Pg 42. Technical Advisor position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg 42. Events Recorder position references and responsibilities removed for applicability.
- Pg 42. Radiation Protection Manager changes made to reflect reporting to the Corporate Emergency Director and responsibilities to reflect the Fleet plan governing EOF operations.
- Pg 44. Environmental Coordinator position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg 44. Field Team Communicator position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg 45. Dose Assessment Coordinator responsibilities updated to reflect the Fleet EP function.
- Pg 45. Dose Assessor position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg 46. HPN Communicator position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg 46. Logistics Manager position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg 46. Administrative Coordinator position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg 47. Security Coordinator position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg 49. EOC Communicator position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg. 49. County EOC Liaisons position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg 49. State EOC Liaison position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.

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- Pg 49. Regulatory Liaison position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg 51. Technical Spokesperson position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg 51. Radiation Protection Spokesperson position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg 52. JIC Spokesperson functions updated to reflect a Fleet EP function defined in Fleet Procedures.
- Pg 53. JIC Coordinator position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg 53. Administrative Coordinator position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg 53. Access Controller position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg 54. News Writer position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg 54. Events Recorder position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg 54. Media Monitoring Staff position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg 55. Rumor Control Staff position references and responsibilities removed for applicability; this is a Fleet EP function and is defined in Fleet procedures.
- Pg 55. 6. Updated to reference the correct new appendix
- Pg 55. 7. One line added to reference where position descriptions can be found.
- Pg 56. First paragraph updated to discuss the EOF, Shift Emergency Director, and the JIC activation time requirements as specified in the staffing plan.
- Pg 59. h. Framatome Inc. added as design and engineering support.
- Pg 61. TABLE B-1: Minimum Staffing Requirements removed and replaced with Table in Appendix 5
- Pg 64. Figure Crane B-1a Updated with changes to the plan staffing and structure.
- Pg 81. Removal of the old ANS system in lieu of IPAWS.
- Pg 82. Removal of the old ANS system in lieu of IPAWS.
- Pg 84. Removal of the Damage Control Line no longer required.
- Pg 84. Edits made to the Operations Status line to align with Fleet procedures and practices.
- Pg 84. Removal of the Technical Conference line no longer required.
- Pg 84. Edits made to Director’s hotline to align with Fleet Procedures and practices.
- Pg 85. Field Monitoring Team Communications updated with satellite phones.

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- Pg 89. Figure 1 updated with the current communications methods and names for communication lines.
- Pg 93. Public Education materials updated with the transfer of ANS to IPAWS.
- Pg 94. JIC functions updated with positions that can be performed remotely if necessary.
- Pg 98. EOF activation time added to description.
- Pg 100. Removed reference to the previous table B-1 for staffing and added staffing of the JIC in 90 minutes. Removed reference to JIC minimum staffing and coordination.
- Pg 101. Changed 'Decommissioning' to 'Restoration' based on current plant operating intent.
- Pg 133. Updated reference to FEMA guidance.
- Pg 150. Supporting Emergency Response Plans updated to the most current and accurate reference.
- Pg 154. Reference updated to reflect the correct date of document publishing.
- Pg 167. Public Alert/Warning definition updated with the IPAWS ANS system to be utilized.
- Pg 174. Appendix 5 added with updated staffing tables.

EP-AA-1009 Radiological Emergency Plan Annex (EP-AA-1009) (Enclosures 2A/2B):

- Pg 17. 2.1 Shift Organization Staffing removed as it is discussed in the site Emergency Plan (EP-CR-1000).
- Pg 17. Repair Team Lead reference and responsibilities removed for applicability.
- Pg 17. Firefighting removed due to commitment to NUREG 0654 Rev 2 which moves firefighting out of emergency response and is governed by its own regulatory requirements.
- Pg 18. First aid and Search and Rescue removed due to commitment to NUREG 0654 Rev 2 which moves these requirements out of emergency response and is governed by its own regulatory requirements.
- Pg 19. AREVA changed to Framatome
- Pg 26. Alert and Notification System updated with the removal of sirens and commitment to use IPAWS in accordance with FEMA guidelines.
- Pg 28. Public information updated due to the use of IPAWS and no longer sirens.
- Pg 43. Shift personnel references too first aid has been removed and are covered by the Emergency Plan and site specific first aid response procedures.

EP-AA-1009 Addendum 3: Radiological Emergency Plan Annex EALs (Enclosures 1C/2C)

- Commas have been added to all numbers where applicable.
- Second period has been removed.
- Title has been italicized.
- 'BOTH' changed to 'ALL' and
- CT5 basis font and alignment fixed to match the other basis statements.

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- 'Computer Point' added to the basis of MU4 to match the basis statement of MA4.
- CA5 basis references updated, removed the summary reference that was just a listing of the previous references.
- 'CU6(cont)' header updated, changed from 'CA6(cont)' to the accurate 'CU(cont)'
- HG1 basis, NEI 03-12 title italicized.
- CRANE updated throughout, that is abbreviated form being used in lieu of Crane Clean Energy Center.
- The Appendix #1 Reference was fixed and documented in the first section of this document.
- Other EAL Changes:
- Pg 10. Statement removed from the end of 1.8 as it references TMI response team which will not be incorporated.
- Multiple instances of greater than/equal to or less than/equal to symbols being incorrectly formatted. They have been fixed throughout the document.
- Spaced placed between all numbers and units where they appear as well as all symbols and numbers where they appear.
- Pg 41. RA2 statement was added for reference to E-HU1.1 if dry casks are damaged.
- Pg 85. Statement added to the basis to add information concerning escalation.
- Pg 140. Removed escalation statement note as not necessary.
- Pg 82. Removed reference in the basis to being able to cross-tie to Unit #2.
- Pg 144. Removed escalation statement note as not necessary.