Licensee: Entergy Operations, Inc.

Facility: Grand Gulf Nuclear Station

License No. NPF-29

Docket No. 50-00416

Date of Conference: July 6, 2023

EA-23-019

NRC REGULATORY CONFERENCE SUMMARY

On July 6, 2023, representatives of Entergy Operations, Inc. and Grand Gulf Nuclear Station met with U.S. Nuclear Regulatory Commission (NRC) personnel to discuss the apparent violations identified in NRC Inspection Report Number 05000416/2023-090, dated May 18, 2023 (NRC's Agencywide Documents Access and Management System [ADAMS] Accession No. ML23122A163). The regulatory conference was held at the request of the licensee and was characterized as an NRC public meeting. The meeting was held in the NRC Region IV office via Microsoft Teams Meeting and with an associated bridge line for audio. The list of attendees is provided as an enclosure to this summary (Enclosure 1). All attendees were informed that the meeting was being recorded and transcribed via Microsoft Teams.

The NRC representatives discussed the preliminary White finding and three associated apparent violations that were described in the subject inspection report and provided an overview of NRC's Reactor Oversight Process (ROP) for significance determination, as shown in the NRC presentation (Enclosure 2). During the opening of the meeting, NRC staff also clarified any changes to the NRC agenda from what was published in the public meeting notice on June 16, 2023, and provided the conference logistics.

The licensee's staff leading the presentation included the General Manager of Plant Operations, Operations Director, Regulatory Assurance Manager, Systems and Components Engineer Manager, the Fleet Regulatory Compliance and Licensing Director, the Fleet Emergency Planning Director, and the Fleet Licensing Senior Manager for the Entergy Operations, Inc. Grand Gulf Nuclear Station. They were also supported by their systems engineer and a vendor. These individuals provided their response to the preliminary White finding and apparent violations, as shown in their enclosed presentation (Enclosure 3). The participants stated that Entergy Operations, Inc. acknowledged a finding and violation for inadequate calibration procedures used to calibrate the drywell and containment high radiation monitors (CHRMs). They further asserted that the finding did not adversely affect the operability of the CHRMs, nor did it affect the capability of the CHRMs to timely and accurately classify a General Emergency. Overall, they asserted that the finding for an inadequate calibration procedure was no greater than Green, a finding of very low to low safety significance per NRC's ROP.

Additionally, the licensee informed the NRC that Entergy implemented changes to their calibration procedures to correct the deficiencies identified, such as reading their radiation source check as-found values from the Safety Parameter Display System (SPDS) versus the meter face; and lowering the source exposure tolerances at the meter face, the logarithmic recorder, and at the SPDS to +/- 20%, as in accordance with the vendor manual criteria. The

licensee maintained their position that the measurement of sensitivity is not needed to perform a successful calibration and that the postulated accident scenario presented by the NRC is not credible; thus, the ability to classify an emergency was not degraded.

The licensee presented data to demonstrate that the CHRMs were operable at the time of the inspection and remain operable, based on "as-found" radiation source check data at the SPDS. The licensee acknowledged that this data was not identified until April 7, 2023, after the close of the NRC's inspection on April 5, 2023. The licensee confirmed review of SPDS data as far back as 2019 for compliance with the calibration tolerances. The NRC requested all calibration records associated with the new SPDS data presented to support the licensee's position for review.

During the business portion of the meeting, NRC staff informed Entergy that the primary objectives of the regulatory conference were to obtain information to support evaluation of the findings through the Significance Determination Process (SDP) and gain their perspective on the apparent violations. NRC staff also maintained that no final decisions will be made during the meeting. All information presented during the meeting, and prior to the meeting, will be considered and assessed to make a final decision and that determination will be communicated to the licensee as soon as possible. NRC also informed the licensee that they had appeal rights if they did not agree with any final NRC determinations.

At the close of the business portion of the meeting, members of the public were allowed to ask any relevant questions and interact with NRC participants. There was no question from the public or the other NRC conference participants on the Teams Meeting or bridge line. NRC then thanked all participants and adjourned the meeting.

In accordance with 10 CFR 2.390 of the NRC's "Agency Rules of Practice and Procedure," a copy of this conference summary and enclosures (Enclosure 1, 2, and 3) will be made available electronically for public inspection in the NRC Public Document room or in the NRC's Agency-wide Documents Access and Management System, accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

Enclosures:

- 1. Attendance List Public
- 2. NRC Presentation Public
- 3. Licensee Presentation Public

NRC REGULATORY CONFERENCE SUMMARY, ENTERGY OPERATIONS, INC., GRAND GULF NUCLEAR STATION – DATED JULY 17, 2023

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PUBLIC ADAMS ACCESSION NUMBER: ML23193A841

X SUNSI Review	SUNSI Review ADAMS:		Non-Publicly Available	le Keyword				
By: NAG	XYes 🗆 No	X Non-Sensitive	X Publicly Available	NRC-002				
OFFICE	DRSS:DIORB	DRSS:BC:DIORB	RIV:ACES	D:DRSS				
NAME	NGreene	GWarnick	JGroom	GMiller				
SIGNATURE	/RA/ E	/RA/ E	/RA E/	/RA/ E				
DATE	07/12/23	07/12/23	07/13/23	07/17/2023				

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Grand Gulf Nuclear Station Regulatory Conference – Public Meeting Attendance List

July 6, 2023 via Microsoft Teams Meeting

*Please note this list is the best available data from the Teams Meeting log and may not be all inclusive.

ATTENDEES AT THE GRAND GULF REGULATORY CONFERENCE

1-XXX-XXX-2168 1-XXX-XXX-4937 1-XXX-XXX-3853 1-XXX-XXX-7875 1-XXX-XXX-2450 1-XXX-XXX-6334 1-XXX-XXX-7387 1-XXX-XXX-1106 Aida Rivera-Varona (NRC Presenter) Alex Garmoe Amy Perkins, GGNS RPM Andrew Saunders Anthony Smallwood Austin Roberts (NRC Presenter) **Beth Alferink** Bernadette Baca Billy Nytko BKH (Guest) **Brad Kapellas** Brad Kapellas (Guest) Brad Schexnayder LADEQ (Guest) Brandon Taylor (Guest) **Brian Hughes** CHM **Christian Dennes** Christopher Tyree Clark, Kody Cliff Acosta, LDEQ (Guest) Dan - WF3 (Guest) **David Crockett** David Cylkowski **David Garmon** Dominic Antonangeli (NRC Presenter) Don Johnson (NRC Presenter) Eliza Hilton Eric McManus Firenze, Gregory J:(Constellation Nuclear) Fisher Warren (Guest)

Geiss, Benjamin M:(Constellation Nuclear) Generette, Lloyd Geoff Miller Greg Warnick (NRC Presenter) Jaime Rodriguez James Anderson (He/Him) Janet Staub Jason Keir (Guest) Jeffrey Josey Jennetta, Andrea Jeremy Groom Jessica Walker (Guest) John Monninger (NRC Presenter) John O'Donnell (NRC Presenter) Kevin Hsueh Linda Howell Michael Waters Myla Ruffin Natasha Greene (NRC Presenter) Pete Snyder Philip McKenna Robert Fisher Rossi, Matthew:(Constellation Nuclear) Russell Felts (He/Him/His) **Ryan Alexander** Ryan Lantz Ryan Stolt S. Peterkin (Guest) Sailesh Thapa Sean Hedger (NRC Presenter) Shawn Lichvar Shultz, Brandon K:(Constellation Nuclear) SMITH, Micheal Sperr, John R:(Constellation Nuclear) Stephanie Anderson Steven Garry Tania Martinez Navedo Val Myers (Guest) William (Guest) William Rautzen William Schuster Winston Quick (Guest)



Nuclear Regulatory Commission Regulatory Conference

Entergy Operations, Inc. Grand Gulf Nuclear Station EA-23-019

USNRC Region IV Thursday, July 6, 2023

Meeting Logistics

- This Microsoft Teams meeting will be RECORDED and TRANSCRIBED. Please be mindful.
- Operation of Microsoft Teams Meeting call
- Ensure all phones and background noises are MUTED
- Scheduled break (15 minutes)
- NRC caucus (Teams Meeting) (30 minutes)
- Public Question Session (if you called in, please Press *5 on phone to "raise hand," then wait for the Moderator to acknowledge you. Press *6 to UNMUTE, and *5 to lower hand.)



MEETING AGENDA

Торіс	Participants		
NRC Opening Remarks and Introductions	John Monninger, RIV		
Licensee Opening Remarks and Introductions	Entergy Operations, Inc. / Grand Gulf Nuclear Station (GGNS)		
Regulatory Conference Process	Aida Rivera-Varona, RIV		
Background and Summary of the White Finding and Violations	Natasha Greene, PhD, RIV Dominic Antonangeli, RIV		
NRC's Dispositioning Process via the Emergency Preparedness (EP) Cornerstone	Sean Hedger, RIV Don Johnson, HQ		
Possible Outcomes and Licensee Appeal Rights	Austin Roberts/ACES, RIV		
Summary of Apparent Violations and Cross- Cutting Aspect	Greg Warnick, RIV		
Licensee Presentation	Entergy Operations, Inc. / GGNS		
Questions and Discussion	NRC and GGNS Participants		
Break and NRC Caucus (via Teams Meeting)	NRC and GGNS Participants		
Questions and Discussion	NRC and GGNS Participants		
Licensee Closing Remarks	Entergy Operations, Inc. / Grand Gulf Nuclear Station (GGNS)		
NRC Closing Remarks	John Monninger, RIV		
Public Question and Answer Session	Public Attendees		

*<u>Please</u> note this agenda has slightly changed from the Public Meeting Notice, issued 6/16/23.

NRC Principal Participants





John MonningerAida Rivera-VaronaAustin RobertsRIV Deputy AdministratorRIV DRSS Deputy DirectorRIV ACES SpecialistDRS



Greg Warnick

IV Deputy Administrator RIV DRSS Deputy Director RI



Natasha Greene, PhD DRSS/DIOR Sr. HP



Dominic Antonangeli DRSS/DIOR HP



Sean Hedger DRSS/RCB Sr. EP Insp.



Don Johnson NSIR/DPR/ROB Sr. EP Specialist

Entergy Operations, Inc. / GGNS Opening Remarks / Introductions









Grant Flynn Ryan Meyer General Manager, Plant Operations Director, GG

Ryan MeyerJeff HardyOperations Director, GGNSReg. Assurance Manager

Grace Settoon Systems & Components Engineer Manager, GGNS



Stephenie Pyle Fleet Reg. Compliance & Licensing Director



Dean Burnett Fleet Emergency Planning Director



Phil Couture Fleet Licensing Senior Manager

Purpose of this Regulatory Conference

- The NRC normally provides an opportunity for a licensee to address apparent violations before the NRC takes escalated enforcement action, or makes a final decision on the significance.
- The primary purpose of a Regulatory Conference is to get information from the licensee on the significance of findings evaluated through the Significance Determination Process (SDP), and gain their perspective on the apparent violations.
- The significance assessment determines whether an escalated enforcement action will be considered (i.e., a Notice of Violation associated with a white, yellow, or red SDP finding). Licensee input during this conference is also considered in making a final NRC decision.



Today's Meeting

- No Final Decision on safety significance or enforcement action will be made today.
- Our NRC Inspection Report (2023-090) provided our current understanding and perspective on the issue.
- We Want **Your, the licensee's, Perspective**
 - Any additional details NRC should consider
 - Whether findings/violations occurred
 - Perceived significance of the findings/ violations
 - Corrective actions implemented and/or Planned Timeline



Public Meeting Disclaimer

• The public is invited to observe the meeting and will have one or more opportunities to communicate with the NRC after the business portion, but before the meeting is adjourned.



Discussion of Apparent WHITE Violation of 10 CFR 20.1501(c)

Performance Deficiency

The licensee failed to perform a calibration in accordance with NRC requirements of 10 CFR 20.1501(c). The licensee then failed to declare these radiation monitors (1D21K648A, 1D21K648B, 1D21K648C, and 1D21K648D) inoperable in accordance with their technical specification requirements (TS 3.3.3.1 and TS 3.0.1) and perform the associated limiting condition for operation (LCO) action. Inoperable radiation monitors would be unable to perform their intended function for Emergency Preparedness actions in accordance with 10 CFR 50.54(q)(2).

SOURCE PLACEMENT ON DETECTOR

Figure 1



Background Information – *How long? What Specifically Happened?*

- Calibration issues with these radiation monitors, in part, were initially identified in 2015 during a Radiation Protection (RP) inspection at Grand Gulf Nuclear Station.
- In 2015, the licensee received a Green NCV of 10 CFR 20.1501(c) for failure to calibrate main steam line (MSL) and Drywell/Containment High Range Radiation Monitors (D/CHRRMs) in accordance with industry standards for calibration tolerances, with a repeatable geometry, and at all seven decades for electronic readings.
- In 2017, during a RP inspection, inspectors identified the licensee had not restored compliance nor established acceptance criteria based on NUREG-0737 tolerances per ANSI standards for their MSL and D/CHRRMs, and received a Notice of Violation (NOV) of 10 CFR 20.1501(c).
- In their response to the 2017 NOV, the licensee implemented changes to their calibration procedures/program (via 06-IC-1D21-R-1002) for these radiation monitors: (1) acceptance criteria per NUREG-0737 - II.F.1, ANSI N320-1979, ANSI N323D-2002, RG 1.97 – Response check is +/-20%; (2) changed vendor <u>system</u> accuracy from +/- 40% to +/- 36%; and (3) added vendor's sensitivity (A/R/hr) parameter with tolerance of +/- 10%.
- Also, in a follow-up review to this 2017 NOV, during a RP inspection, the licensee provided data that demonstrated their rad source check data met the +/- 20% for a single decade reading, which indicated the monitors were operable.

Moving forward to November 2022 ...

- In November 2022, RP inspectors reviewed condition reports that documented the licensee failed to meet the tolerance for the sensitivity parameter (~6.8E-11 A/R/hr). The licensee replaced all four detectors since the 2017 cited NOV and had not maintained the calibration verification requirements, to include this parameter. Data showed an error as high as 1935% for the sensitivity.
- As RP inspectors reviewed calibration records, they identified that the licensee was using the system accuracy tolerance of +/- 36% for the rad source check at ~ 5 R/hr to demonstrate that their D/CHRRMs were "successfully" meeting the calibration verification. However, the acceptance criteria tolerance for the source response check at least one decade below 10 R/hr, as noted in their CR-GGN-2017-06876 in response to the 2017 NOV, should be +/-20% and the overall system accuracy must be demonstrated as +/- 36%.
- NRC determined that the radiation source check data, based on the measuring point at the meter face and/or recorder (as accepted within their procedures and per the vendor), no longer meets +/- 20% as demonstrated in their response to the 2017 NOV.
- On March 7, 2023, we held a call with both the licensee and a representative for the radiation monitors vendor to discuss these issues. The vendor informed the NRC that the system tolerance for these D/CHRRMs is likely above +/- 36%, around +/- 50% when you include all system losses, decade errors, voltage errors, and instrument errors. The vendor informed the NRC that the licensee determines their commitment to a tolerance value. Exceeding +/- 36% for the system accuracy would not meet the licensee's calibration verification tolerance per their procedure, nor would it meet the +/- 20% tolerance (or tighter), as noted in the vendor manual for a successful calibration and operation of the detectors.

Purpose of the "Sensitivity Parameter" (A/R/hr) in Calibration Verification of Rad Monitors

- "Sensitivity Parameter" the actual term is detector efficiency, where the radiation exposed to the detector corresponds to an output current from the detector.
 - The vendor establishes this value by testing three decades of response and averaging them which establishes the linear and consistent response on the detector side of the calibration. In this case, the vendor provided a value of ~6.8 E-11 A/R/hr within a tolerance of +/- 10% to maintain a successful calibration check.
 - The sensitivity check tests the health of the detector and to verify the detector is working properly. There are no significant system losses.
 - This is testing the actual amps that would be provided during real conditions at untested ranges (such as above 10 R/hr).
 - The licensee has been unable to meet this tolerance for the D/CHRRMs, and by procedure, the licensee documents the failure to meet it in a condition report and deems the calibration successful.
- Sensitivity is the one parameter that gives information on how the detector will perform in untested ranges. It connects the two sides of the calibration for these ranges. Thus, it is of importance in special calibrations, as performed per NUREG-0737 guidance.
- The licensee also does a radiation response check on a bottom range which is exposing the source to a known source that verifies it is within tolerance (at ~ 5 R/hr).

In response to the 2017 NOV ...

- Following the issuance of the 2017 NOV, the licensee used their corrective action process, in part, to respond to the violation. In condition report CR-GGN-2017-06876, the licensee documented a validation of the calibration of containment area radiation monitors (B and C) and stated the following, "Based on the calibration sheets, the installed monitors were exposed to a field of 4.95 R/hr. In both cases, the associated control room monitors indicated 4 R/hr. This is within 20% [19.2%] of the actual field, and therefore acceptable. The total stated accuracy of the instrument loop (detector, monitor, and indicator) is +/-36% of the input radiation per vendor manual 460000136. This verifies that the Containment Area Radiation Monitors are capable of detecting and measuring the radiation level within the reactor containment during and following an accident with sufficient accuracy to provide usable information, as per NUREG-0737."
- This statement indicates that the licensee understood the acceptance criteria and acceptable tolerances for the radiation source check and system loop accuracy for a successful calibration. This data was used to satisfy the NRC's concern in 2017 in its determination that the calibrations of these monitors were successful, within tolerance, and operable.

Radiation Protection (RP) vs. Emergency Preparedness (EP) SDP

- Inspection Manual Chapter (IMC) 0609, App. C and D, is the document to determine the significance of performance deficiencies (PDs) related to the Occupational Radiation Safety (App. C) and Public Radiation Safety (App. D) cornerstones, respectively.
 - The D/CHRRMs are primarily used for the purpose of informing control room operators of insitu radiological conditions during plant accidents and emergencies. This is because the levels of radiation that they are designed to detect are not for normal plant operations.
- IMC 0609, App. B, is the document to determine the significance of PDs related to the Emergency Preparedness cornerstone.
 - The D/CHRRMs are more impactful to this pathway because their primary use is for emergency operations, to detect in-situ radiological conditions during and following an accident. Thus, they are primarily deemed for use during off-normal operations.
 - Therefore, the EP SDP pathway is the appropriate process to disposition these findings and has a more significant impact on determination.

Dispositioning the Issue via the <u>EP SDP</u>: Morethan-minor (MTM) and WHITE Significance

The inspectors have determined that the most significant screening pathway is via IMC 0609, Appendix B, Emergency Preparedness, for being unable to perform their intended function for Emergency Preparedness actions in accordance with 10 CFR 50.54(q)(2), failing to comply with 10 CFR 50.47(b)(4).

In short, the performance deficiency is that the licensee failed to maintain calibration and operability of the containment/drywell high range radiation monitoring equipment (D/CHRRMs). This resulted in degraded emergency action levels (EALs). The effects adversely impacted their ability to classify potential emergency conditions associated with this equipment both accurately and in a timely manner.

The finding was <u>MTM</u> because it was associated with equipment needed (i.e., the D/CHRRMs) for EAL determinations, which is considered a risk-significant planning standard (i.e., 10 CFR 50.47(b)(4)) and adversely affected the *Emergency Preparedness Cornerstone* objective to ensure that the licensee can implement adequate measures to protect the health and safety of the public in the event of a radiological emergency and the performance expectation of reasonable assurance exists that the licensee can effectively implement the approved emergency plan.

Dispositioning the Issue via the EP SDP: MTM and WHITE Significance

PLANNING STANDARD FUNCTION(s)	LOSS of RSPS FUNCTION Yellow Finding	DEGRADED RSPS FUNCTION White Finding	Green Finding
(b)(4)			
A standard scheme of emergency classification and action levels is in use.	An EAL has been rendered ineffective such that any General Emergency would not be declared for a particular off-normal event.	An EAL has been rendered ineffective such that any General Emergency would not be declared for a particular off-normal event, but because of other EALs, an appropriate declaration could be made in a degraded manner (e.g., delayed).	An EAL has been rendered ineffective such that any General Emergency woul not be declared for a particular off-normal event, but because of other EALs, an appropriate declaration could be made in an accurate and timely manner.
		An EAL has been rendered ineffective such that any Site Area Emergency would not be declared for a particular off-normal event.	An EAL has been rendered ineffective such that any Site Area Emergency would not be declared for a particular off-normal event, but because of other EALs, an appropriate declaration could be made in a degraded manner (e.g., delayed).
			An EAL has been rendered ineffective such that any Alert or NOUE would not be declared, or declared in a degraded manner for a particular off-normal even
		The EAL classification process* is not capable of classifying a General Emergency or a Site Area Emergency within 15 minutes or declaring the emergency promptly once the appropriate classification level is determined.	The EAL classification process* is not capable of classifying an Alert or NOUE within 15 minutes or declaring the emergency promptly once the appropriate classification level is determined.
			*EAL classification process includes facility procedures; training; ERO staffing; system, instrumentation, or equipment; or other resources or capabilities necessary to complete a classification or declaration.
Continued			(b)(4

EAL Technical Bases GGNS Emergency Plan

Revision 1 03/2021

Table F-1 Fission Product Barrier Threshold Matrix							
	Fuel Clad Barrier (FCB)		Reactor Coolant System Barrier (RCB)		Containment Barrier (CNB)		
Category	Loss	Potential Loss	Loss	Potential Loss	Loss	Potential Loss	
A RPV Water Level	FCB1 SAP entry is required	FCB2 RPV water level cannot be restored and maintained > -167 in. (TAF) or cannot be determined	RCB1 RPV water level cannot be restored and maintained > -167 in. (TAF) or cannot be determined	None	None	CNB1 SAP entry is required	
B RCS Leak Rate	None	None	RCB2 UNISOLABLE break in any of the following: • Main steam line • RCIC steam Line • RWCU • Feedwater • HPCS RCB3 Emergency Depressurization is required	 RCB4 UNISOLABLE primary system leakage that results in exceeding EITHER: One or more EP-4 radiation Operating Limits One or more EP-4 area temperature Operating Limits 	CNB2 UNISOLABLE primary system leakage that results in exceeding EITHER: • One or more EP-4 MAX SAFE area radiation levels • One or more EP-4 MAX SAFE area temperature levels	None	
C CTMT Conditions	None	None	RCB5 Drywell pressure > 1.23 psig due to RCS leakage	None	CNB3 UNPLANNED rapid drop in containment pressure following containment pressure rise CNB4 Containment pressure response not consistent with LOCA conditions	 CNB5 Containment pressure > 15 psig CNB6 Drywell or containment hydrogen concentration > 4% CNB7 Parameters cannot be restored and maintained within the safe zone of the HCTL curve (EP Figure 1) 	
D CTMT Rad / RCS Activity	FCB3 Containment radiation (RITS-K648B or C) > 400 R/hr FCB4 Primary coolant activity > 300 μCi/gm dose equivalent I-131	None	RCB6 Drywell radiation (RITS- K648A or D) > 100 R/hr	None	None	CNB8 Containment radiation (RITS- K648B or C) > 7000 R/hr	
E CTMT Integrity or Bypass	None	None	None	None	CNB9 UNISOLABLE direct downstream pathway to the environment exists after Containment isolation signal CNB10 Intentional Containment venting per EPs	None	
F Emergency Director Judgment	FCB5 Any condition in the opinion of the Emergency Director that indicates loss of the fuel clad barrier	FCB6 Any condition in the opinion of the Emergency Director that indicates potential loss of the fuel clad barrier	RCB7 Any condition in the opinion of the Emergency Director that indicates loss of the RCS barrier	RCB8 Any condition in the opinion of the Emergency Director that indicates potential loss of the RCS barrier	CNB11 Any condition in the opinion of the Emergency Director that indicates loss of the Containment barrier	CNB12 Any condition in the opinion of the Emergency Director that indicates potential loss of the Containment barrier	

Dispositioning the Issue via the EP SDP: MTM and WHITE Significance

Based on review of the evaluations and supplemental information provided by the licensee, and reviewing Grand Gulf's EP Table F-1, "Fission Product Barrier Threshold Matrix," the inspectors determined:

- For detectors A/D: the two drywell detectors would be used to classify up to an Unusual Event or Alert classification.
- For detectors B/C: the two primary containment area radiation monitors would be used to classify up to a Site Area Emergency.
- For detectors A/B/C/D: all four detectors are used to classify up to a General Emergency.

The effect on **EAL classification** of concern is the following:

In conclusion, the licensee has not demonstrated the ability to timely and accurately classify a General Emergency in scenarios with at least 20% fuel clad damage coincident with reactor vessel level greater than those levels that trigger other EAL fission product barrier criteria. Additionally, the licensee credits this ability to determine the need to transition to their Severe Accident Procedures (SAPs).

Possible Outcomes



- The NRC determines there is no violation resulting in no enforcement action.
- The NRC determines the apparent violations are of very low safety significance resulting in non-escalated enforcement (Green Non-Cited Violation).
- The NRC determines the apparent violations are of low to moderate safety significance resulting in escalated enforcement (a White Finding and an associated Notice of Violation).

The NRC determines there is a repeat violation of 10 CFR 20.1501(c) for failure to calibrate the D/CHRRMs in accordance with industry standards (as in 2015 and 2017), and documents a NOV.

Licensee's Appeal Rights

A licensee has the right to challenge any NRC determination or action that may be presented. Instructions for challenging an NRC enforcement action are included in our transmittal letter and the action itself.

<u>AV #1:</u> 10 CFR 20.1501(c) – Failure to calibrate the Drywell and Containment High Range Radiation Monitors

Title 10 CFR 20.1501(c) requires that the licensee shall ensure that instruments and equipment used for quantitative radiation measurements (e.g., dose rate and effluent monitoring) are calibrated periodically for the radiation measured.

Contrary to the above, from September 2019 to April 5, 2023, the licensee failed to ensure that instruments and equipment used for quantitative radiation measurements (e.g., dose rate and effluent monitoring) were calibrated periodically for the radiation measured. Specifically, the licensee failed to adequately calibrate and maintain the drywell and containment high range area radiation monitors in accordance with industry and vendor standards, as committed to, for a successful calibration.

<u>AV #2:</u> 10 CFR 50.54(q)(2) – Failure to follow and maintain the effectiveness of an emergency plan and standards of 10 CFR 50.47(b)(4)

Title 10 CFR 50.54(q)(2) requires, in part, that a holder of a license under 10 CFR Part 50 shall follow and maintain the effectiveness of an emergency plan that meets the requirements in 10 CFR Part 50, Appendix E, and the planning standards of 10 CFR 50.47(b).

Title 10 CFR 50.47(b)(4) requires, in part, that a standard emergency classification and action level scheme 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.

Contrary to the above, from September 2019 to April 5, 2023, the licensee failed to follow and maintain the effectiveness of an emergency plan which met the requirements in 10 CFR Part 50 Appendix E and the planning standards of 10 CFR 50.47(b). Specifically, the licensee failed to maintain a standard emergency classification scheme as required by 10 CFR 50.47(b)(4) as a result of calibration errors for drywell and containment area radiation monitors used for making General Emergency classifications. These calibration errors resulted in a lack of reasonable assurance that the monitors will remain operable and provide timely and accurate radiological information to the licensee during accident conditions.

<u>AV #3:</u> TS 3.3.3.1 LCO Action – Failure to maintain D/CHRRMs operable and initiate action to prepare and submit a Special Report to the NRC immediately

Technical Specification (TS) 3.3.3.1 requires, in part, that the post-accident monitoring (PAM) instrumentation for each function in Table 3.3.3.1-1 shall be operable. Condition C requires, in part, that with one or more functions with two required channels inoperable, restore one required channel to operable status within 7 days. Condition D requires, in part, that with the required action and associated completion time of Condition C not met, enter the Condition referenced in Table 3.3.3.1-1 for the channel immediately. Table 3.3.3.1-1 Function 12, "Primary Containment Area Radiation," and Function 13, "Drywell Area Radiation," reference Condition F. Condition F requires, in part, by action D.1 and referenced in Table 3.3.3.1-1, initiate an action to prepare and submit a Special Report immediately.

Contrary to the above, on December 23, 2022, the licensee failed to initiate an action to prepare and submit a Special Report after seven days had elapsed with two required PAM instrumentation channels inoperable. Specifically, on December 16, 2022, NRC inspectors reviewed the radiation source check data and sensitivity data for each of the D/CHRRMs (detectors) during the calibration surveillance in accordance with procedure 06-IC-1D21-R-1002, and identified the value for all four detectors was outside of acceptable tolerances per industry acceptance criteria and standards, but the licensee still declared them operable. As a result, the licensee failed to initiate the Limiting Condition for Operation (LCO) action.

Cross-Cutting Aspect via IMC 0310

Using NRC Inspection Manual Chapter (IMC) 0310, "Aspects within the Cross-Cutting Areas," NRC inspectors determined **H.9** was most appropriate for this finding.

H.9 - Training: The organization provides training and ensures knowledge transfer to maintain a knowledgeable, technically competent workforce and instill nuclear safety values.

Specifically, since at least 2017, the licensee has not demonstrated that their staff performing the calibration verifications of these radiation monitors has the technical knowledge to understand the full breadth of meeting acceptance criteria and requirements established for a successful calibration. Furthermore, their surveillance requirement 3.0.1 states, in part, that a failure to meet a surveillance is a failure to meet the LCO. NRC staff has engaged with the licensee multiple times to discuss these calibration aspects and establish a common understanding that the calibration data reviewed does not support these radiation monitors as being calibrated, and thus, they are not operable.



ANY questions in the room ...



Entergy Operations, Inc. / GGNS Presentation Agenda



NRC and Entergy Operations, Inc./GGNS Staff Q&A Session



NRC Regulatory Conference with Entergy Operations, Inc. Grand Gulf Nuclear Station



NRC Caucus in Session

... Returning Shortly

Regulatory Conference Closing Remarks

- Entergy Operations, Inc. / GGNS's Closing Remarks
- NRC's Closing Remarks and Next Steps / Expectations
- Conclusion of the business portion of today's Regulatory Conference
- The platform is now OPEN to questions from our public attendees ... If on the phone, PLEASE press *5 on your phone and await the Moderator to announce you, *6 to unmute yourself.

Are there any questions from the public attendees?

(Please press *5 on your phone to raise your hand, then await the Moderator, *6 to UNMUTE)






Grand Gulf Nuclear Station Drywell and Containment High Range Area Radiation Monitors

Regulatory Conference

July 6, 2023



Agenda

Section	Presenter
Sr. Management Overview	Brad Kapellas
Calibration Data	Grace Settoon
CHRMS Function and Use	Ryan Meyer
CHRMS Regulatory History	Jeff Hardy
CHRMS Calibrations	Grace Settoon
Emergency Planning	Dean Burnett
Enforcement Perspective	Jeff Hardy
Closing Remarks	Brad Kapellas





Sr. Management Overview

Sr. Management Overview

- Information from the Safety Parameter Display System (SPDS) indicates that the Drywell and Containment High Range Radiation Monitors (CHRMS) have been calibrated within required tolerances.
- The measurement of sensitivity is not needed to perform a successful calibration.
- The postulated accident scenario is not credible and the ability to classify an emergency was not degraded.



• The CHRMS were operable at the time of the inspection and remain operable.

Nuclear Excellence Model

Committed to excellence

Our vision

We power life today and for future generations

Our mission

We exist to operate a world-class energy business that creates sustainable value for our stakeholders: customers, employees, communities and owners.

In support of the company's mission, we will safely and efficiently provide clean, reliable and sustainable nuclear energy.



Fleet focus areas











Calibration Data – Drywell Monitors

Analysis of Safety Parameter Display System (SPDS) Data

Radiation Calibration [WO-00542468] Performed 03/17/2022				
Instrument	Source Strength	As Found	Percentage	
1D21-K648A Computer Point	4.45 R/hr	4.52 R/hr	(+) 1.57 %	
Radiation Calibration [WO-00542472] Performed 03/18/2022				
Instrument	Source Strength	As Found	Percentage	
1D21-K648D Computer Point	4.45 R/hr	4.26 R/hr	(-) 4.27 %	

- Full calibration of drywell radiation monitors performed during refueling outage 23 (March 2022)
- Data from SPDS indicates acceptable source response accuracy.

SPDS data obtained post-inspection indicates detector accuracy



Calibration Data – Containment Monitors

Analysis of Safety Parameter Display System Data

Radiation Calibration [WO-00593938] Performed 04/07/2023				
Instrument	Source Strength	As Found	Percentage	
1D21-K648B Computer Point	4.34 R/hr	4.00 R/hr	(-) 7.83 %	
Radiation Calibration [WO-00593938] Performed 04/07/2023				
Instrument	Source Strength	As Found	Percentage	
1D21-K648C Computer Point	4.34 R/hr	3.76 R/hr	(-) 13.36 %	
	Source exposures indicate acceptable accuracy			

- Radiation source functional check of containment radiation monitors was performed following NRC exit meeting.
- Data from SPDS indicates
 acceptable source response
 accuracy.





CHRMS Function and Use

System Function

- Purpose is to monitor a wide range of radiation levels in the containment and drywell after an accident condition.
- Measure a range of dose rates from 1 to 10 million R/hr.
- The system has no function related to the safe shutdown of the plant.
- The system is not relied upon for measurement of radioactive releases.



Div 1 of CHRMS – consisting of the 1D21-K648 A Drywell and K648C Containment monitors



Safety Parameter Data System

Outputs of each CHRMS signal are transmitted to SPDS.

- Displayed at high resolution.
- Displayed in Control Room.
- Displayed in all Emergency Response Facilities.
- Used by Emergency Directors to evaluate emergency classification.





Chart Recorder

Outputs displayed on chart recorders.

- Displayed on panels in the Control Room.
- Used if SPDS is not available.
- Emergency Action levels are large, whole numbers:
 - 100 R/hr
 - 400 R/hr
 - 7,000 R/hr



Chart Recorder

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 - 100 R/hr
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Rate Meter

Outputs displayed on 4-inch rate meters.

- Displayed on back panels in the control room.
- Not used by Operators postaccident.
- Display range can be selected using selector knob.





Selector knob



CHRMS Regulatory History

NUREG-0737

• Item II.F.1 "Accident Monitoring"

• Specified requirement and range

• Defined "Special Calibration"

CHRMS incorporated into Tech
 Specs

TABLE II.F.1-3

CONTAINMENT HIGH-RANGE RADIATION MONITOR

REQUIREMENT	-	The capability to detect and measure the radiation level within the reactor containment during and following an accident.
RANGE .	-	l rad/hr to 10 ⁸ rads/hr (beta and gamma) or alternatively l R/hr to 10 ⁷ R/hr (gamma only).
RESPONSE	-	60 keV to 3 MeV photons, with linear energy response + 20%) for photons of 0.1 MeV to 3 MeV. Instruments must be accurate enough to provide usable information.
REDUNDANT	-	A minimum of two physically separated monitors (i.e., monitoring widely separated spaces within containment).
DESIGN AND QUALIFICATION	-	Category 1 instruments as described in Appendix A, except as listed below.
SPECIAL CALIBRATION		In situ calibration by electronic signal substitution is acceptable for all range decades above 10 R/hr. In situ calibration for at least one decade below 10 R/hr shall be by means of calibrated radiation source. The original laboratory calibration is not an acceptable position due to the possible differences after in situ installation. For high-range calibration, no adequate sources exist, so an alternate was provided.
SPECIAL ENVIRONMENTAL QUALIFICATIONS	-	Calibrate and type-test representative specimens of detectors at sufficient points to demonstrate linearity through all scales up to 10 ⁶ R/hr. Prior to initial use, certify cali- bration of each detector for at least one point per decade of range between 1 R/hr and 10 ³ R/hr.



GGNS Response – Sensitivity

Detector sensitivity measurement was added to the CHRMS calibration procedure in 2019.

In situ detector sensitivity measurement is not required by NUREG-0737 or applicable ANSI standards. It is mentioned in the vendor manual as shown below:

Detectors shall either be returned to Fluke Biomedical at a five (5) year interval from the date of delivery or the owner must establish a procedure to determine that the detector average A/R/h output current or field calibrator response, does not deviate from original factory calibration by more than \pm 20 %.

GGNS confirmed with the vendor that CHRMS meet the Vendor Manual statement:

- GGNS procedures use vendor-manufactured field calibrator.
- Field calibrator response was shown to not deviate from the original factory calibration by more than +/- 20% from the SPDS.





CHRMS Calibrations

Grace Settoon – Systems & Components Engineering Manager

NUREG-0737 Special Calibration

SPECIAL

CALIBRATION

In situ calibration by electronic signal substitution is acceptable for all range decades above 10 R/hr. In situ calibration for at least one decade below 10 R/hr shall be by means of calibrated radiation source. The original laboratory calibration is not an acceptable position due to the possible differences after in situ installation. For high-range calibration, no adequate sources exist, so an alternate was provided.

Specific acceptance criteria are not called out in NUREG-0737.

GGNS Calibration procedures satisfy the Special Calibration criteria.

- Electronic signal substitution performed at all range decades.
- Calibrated radiation source within the 1 10 R/hr decade.

CHRMS calibration procedures meet NUREG-0737



ANSI N323D-2002 "American National Standard for Installed Radiation Protection Instrumentation"

- Specifies that instruments shall be removed from service for evaluation "if at any time the instrument response to the source differs from the reference reading by more than +/- 20% or the value specified by the manufacturer."
- This standard does not apply to GGNS CHRMS.
- Specifies that "Special purpose instrumentation, such as emergency post-accident radiological monitors, fall under the scope of other related ANSI standards."
- GGNS commits to an older version of this standard via its Updated Final Safety Analysis Report (UFSAR), but it is not applicable to CHRMS.

ANSI N323D-2002 does not apply to CHRMS



ANSI N320-1979 "...Performance Specifications for Reactor Emergency Radiological Monitoring Instrumentation"

- Specifies "overall system accuracy" within +/- 40%.
- GGNS does not commit to this standard via its UFSAR.
- However, the information identified post-inspection indicates that this criterion is met by GGNS CHRMS.





Vendor Manual "Victoreen® 875 High Range Containment Monitor" dated May, 2021

• Specifies

Detectors shall either be returned to Fluke Biomedical at a five (5) year interval from the date of delivery or the owner must establish a procedure to determine that the detector average A/R/h output current or field calibrator response, does not deviate from original factory calibration by more than \pm 20 %.

• And states:

System Accuracy (during "all" conditions) Accumulative @ Meter +36 % of input radiation Analog Outputs +28 % of input radiation

- Uncertainty analysis indicates acceptable system accuracy at meter and analog outputs.
- All specified accuracy criteria are met by GGNS CHRMS.

CHRMS meet vendor manual requirements



Calibration Data – Drywell Monitors

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Full calibration of Drywell monitors performed during Refueling Outage 23

Data from SPDS indicates acceptable source response accuracy.

SPDS data obtained post-inspection indicates detector accuracy



Calibration Data – Containment Monitors

Analysis of Safety Parameter Display System Data

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	Source exposures indicate acceptable accuracy			

Source exposure of Containment monitors performed April 7, 2023.

Data from SPDS indicates acceptable source response accuracy.



Calibration Criteria – Sensitivity

Detectors shall either be returned to Fluke Biomedical at a five (5) year interval from the date of delivery or the owner must establish a procedure to determine that the detector average A/R/h output current or field calibrator response, does not deviate from original factory calibration by more than \pm 20 %.

- GGNS uses the Victoreen-manufactured field calibrator.
- Detector response to the calibrator did not deviate by more than +/- 20%.
- Procedure to determine average A/R/h output current is not necessary.



Sensitivity not required to complete a successful calibration



Calibration Criteria – Overall System Accuracy

With field calibrator response criteria of +/- 20%, overall system accuracy is as follows:

- At Analog Outputs: $\sqrt{20^2 + 20^2} \cong 28\%$
- At Meter Face:

 $\sqrt{20^2 + 20^2 + 20^2 + 10^2} \cong 36\%$

- At Logarithmic Recorder: $\sqrt{20^2 + 8^2 + 27^2} \cong 34\%$
- GGNS CHRMS meet vendor manual specifications.



GGNS CHRMS meet all system accuracy requirements



Operability Evaluation

Calibration checks and data reviews clearly support CHRMS operability.

Review of procedures identified clear opportunities to improve performance that did not challenge CHRMS operability:

- Field calibrator response tolerances were not aligned to +/- 20% as stated in vendor manual.
- Range selector knob at meter face was not used to optimize accuracy.
- SPDS data was not used.

These gaps have been corrected via the Corrective Action Program.







Issue Significance: Risk Significant Planning Standard

Emergency Event Classification

- Bounding event impacting CHRMS is fission product barrier loss or potential loss.
- CHRMS remained capable of timely and accurate diagnosis of Initiating Conditions within the Control Room or Emergency Operations Facility.
- Declaration of emergency action levels would not rely on redundant EALs.
- As a result, there was no degraded RSPS function and no adverse impact on the Emergency Plan.

CHRMS remained operable – no challenge to emergency classification



Emergency Planning – Accident Scenario

The accident scenario presented by NRC in the Choice Letter is as follows:

- Cladding damage to at least 20% of reactor fuel.
- Reactor pressure vessel level remains > -191 inches.
- Containment Radiation level of 7,000 R/hr.
- Other EAL criteria for Potential Loss of Containment not met.

Entergy finds this scenario to not be credible:

- -191 inches is the Minimum Steam Cooling RPV Water Level at GGNS.
- Steam cooling maintains peak cladding temperature below 1500°F.
- Fuel clad damage of 20% or greater is not postulated to occur.
- GGNS EAL Tech Bases specify that the Containment Rad level of 7,000 R/hr corresponds to the Design Basis LOCA .

Postulated accident scenario is not credible



Emergency Planning – Conclusions

Perspective 1:

CHRMS have been shown to be successfully calibrated and operable.

- SPDS indicates response to source exposure is within +/- 20% of expected.
- Overall system accuracy meets vendor manual specification.

As a result, the declaration of Emergency Action Levels would be made in an effective manner.

Perspective 2:

The proposed accident is not credible.

 > 20% fuel cladding failure is not postulated to occur with RPV water level above -191 inches due to steam cooling.

The radiation IC for Potential Loss of the Containment Barrier assumes:

- Discharge of all RPV inventory into containment
- 20% fuel cladding failure
- This is the Design Basis LOCA

No degraded risk significant planning standard





Enforcement Perspective

Enforcement Perspective

Inspection Report documents three Apparent Violations – preliminarily screened as White.

- 1. 10 CFR 20.1501(c) Failure to calibrate the drywell and containment high range area radiation monitors.
- 2. 10 CFR 50.54(q)(2) Failure to follow and maintain the effectiveness of an emergency plan and standards of 10 CFR 50.47(b)(4).
- 3. TS 3.3.1 LCO Action Failure to maintain the drywell and containment high range radiation monitors operable and initiate action to prepare and submit a Special Report to the NRC immediately.



Enforcement Perspective – 10 CFR 20.1501(c)

Calibrations were performed at the frequency specified by the Surveillance Frequency Control Program.

Following the inspection, SPDS information indicated that field calibrator response did not deviate by more than +/- 20%.

Also, overall system accuracy is within:

- +/- 36% at the meter face and
- +/- 28% at the analog outputs

As a result, calibrations were shown to meet all applicable requirements

Calibrations were complete and successful All applicable requirements were met



Enforcement Perspective – 10 CFR 20.1501(c)

Corrective Actions have been completed to address this apparent violation.

- Source exposure tolerances were lowered to +/- 20%
 - SPDS
 - Meter Face
 - Logarithmic Recorder
- Output range of rate meter adjusted to optimize reading.

Procedure gaps have been addressed in the Corrective Action Process



Enforcement Perspective – 10 CFR 50.54(q)(2)

CHRMS calibrations maintained instrument operability.

Capability to provide accurate radiological information was met.

Emergency classification scheme remained capable of timely classification and protective action recommendations.

The accident scenario presented by NRC in the Choice Letter is not credible.

The risk significant planning standard function was not degraded.

No loss or degradation of classification capability


Enforcement Perspective - Tech Spec 3.3.3.1

CHRMS remained Operable – the LCO was met at all times.

LCO Required Actions were not necessary.

Therefore, there was no failure to prepare and submit a Special Report to the NRC.

PAM Instrumentation 3.3.3.1

3.3 INSTRUMENTATION

3.3.3.1 Post Accident Monitoring (PAM) Instrumentation

LCO 3.3.3.1 The PAM instrumentation for each Function in Table 3.3.3.1-1 shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

CHRMS remained operable Technical Specification requirements were met



Enforcement Perspective

Entergy acknowledges a finding and violation as our calibration procedures did not adequately prescribe measures to properly calibrate the CHRMS.

This finding did not adversely affect the operability of CHRMS.

This finding did not affect the capability of the CHRMS to timely and accurately classify a General Emergency.

As a result, the finding is no greater than Green.





Closing Remarks

Brad Kapellas - Site Vice President

Summary

Despite a procedure that was flawed:

- Information from SPDS and field calibrator response checks indicates that the CHRMS have been calibrated within required tolerances.
- The postulated accident scenario is not credible and the ability to classify an emergency was not degraded.
- The CHRMS were operable at the time of the inspection and remain operable.





Questions?

