

Dominion Nuclear Connecticut, Inc.
Millstone Power Station
Rope Ferry Road
Waterford, CT 06385



DominionSM

JUN 27 2001

Docket No. 50-423
B18404

RE: 10 CFR 50.73

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

Millstone Nuclear Power Station, Unit No. 3
Supplemental Licensee Event Report 99-002-01
Inadvertent Carbon Dioxide Fire Suppression System Actuation
in the Cable Spreading Room

Dominion Nuclear Connecticut, Inc. (DNC) hereby forwards Supplemental Licensee Event Report (LER) 99-002-01 (Attachment 1), documenting a condition that was determined reportable at Millstone Unit No. 3 on January 15, 1999. This Supplemental LER addresses an outstanding reportability question associated with the referenced event and corrects one aspect of the original reportability determination. It should be noted that the reportability determinations in this supplemental LER are based on the standards that were in place at the time of the event.

There are no regulatory commitments contained within this letter.

Should you have any questions regarding this submittal, please contact Mr. David W. Dodson at (860) 447-1791, extension 2346.

Very truly yours,

DOMINION NUCLEAR CONNECTICUT, INC.



C. J. Schwarz
Master Process Owner - Operate The Asset

Attachment (1) LER 99-002-01

cc: H. J. Miller, Region I Administrator
A. C. Cerne, Senior Resident Inspector, Millstone Unit No. 3
V. Nerses, NRC Project Manager, Millstone Unit No. 3

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Attachment 1

Millstone Nuclear Power Station, Unit No. 3

Supplemental Licensee Event Report 99-002-01
Inadvertent Carbon Dioxide Fire Suppression System Actuation
in the Cable Spreading Room

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-6 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) Millstone Nuclear Power Station Unit 3		DOCKET NUMBER (2) 05000423	PAGE (3) 1 OF 6
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TITLE (4)
Inadvertent Carbon Dioxide Fire Suppression System Actuation in the Cable Spreading Room

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
01	15	99	99	-- 002 --	01	06	27	01	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9) 1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)									
POWER LEVEL (10) 100	20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)	50.73(a)(2)(viii)						
	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)	50.73(a)(2)(iv)	X OTHER Voluntary						
	20.2203(a)(2)(iii)	50.36(c)(1)	50.73(a)(2)(v)	Specify in Abstract below 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 David W. Dodson, Supervisor, Unit 3 Regulatory Compliance								TELEPHONE NUMBER (Include Area Code) (860) 447-1791, ext. 2346		

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)						EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE).						X NO				

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

On January 15, 1999, at 1749, with the Unit operating in Mode 1 at 100 percent power, spurious actuation of a control circuit caused an inadvertent discharge of the carbon dioxide (CO₂) fire suppression system in the Cable Spreading Room (CSR). The plant operated at 100% power throughout the event. During the event, CO₂ concentrations in the adjacent control room and the adjoining east and west switchgear rooms exceeded OSHA limits due to leakage across penetration seals, ventilation dampers and CO₂ supply piping leaks. Ongoing evaluations of the conditions associated with this event also identified non-conservative Technical Specification ACTION statements associated with Specification 3.7.8, Control Room Envelope Pressurization System. These conditions are reported as historical operation in a condition that was outside the design basis of the facility. Additionally, a voluntary report is being made for a related matter in that some control room operators had not maintained qualification in the use of self contained breathing apparatus (SCBA). The root cause was determined to be that previous corrective actions for various fire protection system related events were inadequate.

The CSR CO₂ system has been locked-out to preclude operation. The Shift Manager and Fire Brigade Captains have been informed that CO₂ initiation into the CSR is not to be included as part of the strategy to fight a fire in this room. Changes to Technical Specification 3.7.8 have been submitted for NRC approval. Repair and/or upgrade of penetration seals and ventilation access door and damper seals has been accomplished. Alternative fire suppression strategies are also being investigated for use in the CSR.

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

I. Description of Event

On January 15, 1999, at 1749, with the Unit operating in Mode 1 at 100 percent power, an inadvertent discharge of the carbon dioxide (CO2) fire suppression system occurred in the Cable Spreading Room (CSR). The actuation was caused when a non-licensed plant equipment operator (PEO) trainee in the Service Building blew dust off a printed circuit board located in the CSR CO2 control panel. There were no plant personnel in the CSR at the time of the discharge. Shortly after the discharge (approximately 30 minutes), CO2 was found to have migrated down into the East and West Switchgear Rooms located directly below the CSR. Subsequently, over the next several hours, CO2 migrated beyond the CSR boundary to other contiguous areas of the plant, including areas within the Control Room habitability zone.

The following significant conditions were associated with this event:

1. Some on-shift Operations personnel had not maintained proficiency in the use of Self Contained Breathing Apparatus (SCBA).
2. CO2 migration to adjoining safe shutdown equipment areas (i.e., Control Room, East and West Switchgear areas) was not in accordance with the design basis for Millstone Unit No. 3. The migration of CO2 was determined to be the result of excessive leakage across installed penetration seals and ventilation system access doors facilitated by differential pressures created during operation of the Control Building Purge System (CBPS).
3. By its design, operation of the CBPS breaches the Control Room habitability zone boundary. This condition was originally determined to be a violation of TS 3.7.7 which would have required entry into TS 3.0.3 as it was considered to render both trains of the Control Room Emergency Ventilation System (CREVS) inoperable. Subsequent review determined that TS 3.0.3 entry was not applicable during CBPS operation as the CREVS is a manually operated system and system alignment, including verification of CBPS isolation is directed by the Emergency Operating Procedures. However, this review also determined that historical operation of the CBPS at power for non-fire scenarios was not consistent with the assumptions used for evaluating potential radiological consequences to the control room.

The CSR is located in the Control Building (24 foot 6 inch elevation) directly below the Control Room complex (43 foot elevation). The Control Room complex includes the Control Room, Instrument Rack Room (IRR), Computer Room, Control Room back stairwell, and also the Mechanical Equipment Space (64 foot elevation) to make up the Control Room envelope or habitability zone. This envelope is designed to be pressurized above the adjacent areas to maintain habitability following a design basis accident. Directly below the CSR are the East and West Switchgear Rooms (4 foot 6 inch elevation).

Placing the CBPS in service to remove CO2 from the Switchgear rooms diverted air from the Control Room to the Switchgear Rooms which lowered the pressure in the Control Room relative to the CSR. This reduction in pressure within the Control Room habitability zone is believed to have allowed increased CO2 leakage from the CSR to migrate into the Control Room. Potential leakage pathways into the Control Room habitability zone and other areas adjacent to the CSR are being evaluated.

At 2141 the purge of the East and West Switchgear Rooms was shutdown due to increasing CO2 levels in the Control Room. At approximately 2203 when the CO2 concentration exceeded 5000 ppm in the Control Room, operators donned SCBA and maintained stable plant conditions from the Control Room. The operators realigned the CBPS at 2306 to remove CO2 from the Control Room and Instrument Rack Room. The concentration of CO2 in the Control Room reached a peak level in excess of 17,000 ppm before it began to decrease. Operators remained in SCBAs until approximately 0400 on January 16, 1999, when the CO2 concentration had been reduced to approximately 1,500 ppm. The event was terminated after access was restored to all plant areas (including the CSR).

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The reportability of this event has been evaluated as follows:

A. SCBA Qualification Requirements Not Maintained

The condition, responding to a fire, requiring Control Room personnel to be trained and qualified to SCBA was thought to be eliminated when the site fire brigade organization was formed in 1997. Operations chose to qualify Control Room and PEO personnel only in respirators to meet Station Emergency Response Organization requirements. Consequently, personnel formerly trained were not current with these requirements. This condition is being voluntarily reported.

B. Compliance with Technical Specifications

OP 3341C, "Carbon Dioxide Fire Protection System," Section 4.31, 'Cable Spreading Area CO2 system actions during and following automatic actuation,' provides instructions following a discharge. It directs the evacuation of personnel from uninhabitable areas, notification of personnel in areas containing slight amounts of CO2, indicates that monitoring devices be used in areas adjacent to the CSR, and provides guidance on purging both the CSR and adjacent areas using the Control Building Purge/Exhaust System where applicable.

OP 3314F, "Control Building Heating, Ventilation, Air Conditioning, and Chill Water," Section 4.12, contained a note that operation of the CBPS may require entry into Limiting Conditions for Operation (LCOs) for Specifications 3.7.7, "Control Room Emergency Ventilation System" and/or 3.7.8 "Control Room Envelope Pressurization System." This was due to the recognition that use of the CBPS breaches the control room habitability boundary. Historically, operation of the CBPS followed entry into ACTION 3.7.8b.1, which allows continued operation provided that an OPERABLE CREVS train is in service in the recirculation mode. However, in this alignment the CREVS cannot achieve the TS required control room differential pressure. Following the event, operation in this configuration during non-fire related events was determined to be a violation of TS 3.7.7 requiring entry into TS 3.0.3. Subsequent reviews have identified this determination to be in error. The CREVS has no automatic alignment features. It is placed in service in accordance with Emergency Operating Instructions following an accident. These instructions also direct actions to secure and isolate the CBPS if it was in service at the time of the event. Consequently, OPERABILITY of CREVS is restored through procedurally directed operator actions prior to the time its function is required. On this basis, entry into TS 3.0.3 would not be required and this condition is no longer considered reportable.

C. Design Basis Implications

As previously stated CO2 migrated to the Control Room and East and West Switchgear Areas, all of which contain fire related safe shutdown equipment. At the time of the original LER submittal, the cause of this condition was still under investigation and was believed in-part to be due to the CBPS alignment used for purging CO2 following the event. Subsequent testing and inspections identified degraded conditions associated with installed penetration fire seals and ventilation duct access doors and damper seals. These conditions developed over time following initial startup of the unit. The resultant condition would have required SCBA use for completion of shutdown actions in the event of a fire which rendered the control room inoperable (i.e. fire in the Control room or CSR). This condition was not anticipated under the design basis of the facility.

In addition, the CBPS had been used since original plant start up to perform purging after functional testing of the Control Building CO2 fire suppression system. Use of CBPS for non-fire related purposes was preceded by entry into ACTION 3.7.8b.1 which allows continuous operation provided a train of CREVS is in operation. It was noted that the design basis radiological calculations are based on initial automatic isolation of the control room outside air intakes and pressurization of the control room using the CREPS for the first hour of the event. Using the CBPS for non-fire related conditions is non-conservative relative to the GDC 19 control room habitability analysis in that control room

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pressurization would be delayed until the purge system was successfully isolated. The inconsistency between the analysis basis and Technical Specification ACTION requirements was historically reconciled on the presumption that a radiological event coincident with a Control Room habitability envelope breach was low and operation of CREVS would provide some filtration of the Control room atmosphere. While this presumption is technically correct, it failed to consider that there were no time restraints placed on operation in this alignment to ensure the safety risk was maintained at a low value.

These conditions together are reported as historical operation that was outside the design basis of the facility.

II. Cause of Event

The direct cause of this event, the CO2 discharge to the CSR, was spurious actuation of a circuit card in the CO2 control panel. Blowing dust off an energized circuit card although not an appropriate thing to do should not have caused the card to actuate.

The root cause was determined to be that previous corrective actions for various fire protection system related events were inadequate. Based on industry experience and previous close calls, actions should have been initiated to allow the automatic CSR CO2 fire suppression system to be a manual system.

The causes of the events identified herein are related and are historical in nature. In each case, inadequate or misapplication of Licensing and Design basis information led to inappropriate decisions supporting the conditions identified during the post event review.

III. Analysis of Event

A. SCBA Qualification Requirements Not Maintained

Regulatory Guide (RG) 1.78, "Assumptions For Evaluating The Habitability Of A Nuclear Power Plant Control Room During A Postulated Hazardous Chemical Release," provides general design considerations to assess the capability of the control room, as designed, to withstand hazardous chemical releases occurring either on site or within the surrounding area. The analyses performed by the Architect Engineer (A/E) considered accidents occurring both off-site and on-site (including chemicals utilized by Units 1 and 2). The Regulatory Position section of RG 1.78 emphasizes hazardous chemicals originating from transportation accidents and on-site or near-site bulk storage facilities. However, the Discussion section of RG 1.78 states, "Fire-fighting equipment used for fighting chemical and electrical fires should be considered as a potential source of hazardous chemicals."

Plant Information Report (PIR) 3-93-350, dated December 7, 1993, addressed the need for SCBAs in the Control Room, specifically in case of a chlorine release. Because actions had previously been taken to remove potential chlorine sources, a decision was made to initiate a Final Safety Analysis Report Change Request (FSARCR) to remove the requirement for SCBA usage in the Control Room. FSARCR 94-MP3-22 was prepared. This FSARCR identified that from a radiological and toxic gas perspective, SCBAs were not needed for CR habitability. Within the associated safety evaluation it stated that "An evaluation in accordance with RG 1.78 has determined that there are no other credible toxic gas threats to the MP3 Control Room. No credit is given or required for SCBAs for any toxic gas." Adverse Condition Report (ACR) #960 was written on April 17, 1995, to document a concern with FSARCR 94-MP3-22 (prior to approval of the FSARCR) concerning SCBA Operator training requirements. Following evaluation of the concern, the ACR was dispositioned indicating that no additional training was required because fire brigade training was sufficient since the on-shift operators were part of the Fire Brigade and therefore were required to be SCBA qualified. Subsequently, the FSARCR was approved on May 31, 1995. Based upon this, the FSAR was changed to delete statements concerning the availability of Control Room SCBAs from a radiological and toxic gas hazard Control Room habitability perspective. Statements concerning Control Room SCBA availability were retained in the Fire Protection Evaluation Report.

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SCBA qualification was originally considered to be associated with both the fire brigade and station emergency response organization (SERO) requirements. In 1997 the site fire brigade organization was formed as a separate organization under the direction of the Site Fire Marshal. This was thought to eliminate the requirement for Control Room personnel (with the exception of Operators acting as the Fire Brigade Advisor) to be SCBA qualified. Since the SERO requirement involved radiological protection, the SERO requirement could be satisfied with either a SCBA or respirator. Operations choose to qualify Control Room and PEO personnel in respirators to meet the emergency response requirements associated with the SERO.

The FSAR change, in part, provide the justification for why the Control Room personnel no longer had to be SCBA qualified. However, as previously discussed, it was identified during the investigation following this event that bulk CO2, including CO2 used in fire fighting systems, was required to be considered in the RG 1.78 analysis and was not. Further, contrary to a FSAR Section 9.4.1.3 statement, the fire zone barrier between the CSA and the Control Room did not preclude CO2 infiltration because a positive Control Room pressure was not maintained during the event due the HVAC alignment associated with the CBPS operation. Therefore, the revised basis that made it unnecessary for operators to wear SCBAs was inadequate.

B. Operation in a condition that was outside the design basis of the facility

The migration of CO2 into the Control Room habitability boundary, and the East and West Switchgear Rooms (three separate fire zones) could have adversely affected the operators' ability to shut down the plant during a fire in the CSR. In the event the operators were required to evacuate the Control Room, plant procedures require operators to shut down the plant from the Auxiliary Shutdown Panel and other panels located in the switchgear rooms. During this event, the CO2 concentration at the Auxiliary Shutdown Panel would have prohibited access without SCBA. Operator awareness of CO2 in these areas would have been prompted by the smell of wintergreen. Although training and qualifications for all plant operators were not current, the plant operators that were on shift during the event had previously been trained and qualified with the SCBA and consequently were able to perform their duties using the SCBA. For this reason, this condition is judged to have low safety significance.

If a design basis accident were to have occurred coincident with the plant operating as allowed under ACTION 3.7.8b.1, doses to control room operator could have exceeded the limits established under GDC 19. However, the actual periods of CBPS operation under this ACTION were very short. Additionally, plant emergency procedures direct operators to check the status of the purge system to ensure proper isolation. As such, this condition is judged to be of low safety significance.

IV. Corrective Action

The following corrective actions have been completed:

1. The CSR CO2 System has been locked-out to preclude automatic operation while alternatives to the use of CO2 as a fire suppression agent in this area are evaluated.
2. The Shift Manager and Fire Brigade Captains have been informed that CO2 initiation into the CSR is not to be included as part of the strategy to fight a fire in this room.
3. Operations personnel serving on shift have been qualified to wear SCBAs.
4. A Change to Technical Specification 3.7.8 has been submitted to clarify applicable ACTIONs for an inoperable control room habitability boundary. The Bases for Technical Specifications 3.7.8 has been revised to reflect appropriate actions when the Control Room boundary is breached.

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- 5. Operations procedures have been revised to correct the requirements for use of the CBPS.
- 6. This event has been reviewed with Operations personnel as part of Current Events Training.

V. Additional Information

None

Similar Events

None

Manufacturer Data

EIS Codes Systems:

CSR CO2 Fire Suppression System.....LW

EIS Codes Components:

Panel (Fire Protection).....PF
Valve, Isolation.....ISV