

A CMS Energy Company

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March 17, 1998

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555

**DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT**  
**LICENSEE EVENT REPORT 98-005 - ACTUATION OF CONTAINMENT ISOLATION**  
**CAUSED BY AN INADVERTENT CONTAINMENT HIGH RADIATION SIGNAL**

Licensee Event Report (LER) 98-005 is attached. The condition is reportable to the NRC in accordance with 10 CFR 50.73(a)(2)(ii)(B) as a condition outside the design basis of the plant and 10 CFR 50.73(a)(2)(iv) as an actuation of an engineered safety feature. While performing maintenance on a containment radiation monitor, a containment high radiation (CHR) signal caused a containment isolation, which was an inadvertent safety system actuation.

**SUMMARY OF COMMITMENTS**

This letter contains two new commitments. The commitments are:

1. Modify containment isolation radiation monitors circuit wiring to satisfy FSAR design requirements.
2. Review drawings associated with containment isolation radiation monitor circuits, correct drawing inconsistencies, and eliminate inappropriate safety-related "Q" status indication for equipment depicted.

  
Thomas J. Palmisano  
Site Vice President

CC Administrator, Region III, USNRC  
Project Manager, NRR, USNRC  
NRC Resident Inspector - Palisades

Attachment

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**LICENSEE EVENT REPORT (LER)**

(See reverse for required number of digits/characters for each block)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-8 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104, OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503)

FACILITY NAME (1) **CONSUMERS ENERGY COMPANY  
PALISADES NUCLEAR PLANT**

DOCKET NUMBER (2)  
**05000255**

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TITLE (4) **Licensee Event Report 98-005 - Actuation of Containment Isolation Caused by an Inadvertent Containment High Radiation Signal**

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
02	17	98	98	005	00	03	17	98		05000
									FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9) <b>N</b>	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check one or more) (11)				
POWER LEVEL (10) <b>100</b>	20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(I)	50.73(a)(2)(iii)	
	20.2203(a)(1)	20.2203(a)(3)(I)	X 50.73(a)(2)(ii)	50.73(a)(2)(x)	
	20.2203(a)(2)(I)	20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71	
	20.2203(a)(2)(ii)	20.2203(a)(4)	X 50.73(a)(2)(iv)	OTHER	
	20.2203(a)(2)(iii)	50.36(c)(1)	50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iv)	50.36(c)(2)	50.73(a)(2)(vii)		

LICENSEE CONTACT FOR THIS LER (12)

NAME **Dale E Engle, Licensing Engineer**

TELEPHONE NUMBER (Include Area Code)  
**(616) 764-2848**

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)

YES	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
If yes, COMPLETE EXPECTED COMPLETION DATE	X				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On February 17, 1998, with the plant at 100% power, an inadvertent containment high radiation (CHR) signal caused a containment isolation, which is a safety system actuation. Work was in progress to replace the power supply for a containment isolation radiation monitor. This containment isolation radiation monitor (RIA-1808) is one of four containment isolation radiation monitors used to create two out of four (2/4) CHR logic. When any one of the four containment isolation radiation monitors is de-energized, that monitor fails to a tripped condition. With RIA-1808 in a tripped condition, one half of the 2/4 logic was satisfied and a trip on any one of the three remaining containment isolation radiation monitors would cause a containment isolation. When a wire was lifted, in combination with an open link, to allow removal of the power supply to RIA-1808, an inadvertent CHR signal was generated when a second monitor also tripped. During this event all equipment responded as expected. After the containment isolation, work was halted and the plant status was evaluated. Once plant conditions were understood and it was recognized that the containment isolation was due to an inadvertent CHR, actions were taken to reset the containment isolation and restore equipment lineups.

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

**EVENT DESCRIPTION**

On February 17, 1998, with the plant at 100% power, an inadvertent containment high radiation (CHR) signal caused a containment isolation, which is a safety system actuation. Work was in progress to replace the power supply for the containment isolation radiation monitor (RIA-1808). Containment isolation radiation monitor RIA-1808 is one of four containment isolation radiation monitors used to create two out of four (2/4) CHR logic. When any one of the four containment isolation radiation monitors is de-energized, that monitor fails to a tripped condition. With RIA-1808 in a tripped condition, one half of the 2/4 logic was satisfied and a trip on any one of the three remaining containment isolation radiation monitors would cause a containment isolation. To allow removal of the RIA-1808 power supply for replacement, a wire from the power supply was lifted, in combination with an open link, which resulted in an inadvertent CHR signal being generated. The lifting of this wire, in combination with an open link, led to the removal of a common ground used by RIA-1806 and RIA-1808 which ultimately caused RIA-1806 to also fail in a tripped condition. The common ground was used by both RIA-1806 and RIA-1808 circuits as an active return path. RIA-1806 failing in the tripped condition provided the second trip required by the 2/4 CHR logic and a containment isolation signal was generated. During this event all equipment responded as expected.

After the containment isolation, work was halted and the plant status was evaluated. Once plant conditions were understood and it was recognized that the containment isolation was due to an inadvertent CHR, actions were taken to reset the containment isolation and restore equipment lineups.

**ANALYSIS OF EVENT**

Plant personnel believed that each containment isolation radiation monitor (RIA) had a completely separate control circuit and work on one RIA would not effect another redundant RIA. The power supply to RIA-1808 was being replaced as a proactive effort prior to potential failure, as experienced by the previous failure of the power supply to RIA-1806. When replacing P/S-1808A, the power supply to RIA-1808, the daisy-chained ground to RIA-1806 was interrupted, causing RIA-1806 to trip, actuating 2/4 CHR logic, initiating the CHR signal, and isolating containment. (Disruption of the RIA-1806 ground circuit was made by opening the link at terminal board TB306, and then lifting the lead from P/S-1808A. Refer to Enclosure 1 for related sketch.) The power supply to RIA-1806 had been replaced in June 1997 without incident because the ground was opened at a different point and did not affect the operation of RIA-1808.

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A plant connection drawing identifies the ground connections in question to be "Non-Q Equipment Connections" which led personnel to believe that they were equipment case grounds intended for worker safety and not vital to equipment operation. This is believed to be a contributing factor in that a false sense of security was promoted by the drawing. In this case, the RIA-1806 ground path was maintained by the P/S-1808A "case ground" until the wire from P/S-1808A was lifted.

This event revealed that the two redundant right channel monitors RIA-1806 and RIA-1808 share a common daisy-chained ground connection which allows a single failure (opening the common ground) to effect the two RIA's. A review was also performed for the opposite left channel monitors RIA-1805 and RIA-1807. This review determined that RIA-1805 and RIA-1807 also share a common daisy-chained ground connection. The review also determined, however, that left channel monitors RIA-1805 and RIA-1807 do not share common ground connections with right channel monitors RIA-1806 and RIA-1808.

During the evaluation of this condition, the following conclusions were reached as to the cause for the common grounds and the extent to which this condition exists or could be implemented unknowingly as part of a future modification.

1. Based on historical records, it appears that grounding problems related to RIAs 1805, 1806, 1807 and 1808 were encountered during a 1986 modification which replaced the subject RIAs. To resolve the grounding problems, a modification field change was implemented which installed the aforementioned common grounding configuration. The field change, however, failed to adequately document the basis for the as-left configuration, and failed to reflect the as-left configuration in as-built drawings. The Configuration Control Project (CCP) later revised the drawings to reflect the as-built configuration. As in the case of the modification, no documentation was located within the CCP that provided a basis for acceptability of this configuration.
2. Based on the standard ungrounded design of Engineered Safety Features Actuation System (ESFAS) and the Reactor Protections System (RPS), it is concluded that this grounding condition is isolated. A similar common connection is not utilized in other ESFAS or RPS components which serve, as in the case of the RIA, as both the electrical reference point and the active signal return path for functioning safety related circuitry.

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3. Both the modification and the CCP project were completed in the mid-to-late 1980's. A review of current modification procedures confirmed that additional requirements have been implemented for the evaluation and provision of redundant safety circuit separation. These requirements serve to prevent similar modification deficiencies in the future.
  
4. Current revision design drawings related to radiation monitor circuits have inconsistencies from one drawing to another related to the manner in which the grounding circuits are depicted. The use of such drawings places additional review and reconciliation burden on the user.

**SAFETY SIGNIFICANCE**

All four RIAs were capable and remain capable of providing a trip output signal to the 2/4 CHR logic matrix, when needed, to effect a containment isolation actuation. All four RIAs will provide a needed trip output signal even in the event that the ground common to RIA-1806 and RIA-1808, or the ground common to RIA-1805 and RIA-1807, were to open. Furthermore, all four RIAs will provide a needed trip output signal even if the ground common to RIA-1806 and RIA-1808, and the ground common to RIA-1805 and RIA-1807, were to both open concurrently. The common ground configuration, however, violates the plant design basis criteria for redundant safety related equipment separation.

The inadvertent CHR signal caused containment to isolate. The containment isolation system functioned as required. This event was an unnecessary challenge to safety related plant equipment.

An independent Probabilistic Safety Assessment (PSA) review of the containment isolation was performed which concluded that the failure of the two RIAs had little direct impact on overall plant risk. The components affected by the RIA failures, and subsequent CHR actuation, have no impact on the core damage frequency. The ability of the RIA's to perform their safety function with the two RIA's sharing a common daisy-chained ground was questioned. It was also questioned whether a single failure would prevent the RIA's from performing their trip function. It was determined that the two likely failure modes for the common ground connection would be to short together or to disconnect open. Since the connection is already tied to ground, a short to ground is not expected to create any problems. If the common ground connection were to open, the failure mode is for the RIA's to fail in a tripped condition, which is their safety position. Therefore, the RIA's continued to perform their design function.

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**CAUSE OF THE EVENT**

An unauthorized field change made as part of a 1986 modification to install new containment isolation radiation monitors created wiring deficiencies that violated FSAR design criteria related to separation of redundant safety related equipment. RIA-1806 and RIA-1808 share a common daisy-chained ground connection as do RIA-1805 and RIA-1807. These common daisy-chained ground connections allow a single failure to affect two RIA's.

**CORRECTIVE ACTIONS**

**Remedial Action Taken**

1. Once a determination was made that the containment isolation was due to an inadvertent high radiation signal, affected plant systems were returned to their normal operating configuration.
2. Troubleshooting of the affected circuits was completed to determine the cause and confirm the effects of the event. Once the cause and effects were understood, RIA-1806 and RIA-1808 were returned to service.
3. As part of the corrective action evaluation and additional staff discussions, Operations, Systems Engineering, Design Engineering and Maintenance personnel have been made aware of this event and existing RIA configuration.

**Corrective Actions to be Completed**

1. Modify containment isolation radiation monitors circuit wiring to satisfy FSAR design requirements.
2. Review drawings associated with containment isolation radiation monitor circuits, correct drawing inconsistencies, and eliminate inappropriate safety-related "Q" status indication for equipment depicted.