



Harris Nuclear Plant Pre-Submittal Meeting - February 27, 2018



License Amendment Request for
Emergency Plan Emergency Action Level
Scheme Changes

- Art Zarembo, Licensing Corporate Manager
- David Thompson, Emergency Preparedness Corporate Manager
- Sarah McDaniel, HNP Licensing Engineer
- Jamey Sharlow, HNP Emergency Preparedness Specialist

#	Affected EAL	Mode	Description of Change	Driver
1	Cat F; Loss of Fuel Clad (FC) Cat F; Pot Loss of Containment (CNMT)	1, 2, 3, 4	Correct Containment High Range Radiation Monitor (CHRRM) thresholds	Violation
2	Cat F; Loss of Reactor Coolant System (RCS)	1, 2, 3, 4	Credit Different Radiation Monitor / Threshold	Extent of Condition (EOC) for Violation
3	Cat C; Loss of RCS	5, 6	Credit Different Radiation Monitor / Threshold	EOC of Violation

Background: Category F, Fission Product Barrier

Table F-1 Fission Product Barrier Threshold Matrix

	Fuel Clad (FC) Barrier		Reactor Coolant System (RCS) Barrier		Containment (CNMT) Barrier	
	Loss	Potential Loss	Loss	Potential Loss	Loss	Potential Loss
A. RCS or SG Tube Leakage	None	None	1. An automatic or manual ECCS (SI) actuation required by EITHER: • UNISOLABLE RCS leakage • SG tube RUPTURE	1. Operation of a standby charging pump is required due to EITHER: • UNISOLABLE RCS leakage • SG tube leakage 2. CSFST Integrity-RED Path entry conditions met	1. A leaking or RUPTURED SG is FAULTED outside of containment	None
B. Inadequate Heat Removal	1. CSFST Core Cooling-RED Path entry conditions met	1. CSFST Core Cooling-ORANGE Path entry conditions met 2. CSFST Heat Sink-RED Path entry conditions met AND Heat Sink is required	None	1. CSFST Heat Sink-RED Path entry conditions met AND Heat Sink is required	None	1. CSFST Core Cooling-RED Path entry conditions met AND Restoration procedures not effective within 15 min. (Note 1)
C. CNMT Radiation / RCS Activity	1. Containment radiation >150 R/hr (RM-1CR-3589-SA or RM-1CR-3590-SB) 2. Dose equivalent I-131 coolant activity > 300 μ Ci/gm	None	1. Containment Leak Detection Monitor Noble Gas (REM-1LT-3502A-SA) > 8.3E-3 μ Ci/ml	None	None	1. Containment radiation > 600 R/hr (RM-1CR-3589-SA or RM-1CR-3590-SB)
D. CNMT Integrity or Bypass	None	None	None	None	1. Containment isolation is required AND EITHER • Containment integrity has been lost based on Emergency Coordinator judgment • UNISOLABLE pathway from Containment to the environment exists 2. Indications of RCS leakage outside of containment	1. CSFST Containment-RED Path entry conditions met 2. Containment hydrogen concentration > 4% 3. Containment pressure > 10 psig with < one full train of depressurization equipment operating (one CNMT spray pump and two CNMT fan coolers) per design for \geq 15 min. (Note 1)
E. EC Judgment	1. Any condition in the opinion of the Emergency Coordinator that indicates loss of the Fuel Clad barrier	1. Any condition in the opinion of the Emergency Coordinator that indicates potential loss of the Fuel Clad barrier	1. Any condition in the opinion of the Emergency Coordinator that indicates loss of the RCS barrier	1. Any condition in the opinion of the Emergency Coordinator that indicates potential loss of the RCS barrier	1. Any condition in the opinion of the Emergency Coordinator that indicates loss of the Containment barrier	1. Any condition in the opinion of the Emergency Coordinator that indicates potential loss of the Containment barrier

I. Loss of FC & Potential Loss of CNMT Thresholds

Description of Change:

Current

- 'Loss of Fuel Cladding (FC)': 150 R/hr at CHRRMs
- 'Potential Loss of Containment (CNMT)': 600 R/hr at CHRRMs

Fuel Clad (FC) Barrier		Containment (CNMT) Barrier	
Loss	Potential Loss	Loss	Potential Loss
	<div>Revise to</div> <div>"1. (RM-1CR-3589SA or RM-1CR-3590SB) > Table F-2 Column FC Barrier Loss"</div>	1. A leaking or RUPTURED SG is FAULTED outside of containment	None
1. CSFST Core Cooling-RED Path entry conditions met	1. CSFST Core Cooling-ORANGE PATH entry conditions met 2. CSFST Heat Sink-RED Path entry conditions met AND Heat sink is required	<div>Revise to</div> <div>"1. (RM-1CR-3589SA or RM-1CR-3590SB) > Table F-2 Column CNMT Potential Loss"</div>	Core Cooling-RED Path conditions met Containment procedures not to be initiated within 15 min. (Note 1)
<div>1. Containment radiation >150 R/hr (RM-1CR-3589-SA or RM-1CR-3590-SB)</div> <div>2. Dose equivalent I-131 coolant activity > 300 µCi/gm</div>	None	None	<div>4. Containment radiation >600 R/hr (RM-1CR-3589-SA or RM-1CR-3590-SB)</div>

Proposed

Table F-2 Containment Radiation

Time After S/D (Hours)	FC Barrier Loss R/hr	RCS Barrier Loss mR/hr	CNMT Potential Loss R/hr
0 - 1	130	1.37E+03	2360
1 - 2	110	1.12E+03	2000
2 - 8	70	6.35E+02	1300
≥ 8	21	1.37E+02	390

I. Loss of FC & Potential Loss of CNMT Thresholds

Reason for Change:

- The current CHRRM thresholds were not updated during the transition between NUREG-0654 and NEI 99-01 EAL guidance
- Violation was received in November 2017
- Improvement Opportunity: Time-based thresholds to account for radioactive decay and containment spray removal

II. Loss of RCS Threshold

Description of Change:

Current

Containment Leak
Detection Monitor Noble
Gas > 8.3E-3 $\mu\text{Ci/ml}$ "

Proposed

Containment Ventilation
Isolation (CVI) monitors
per Table F-2, RCS
Barrier Loss

Reactor Coolant System (RCS) Barrier	
Loss	Potential Loss
1. An automatic or manual ECCS (SI) actuation required by EITHER :	1. Operation of a standby charging pump is required by EITHER : <ul style="list-style-type: none"> • UNISOLABLE RCS leakage
<ul style="list-style-type: none"> • Revise to • 1. " (RM-1CR-3561A-SA, or RM-1CR-3561B-SB, or RM-1CR-3561C-SA, or RM-1CR-3561D-SB) > Table F-2 Column RCS Barrier Loss" 	entry
<div>1. Containment Leak Detection Monitor Noble Gas (REM-1LT-3502A-SA) > 8.3E-3 $\mu\text{Ci/ml}$</div>	th entry
	None

Table F-2 Containment Radiation

Time After S/D (Hours)	FC Barrier Loss R/hr	RCS Barrier Loss mR/hr	CNMT Potential Loss R/hr
0 - 1	130	1.37E+03	2360
1 - 2	110	1.12E+03	2000
2 - 8	70	6.35E+02	1300
≥ 8	21	1.37E+02	390

Reason for Change:

- REM-1LT-3502A-SA provides detection of Loss of RCS for leaks $< SI$
- REM-1LT-3502A-SA isolates on an SI Signal
- CVIs remain active after SI and have a lower range than the CHRRMs

III. Cold Shutdown Radiation Monitor Threshold

Description of Change:

Current: 'CG1.2' and 'CS1.3' utilize CNMT radiation levels at the CHRRMs

Proposed: Utilize Containment Ventilation Isolation (CVI) radiation monitors high alarm

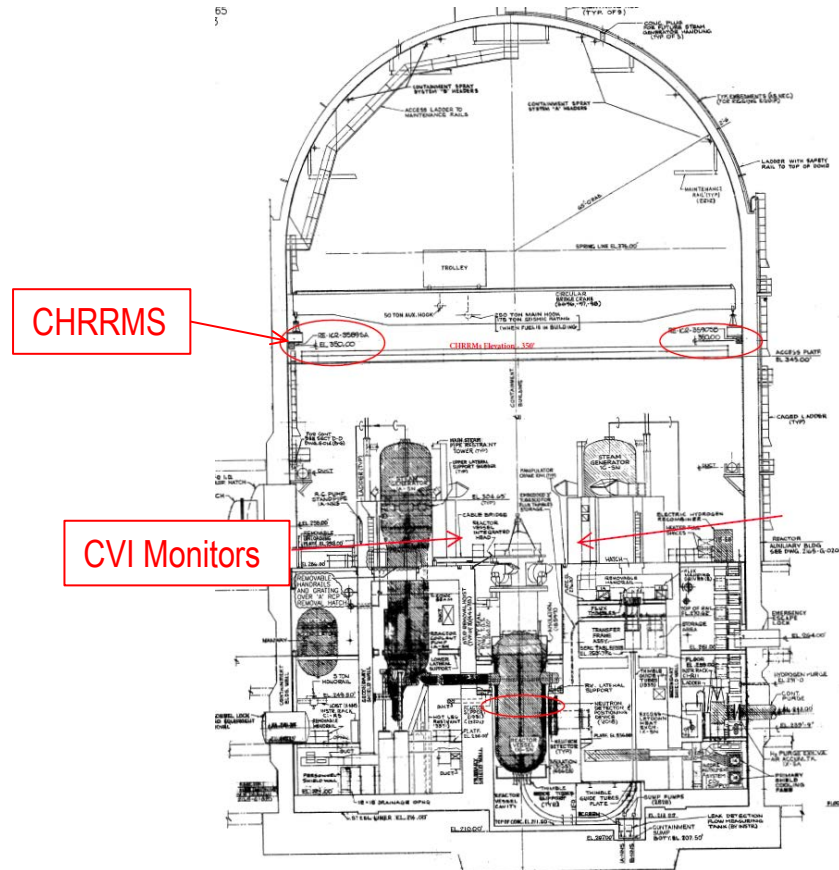
GENERAL EMERGENCY	SITE AREA EMERGENCY
Loss of RCS inventory affecting fuel clad integrity with containment challenged [][][][][5][6][]	Loss of RCS inventory affecting core decay heat removal capability [][][][][5][6][]
CG1.1 RCS level < 63% RVLIS Full Range for ≥ 30 min. (Note 1) AND Any Containment Challenge indication, Table C-2	CS1.1 With CONTAINMENT CLOSURE not established, RCS level < 70% RVLIS Full Range
CG1.2 RCS water level cannot be monitored for ≥ 30 min. (Note 1) AND Core uncover is indicated by any of the following: - UNPLANNED increase in any Table C-1 sump or tank of sufficient magnitude to indicate core uncover - Containment radiation > 10,000 R/hr (RM-1CR-3589-SA or RM-1CR-3590-SB) - Erratic source range monitor indication AND Any Containment Challenge indication, Table C-2	CS1.2 With CONTAINMENT CLOSURE established, RCS level < 63% RVLIS Full Range
	CS1.3 RCS water level cannot be monitored for ≥ 30 min. (Note 1) AND Core uncover is indicated by any of the following: - UNPLANNED increase in any Table C-1 sump or tank of sufficient magnitude to indicate core uncover - Containment radiation > 10,000 R/hr (RM-1CR-3589-SA or RM-1CR-3590-SB) - Erratic source range monitor indication
A CVI monitor in high alarm (RM-1CR-3561A-SA, RM-1CR-3561B-SB, RM-1CR-3561C-SA, or RM-1CR-3561D-SB)	

III. Cold Shutdown Radiation Monitor Threshold

Reason for Change:

CVIs offer several advantages over CHRRMs for use in EALs CS1.3 and CG1.2:

- Better low range sensitivity
- Greater number of monitors
- Closer to the core



- 10 CFR 50.54(q), “Conditions of Licenses, Emergency Plans”
- 10 CFR 50.47, “Emergency Plans” and 10 CFR 50, Appendix E, “Emergency Planning and Preparedness for Production and Utilization Facilities”
- NRC Regulatory Issue Summary 2005-02, Revision 1, “Clarifying The Process For Making Emergency Plan Changes”
- NEI 99-01 Revision 6, “Development of Emergency Action Levels for Non-Passive Reactors”

The following two LARs are examples of plants who identified deficiencies in their EAL scheme that required prior approval to implement correction:

- Vogtle, 2013 – Main Steam Radiation Monitors Used for Steam Generator Tube Rupture EAL Declarations
- Prairie Island, 2012 – Change to Effluent Threshold and to a Loss of Fuel Clad Barrier Threshold

- Changes are non-voluntary to correct nonconformances
- These changes enhance the plant's ability to protect the health and safety of the public in an emergency

