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Dominion

JAN 23 2004

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

Serial No. 04-021
NSS&L/DF R2
Docket No. 50-423
License No. NPF-49

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 3
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING A CHANGE TO THE FIRE PROTECTION PROGRAM (TAC NO. MB8731)

This letter provides the Dominion Nuclear Connecticut, Inc. (DNC) response to a request for additional information regarding a proposed change to the fire protection program, submitted by DNC letter dated April 17, 2003.[1] In a facsimile dated August 7, 2003,[2] the U.S. Nuclear Regulatory Commission (NRC) transmitted a draft of a request for additional information. On December 17 and 30, 2003, teleconferences were held to discuss this information with the NRC. DNC's response to the NRC questions is provided in Attachment 1.

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

Very truly yours,

J. Alan Price
Site Vice President - Millstone

cc: See next page.

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[1] DNC letter, "Millstone Power Station Unit No. 3, Proposed Revision to the Previously Approved Deviation From Branch Technical Position (BTP) CMEB 9.5-1, Section C.7.c," dated April 17, 2003.
[2] V. Nerses (NRC) Facsimile to R. Joshi, "Draft Request for Additional Information (RAI) to be discussed in an Upcoming Conference Call (TAC No. MB8731)," August 7, 2003.

Attachment (1)

Commitments made in this letter: None

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Serial No. 04-021
Docket No. 50-423
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Attachment 1

Millstone Power Station, Unit 3

Response to a Request for Additional Information Regarding
a Change to the Fire Protection Program (TAC No. MB8731)

Millstone Power Station, Unit 3

Response to a Request for Additional Information Regarding
a Change to the Fire Protection Program (TAC No. MB8731)

BACKGROUND:

During original plant licensing, Millstone Unit 3 (MP3) requested a deviation from the requirements of Branch Technical Position (BTP) CMEB 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants," to allow an automatic carbon dioxide (CO2) fire suppression system to be installed in the cable spreading area (CSA). The deviation was approved by the NRC in September 1985.[1] After a 1999 inadvertent CO2 discharge and subsequent investigation and evaluation of CO2 migration concerns, Dominion Nuclear Connecticut, Inc. (DNC) proposed a change to the fire suppression methodology in the CSA. On April 17, 2003, DNC submitted its request for approval of conversion of the automatic CO2 system to a manual mode.[2] In a facsimile dated August 7, 2003,[3] the U.S. Nuclear Regulatory Commission (NRC) transmitted a draft of a request for additional information on DNC's proposed change. On December 17 and 30, 2003, teleconferences were held to discuss this information with the NRC. DNC's response to the NRC questions is provided in the balance of this Attachment.

QUESTION 1:

10 CFR Part 50.48(a) requires each operating nuclear power plant to have a fire protection plan which meets Criterion (GDC) 3 of Appendix A to Part 50. In particular, GDC 3 states, "Fire-fighting systems shall be designed to assure that their rupture or inadvertent operation does not significantly impair the safety capability of these structures, systems, and components." The NRC has provided specific criteria, information, recommendations, and guidance acceptable to the staff that may be used to meet the requirements of 10 CFR 50.48 and GDC 3. This information is provided in NUREG 0800, Standard Review Plan, Section 9.5.1, Fire Protection Program and in Regulatory Guide (RG) 1.78 as it relates to habitable areas such as the control room and to the use of specific fire extinguishing agents.

Please describe how the planned configuration meets the regulatory requirements. The licensee may address this by describing how the proposed change conforms to RG 1.78 as it relates to habitable areas such as the control room and at the local control stations

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(1) NUREG 1031, Supplement 2, "Safety Evaluation Report related to the operation of Millstone Nuclear Power Station, Unit No. 3," dated September 1985.

(2) DNC letter, "Millstone Power Station Unit No. 3, Proposed Revision to the Previously Approved Deviation From Branch Technical Position (BTP) CMEB 9.5-1, Section C.7.c," dated April 17, 2003.

(3) V. Nerses (NRC) Facsimile to R. Joshi, "Draft Request for Additional Information (RAI) to be discussed in an Upcoming Conference Call (TAC No. MB8731)," August 7, 2003.

in the east and west switchgear rooms or describe specifically how any alternatives will meet the requirements.

RESPONSE TO QUESTION 1:

Regulatory Guide (RG) 1.78 requires the control room be appropriately protected from hazardous chemicals that may be discharged as a result of equipment failures or other events. DNC has determined that the potential exists for CO2 migration from the CSA into the control room (above) and the east and west switchgear rooms (below), during a CO2 discharge in the CSA. The CO2 leakage could potentially result in unacceptable concentration levels in the spaces adjacent to the CSA over an extended period of time after a discharge. To restore CO2 as a fixed fire suppression system in the CSA while maintaining compliance with our license condition, several plant design changes are being implemented. These changes, previously discussed in our April 17, 2003 letter, ensure habitability of the control room and alternate plant shutdown locations (east and west switchgear rooms) throughout the anticipated duration of a postulated fire event. Specifically, the requirements of RG 1.78 (1974) are met as follows:

General toxicity limit from RG 1.78, Table C-1. Toxicity limit for CO2 is 1.0% by volume (approximately 10,000 ppm). Consideration of the toxicity limit is included in procedure directed actions to control room operators to don self-contained breathing apparatus if CO2 concentration is above 5,000 ppm for a predetermined time or when oxygen levels drop below 19.5%. Installation of CO2 and oxygen (O2) monitoring equipment discussed in our April 17, 2003 letter, Attachment 1, Section B.VII, assists operators in determining these levels.

Regulatory Position C.1. Major depots or storage tanks of CO2 should be considered in evaluation of control room habitability during a postulated hazardous chemical release. Engineering analysis was performed to determine the effects on control room habitability for a CO2 tank rupture and CO2 relief and purge paths. Recent results from the inadvertent CO2 discharge event and subsequent testing have indicated that the purge path contributed to CO2 migration and modification to the purge system was necessary. The CSA portion of the control building purge system is being blocked off as discussed in our April 17, 2003 letter, Attachment 1, Section B.IX and in the response to question 4 below.

In addition, due to the location of outside air intake into the east switchgear room, which has a separate ventilation system, an analysis was performed to evaluate habitability of this room following CSA CO2 relief. It was determined that procedure instructions to isolate the east switchgear room supply fan prior to a CSA CO2 discharge will be required as part of the restoration of the CO2 suppression system to operational status.

Regulatory Position C.2. Evaluate frequent rail, road and water shipments of CO2 past the site for impact on control room habitability. Based on past studies, CO2 shipments by rail, road or water are not of concern. The on-site MP3 CO2 storage tank of

approximately 45 tons has been analyzed for control room habitability and bounds any potential impacts of CO2 shipments in transit past the site.

Regulatory Position C.3. CO2 stored on site should be accompanied by instrumentation that will detect its escape, set off an alarm, and provide a readout in the control room. In accordance with the original design, the control room receives an alarm on CO2 tank low level should inadvertent discharge of the CO2 storage tank occur during normal plant operation. In the event of a control room evacuation to the alternate shutdown location, (east and west switchgear rooms) new air monitors permanently installed in these rooms have audio and visual alarms and reset capability to alert operators to potential rising CO2 levels. In addition, portable CO2 monitors are available for local surveys.

Regulatory Position C.4. CO2 toxicity limits should be taken from appropriate authoritative sources. Source and basis for toxicity limits for the CO2 system are addressed in approved calculations. These sources include:

- Genium Publishing Corporation, Material Safety Data Sheets Collection: Sheet No. 54 – Carbon Dioxide, Revision B, September 1992. Genium Publishing Corporation, Schenectady, New York.

- 1994-1995 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. American Conference of Governmental Industrial Hygienists, Cincinnati Ohio.

Regulatory Positions C.5.a. and C.5.b. Consider maximum concentration and maximum concentration-duration accidents described in RG 1.78 in control room habitability evaluation. Effects of a full CO2 storage tank rupture were analyzed in approved calculations and both accidents described in RG 1.78 are covered. The largest safety relief valve for the CO2 system is on the stationary outdoor storage tank. The results of these calculations are not impacted by the planned CSA CO2 system configuration. However, should a tank rupture or relief occur when operators are performing shutdown activities from the alternate location, self-contained breathing apparatus, a breathing air system, and air monitors are available.

Regulatory Position C.6. Atmospheric dilution factors. Analytical methods used in calculations for control room habitability and east switchgear room were taken from RG 1.78 and NUREG-0570 and dilution factors were included.

Regulatory Postion C.7. Closing air ducts, detection of CO2, and air flows should be considered in evaluation of control room habitability. The control room ventilation and the east and west switchgear rooms can be isolated by shutting off room intake fans and closing ventilation dampers as needed. CO2 and O2 alarm and monitoring equipment is located in the control room, instrument rack room, east and west switchgear rooms, and in the service building, northwest stairway (control room evacuation path). Portable monitors are available also. Changes to emergency

procedures, drills, and training are planned to capture the use of the air monitoring equipment. Currently the CO2 storage tank rupture and effects on control room intake are analyzed. The path to the switchgear room intakes is more torturous and longer than the path to the control room. The limiting event for switchgear room habitability is understood to be the evacuation of the control room to the alternate shutdown location, accompanied by a CSA CO2 discharge.

Regulatory Position C.8. Rate of air infiltration. It has been determined that potentially unacceptable levels of CO2 may infiltrate the switchgear rooms and the control room during a CSA discharge event. For this reason, supplemental breathing air systems are being installed in the east and west switchgear rooms as discussed in our April 17, 2003 letter, Attachment 1, Section B.VII. Sufficient breathing capacity is provided to account for the completion of two full CO2 discharges without cylinder change-out. The air breathing system is designed so air cylinders may be replaced as the system is being used. Each system consists of manifold(s), regulator pressure gauge, air bottles, airlines, and low-pressure alarm and meets NFPA breathing air requirements. The breathing air systems are self-contained and do not require electric power.

In the control room, seven self-contained breathing apparatus (SCBA) are currently pre-staged, each with a spare 60-minute air cylinder. The associated SCBA masks have been outfitted with new voice amplifiers for stronger person-to-person communications. Power supplies can be changed out during use and spares are available. Each SCBA staged in the control room will also be outfitted with a quick-connect airline fitting to allow connection to the new breathing air system in the east and west switchgear rooms. All equipment is periodically checked and maintained to ensure continued functionality. Changes to emergency procedures, drills, and training are planned to capture use of the air breathing systems.

It is important to note, as discussed in response to Regulatory Position C.11., these areas are capable of being purged of CO2 using various methods.

The following measures assist in reducing potential leakage from the CSA into adjacent areas:

- Additional sealing of the spare electrical metal floor penetrations in the west portion of the instrument rack room and CSA has been performed to improve the leak-tightness of fire protection seals further preventing potential CO2 migration from the CSA boundary.

- Penetrations in the boundaries of the CSA are fire rated assemblies (penetration seals and fire dampers) that are captured in the penetration inspection program. Some ductwork passes through the CSA to the control room and these ventilation duct penetrations are also periodically inspected.

- The CSA fire doors, their hardware and seals are inspected visually and functionally to insure that they operate properly every 18 months. In addition, the

doors are inspected periodically per approved procedures to assure they are not damaged or degraded and that they latch securely.

Regulatory Position C.9. Makeup air for room pressurization and pressure differential. The control room emergency ventilation system operating in recirculation mode and a control room pressurization system can be manually initiated. To support operation of the control room emergency ventilation system, the MP3 Technical Specifications surveillance requirement ensures control room positive pressure of greater than or equal to 1/8-inch water gauge relative to adjacent areas on a periodic basis. The switchgear room ventilation system was not designed to provide a positive pressure relative to surrounding areas.

Regulatory Position C.10. Allow for 10 cubic feet per minute of unfiltered air into control room. Refer to response to Regulatory Position C.8. Note that the switchgear rooms were not designed to limit or filter intake air during a radiological event.

Regulatory Position C.11. Removal capability of chemical by filtration or other means. The fire brigade has portable exhaust fans for purging CO2 from the CSA and the switchgear rooms and is trained on their use. In addition, the control building purge system (CBPS) is capable of purging CO2 from the control room and the switchgear rooms. Portable fans are also available for purging operations in these rooms.

Regulatory Position C.12. Chemical Release from container (storage tank) or pipe concurrent with design accident (LOCA, flood, tornado or earthquake). The potential CO2 migration into the control room or east and west switchgear room is bounded by the CO2 storage tank rupture analysis.

Regulatory Position C.13. If accident indicates that chemical toxicity limits might be exceeded, SCBA should be provided. For long duration event, sufficient air for six hours should be provided. Seven SCBAs each with one-hour air cylinders and one replacement cylinder are pre-staged in the control room. The breathing air system in the east and west switchgear rooms has sufficient air for four operators for approximately 4.8 hours. The breathing air system design allows bottle swap-out during use and spare air bottles are located on site. Total breathing air available per operator is considered to be sufficient breathing air for a worst-case fire scenario in which purging of CSA and adjacent areas to acceptable CO2 levels is completed approximately 2.5 hours after initial CO2 discharge. Future drills and training are planned to include the use of the breathing system and monitors.

Regulatory Position C.14. Detection instrumentation and air supply equipment should meet the single-failure criterion. The west switchgear room (auxiliary shutdown panel) will have two permanent air detectors/monitors/alarms and the east switchgear room will have one. The permanent monitors have back up power. The fire brigade has portable air monitors for use during an event. There are a total of 61 SCBA, 60-minute packs on-site with 60 spare full air cylinders. During a significant fire event, mutual aid is called immediately which brings more fire fighters, SCBA, spare cylinders, and a

cascade fill station. New switchgear room breathing air systems are self-contained mechanical systems, requiring no electric power. Air cylinders can be switched out during system operation and spare bottles will be available on site.

Regulatory Position C.15. Emergency procedures should be written to address the event, including use of detection instrumentation. Changes to the emergency operating procedures are planned to address CO2 discharge in the CSA. Prior to manually initiating a CSA CO2 discharge, procedure directed actions including announcements and evacuations are performed associated with the potential hazards. Instructions are provided for evacuation of the control room and SCBA use while traveling to switchgear rooms to perform shutdown. Permanent CO2 and O2 detectors, monitors, and alarms will be located in the control room, instrument rack room, east and west switchgear rooms, and service building northwest stairway to assist in detecting levels at which operators are required to don SCBA. Operators are directed to don SCBA if CO2 levels are above 5,000 ppm for a predetermined time or when O2 levels drop below 19.5% or CO2 concentration is 20,000 ppm or greater. Procedures are also provided to isolate the control room (no evacuation). Procedures for inspection and inventory of SCBA are also in place.

QUESTION 2:

Millstone Power Station, Unit No.3 committed to install an incipient fire detection system.

How would the incipient fire detection system, which is designed to detect very minute quantities of combustion products, assure adequate plant response (defense-in-depth) for fires which are more rapidly developing than a cable that slowly overheats due to ampacity problems? This should include a discussion of how the licensee assures other plant activities, such as welding or diesel generator operations, that may result in spurious alarms will not affect response to valid alarms.

RESPONSE TO QUESTION 2:

For clarification, there is no regulatory commitment related to the installation of the incipient fire detection (IFD) system. A DNC commitment exists to install a fixed fire suppression system in the CSA prior to startup from the next refueling outage as stated in DNC letter dated July 3, 2002.[4] The IFD system is a related modification which is being provided to ensure that on-site fire brigade response occurs as early in the fire development stage as practical to prevent or minimize fire damage.

A rapidly developing fire is one in which the combustion stage occurs almost simultaneously with ignition. This type of fire would require that a significant quantity of

[4] DNC letter, "Millstone Nuclear Power Station, Unit No. 3 Update to Information Regarding Change to the Fire Protection Program," dated July 3, 2002.

type A transient combustibles be available to ignite and rapidly burn. The fire protection defense-in-depth philosophy for the CSA assures that this type of fire has a low likelihood of occurrence and that should such a fire occur, the fire will be detected and extinguished by the fire brigade prior to compromise of the intervening fire barriers. This assurance is provided by the following:

- Transient combustibles and ignition sources are strictly controlled in the CSA as previously discussed in DNC letter dated April 17, 2003, Attachment 1, section A.III.[5] A fire protection permit is required for storage of transient combustibles in the CSA. Also, fire protection procedures require that prior documented concurrence be obtained from the fire protection program engineer or site fire marshal before transient combustibles or ignition sources are allowed in the CSA.

- If this type of fire were to occur, both the IFD system and the ionization and photoelectric smoke detection system would be available to provide alarms to alert the control room of a fire. The addition of the IFD system increases the reliability of the detection function in the event of a fire. The improvement in response time attributable to IFD will vary dependent upon the circumstances involved. It should be noted that the ionization and photoelectric smoke detection system is not being replaced or removed. This cross-zoned detection system was approved and determined to be acceptable in accordance with BTP CMEB 9.5-1, Section C.6.a, during original plant licensing in Supplement 1 to the NRC SER.[6]

- Propagation of fire in the CSA is expected to be very slow based on the combustible loading of the room and the spatial separation of the cable trays from ignition sources. The combustible loading of the CSA is described in the cover letter of the May 7, 2002 letter and details for the principle combustible (cables) can be found in Attachment 1 of that letter. The CSA has a combustible loading of approximately 220,000 Btu/ft^2 which we characterize as "moderately severe". The primary combustibles in the room are cables which are IEEE-383 qualified or jacketed with flame retardant material. Exposed cables in the CSA are low-voltage control and instrumentation cables (125 volts and lower). High-voltage cables (4160 vac, 480 vac) that traverse the CSA are inside metal conduit or encased in concrete that will limit flame spread.

  Aside from cabling, the CSA also contains two electrical isolation panels fed with wiring in metal conduits from cable trays. The nearest cable trays are located approximately three feet horizontally from the isolation panels. Heavy metal

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[5] DNC letter, "Millstone Power Station Unit No. 3, Proposed Revision to the Previously Approved Deviation From Branch Technical Position (BTP) CMEB 9.5-1, Section C.7.c," dated April 17, 2003.

[6] NUREG 1031, Supplement 1, "Safety Evaluation Report related to the operation of Millstone Nuclear Power Station, Unit No. 3," dated March 1985.

junction boxes are also located at the ceiling, floor, walls, and on columns within the CSA. The junction boxes and electrical isolation panels have steel construction with no or minimal openings. Fire propagation from the panels or junction boxes is very unlikely. Additionally, there are two switch enclosure panels used as junction boxes in the CSA. A fire initiated inside one of these switch enclosures is not expected to propagate to cable trays due to the insignificant combustibles inside the switch enclosure.

- The site fire brigade response to the CSA upon receiving an alarm from either the IFD or smoke detection system ensures fire damage would be limited. For this type of fire, the primary suppression method expected is manual fire fighting, using fire suppression activities commensurate with the type and size of fire encountered. The NRC observed and documented in SER, Supplement 1, Section 9.5.1.4, that cable tray configuration would permit manual hose streams to be effectively applied in areas of the plant with concentrated cable arrangements. The NRC allowed the use of CO2 as an extinguishing agent in the CSA, with the stipulation that there be good access for manual fire fighting with hose streams.[7] Since that time, DNC has supplemented the existing manual fire fighting equipment with new equipment and methods to improve the fire brigade's effectiveness in fire suppression activities.

  Should it become necessary to isolate the room and use CO2 as an extinguishing agent, procedures are in place to ensure safe and effective CO2 discharge. These diverse methods of suppression capability build the level of defense-in-depth for the CSA and ensure there is no significant fire damage to seals and barriers.

- Finally, the plant fire safe shutdown analysis demonstrates that loss of the CSA will not prevent the safe shutdown of the plant. Alternate shutdown capabilities are provided for a fire in the CSA using the fire transfer switch panel (east switchgear room) and the auxiliary shutdown panel (west switchgear room) which are located in separate fire areas.

To address the staff's question on spurious alarms, currently, the IFD system has been installed for approximately 8 months, and there have been no spurious IFD system alarms due to either welding or grinding outside the CSA, or from monthly emergency diesels runs. The CSA atmosphere is isolated from adjacent environments. No supply or exhaust air ventilates the CSA. In addition, the CSA is not normally occupied and is a low traffic area.

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[7] NUREG 1031, Supplement 1, "Safety Evaluation Report related to the operation of Millstone Nuclear Power Station, Unit No. 3," dated March 1985.

A DNC engineering evaluation of the fire scenarios in the CSA was performed based on the fire loading and the administrative controls in place in the CSA. The fire scenarios evaluated are as described in DNC letter dated May 7, 2002, Attachment 2.[8]

QUESTION 3:

The most recent test, which was to demonstrate in part that the licensing basis is still being met, of the CO2 fire suppression system resulted in failure of a closed door to the Cable Spreading Area (CSA) and the test had to be aborted before all the objectives were achieved. Lacking this demonstration via the test, the licensee provides an explanation of why it is not necessary to retest. However, the explanation does not make clear how the licensee will assure when the CO2 system is called upon to perform as designed it will function within the CSA to extinguish a fire.

RESPONSE TO QUESTION 3:

Per the requirement of BTP CMEB 9.5-1, the CSA CO2 system complies with NFPA 12, "Carbon Dioxide Extinguishing Systems." NFPA 12, in turn, requires a system qualification test to verify operability of a new system. The original qualification test demonstrated that a 30 percent CO2 concentration can be attained within 2 minutes of discharge, and a 50 percent concentration can be achieved within 7 minutes and sustained for the duration of the required discharge. The purpose of the February 2001 discharge test was to verify CO2 concentrations as a function of time in areas adjacent to the CSA; it was not designed to be a new system qualification test. However, the NFPA concentration build-up rates were met for the CSA elevations monitored and were maintained even though the discharge was terminated early. Indications from these test results showed that concentrations at all elevations measured were trending as expected, and acceptable CO2 concentrations in the CSA would have been achieved if the test had not been terminated. Nevertheless, an engineering evaluation was performed to determine if a new system qualification test would be required prior to returning the CO2 system to operation to ensure CO2 levels would be met as originally designed. The evaluation concluded that no test was required since the CSA design features have not been changed since original plant licensing in such a way that would adversely alter CO2 concentrations achieved following a discharge. The following considerations were included in this evaluation:

- There is no ventilation system serving the CSA other than the control building purge system (CBPS). The CBPS supply and exhaust dampers that enter the CSA have been isolated and blocked off. This change prevents pressurization of the control building purge system and potential CO2 leakage through purge system dampers into areas outside the CSA during a CSA CO2 discharge event. This change is considered to be an improvement to the CO2 boundary. (Note

[8] DNC letter, "Millstone Nuclear Power Station, Unit No. 3 Update to Information Regarding Change to the Fire Protection Program," dated May 7, 2002.

that an acceptable means of purging CO2, smoke, and combustion products from the CSA has been established and is discussed in our response to question 4.)

- The CO2 relief path remains unaltered. The CSA shares a common relief path with the east and west switchgear rooms. Backdraft dampers that prevented CO2 leakage from the CSA into the switchgear rooms have been replaced by manual bubble tight dampers that are normally closed. This change was made in an effort to eliminate any potential CO2 leakage via the relief ducting back into the switchgear rooms given a CO2 discharge in the CSA, and it represents an improvement to the CO2 boundary.

- The CO2 delivery system remains unchanged except for changing the initiation of the system from automatic to manual. This change does not affect the amount or rate of CO2 discharged into the CSA. The modification from automatic to manual initiation is discussed in our April 17, 2003 letter, Attachment 1, Section B.IV.

- The CSA CO2 over-pressurization vent path design has been reviewed and found to be acceptable.

- Based on data obtained during the February 2001 discharge test, it was determined that the initial pneumatic discharge timer timed out approximately 30 seconds longer than required by the original qualification test criteria. The timer has been recalibrated and a periodic surveillance is planned for this timer as well as other initial pneumatic discharge timers. This surveillance requirement provides added assurance that discharge timers will consistently perform as originally specified. A periodic preventive maintenance work activity is also planned to rebuild all selector and master selector valves for the CSA CO2 system to ensure proper functioning. These improvements assure the system will perform as designed, consistent with the requirements for initial qualification testing. These improvements would not affect expected CO2 concentrations and thereby require new qualification testing.

- Leakage observed during the inadvertent discharge event in 1999 was not of a magnitude that would cause the CO2 concentrations inside the CSA to drop below the original design criteria. The failure of the door during the February 2001 test was attributed in part to latching issues. In addition, the unexpected extended initial discharge period may have caused an over-pressurization condition in the room contributing to door failure as well. The door in question did not exhibit any damage during initial startup or the inadvertent CO2 discharge. The door, door hardware, electronic striker, closure arm, hinges, door sweep, auto door sweep and weather strip were all replaced after the planned discharge in 2001. Various other improvements or repairs to the CSA CO2 boundary were made after the 1999 inadvertent discharge primarily to control CO2 leakage to adjacent areas. These changes were determined to have a

negligible effect on overall CO2 concentration levels required during a CO2 discharge.

QUESTION 4:

Your approved fire protection program includes a smoke purge system to remove smoke from the cable spreading room. This system was provided to meet the guidelines of the Standard Review Plan, Section 9.5.1.

Explain why prior approval is not required prior to disabling this system.

RESPONSE TO QUESTION 4:

The CSA was designed to be connected through ducting and fire dampers to the control building purge system (CBPS), which utilizes a common duct system with one supply fan and one exhaust fan. In the event of a fire, the control room operators would align the CBPS to one of the six rooms that the CBPS serves. In the event of a large fire in the CSA, it is likely (expected) that the fire dampers would close and the CBPS would be unavailable for purging operations. As defined in our Fire Protection Evaluation Report during original plant licensing, portable smoke ejectors are provided to assist in removal of the products of combustion should the normal ventilation systems be unavailable because of damper closures or other failures. It should be noted that the CBPS as originally designed, is powered from a non Category 1E source and would therefore not be available in the event of a loss of off-site power.

Millstone Unit 3, Facility Operating License No. NPF-49, Condition 2.H "Fire Protection" states the following:

> "Dominion Nuclear Connecticut, Inc. shall implement and maintain in effect all provisions of the approved fire protection program as described in the Final Safety Analysis Report for the facility and as approved in the SER (NUREG - 1031) issued July 1984 and Supplements Nos. 2, 4, and 5 issued September 1985, November 1985 and January 1986, respectively, subject to the following provision:
>
> The licensee may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire."

Removal of the smoke purge system in the CSA was evaluated and determined to be a change that does not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire. The following justification is provided:

- The CSA supply and exhaust purge system ductwork is a potential path for CO2 leakage from a CSA CO2 discharge into unwanted areas. Eliminating these

pathways will ensure no CO2 will be transported through common ductwork into the control room pressurization boundary or the east or west switchgear rooms during a CSA CO2 discharge. RG 1.78 requires protection of the control room from hazardous chemicals that may be inadvertently discharged. The CBPS was determined to enhance the CO2 migration from the CSA to the control room and is discussed in detail in our letter dated March 21, 2001.[9]

- During original plant licensing, the CSA fire fighting strategy provided for manual venting of the CSA using portable venting methods as recommended by the BTP, Section C.7.c. The common purge system was intended to assist in purging operations in the CSA as needed and manual control was provided in the control room. The requirement for portable venting was also established during original plant licensing. The site fire brigade is routinely trained on the use of portable ventilation methods for purging the CSA.

- The use of portable fans for smoke or CO2 removal provides an adequate and appropriate method of smoke removal from the CSA and has been successfully demonstrated during both the 1999 inadvertent CO2 discharge event and subsequent discharge testing in February 2001. The CSA is easily accessible, portable fans are easily set up and there exists a relatively short smoke removal path to the outside. In addition, based on actual experience in purging operations in the CSA, the portable smoke ejectors were judged to be more efficient that the CBPS. Diverse methods are provided for manual smoke removal -- both hydraulic powered fans and electric fans available. DNC has determined that manual purging methods using a system that is completely controlled outside the CSA, is versatile enough to use various sources of power (hydraulic, normal plant power, fire brigade electrical generators), and can be used regardless of fire damper closures, is a more efficient system than the CBPS for the CSA.

- The portable smoke ejectors are set up such that smoke and CO2 are exhausted through the west stairwell directly to the outside courtyard. This forced ventilation pathway does not affect access or egress to other plant areas where safe shutdown actions may be required.

For the reasons discussed above, it was determined that this change did not adversely impact the ability to achieve and maintain safe shutdown in the event of a fire and therefore, prior NRC approval was not considered to be a requirement for disabling the portion of the CBPS that serves the CSA.

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[9] Northeast Nuclear Energy Company, "Millstone Nuclear Power Station, Unit No. 3 Control Building Purge System," dated March 21, 2001.

QUESTION 5:

You state that the smoke will be removed hydraulically or with electrical fans.

Please provide details of the planned smoke removal method. What is the power supply to the electrical fans, and how will you assure the reliability and availability of the power supply after the fire has started? Where will water drain if the smoke is removed hydraulically, and how you will assure safe shutdown capability especially in light of the concerns in Question 7?

RESPONSE TO QUESTION 5:

Smoke removal in the CSA is directed by the fire brigade captain per the guidance contained in the MP3 Fire Fighting Strategies. These strategies are used by the fire brigade in response to an alarm or actual fire in the CSA. The fire brigade regularly trains to these strategies and periodic drills are conducted in the CSA that include setting up the portable smoke ejectors. As discussed above in our response to question 4, manual smoke removal has been determined to be an acceptable means of purging the CSA and does not adversely impact the ability to safely shut down the plant in the event of a fire. The details of the smoke removal methods for the CSA are as follows:

- Regular station power to the portable electric fans will be used if available. Vital power is available in the nearby emergency diesel generator building. Power for portable fans would not be needed until approximately one hour into the event. At that time, mutual aid fire trucks with electrical generators from surrounding towns would be on site, staged and available to provide power and assistance. Additionally, site fire protection has portable electrical generators available on site.

- The hydraulic (water turbine) smoke ejector has an inlet and outlet hose connection. The outlet hose would be attached and run out of the CSA, discharging in the outdoor courtyard. Water operating the hydraulic fan is not anticipated to be discharged into the CSA at any time.

QUESTION 6:

You state that the fire brigade will be directed to minimize the use of water and to use fire extinguishers to suppress a fire in the cable spreading room. The primary in situ combustible material in this area is electrical cable insulation which burns with a deep seated fire. Several recent industry events have highlighted the fact that gaseous fire extinguishers will not suppress a deep seated cable fire.

Please provide details of the types of extinguishers available for use by the fire brigade in this area, and how you will assure fires with these attributes will be effectively extinguished?

RESPONSE TO QUESTION 6:

The array of fire fighting equipment available to the fire brigade is discussed in our letter dated April 17, 2003, Attachment 1, Section B.III. Included in this list is a general description of the extinguishers available. Additional details are as follows:

- Four 20-lbs carbon dioxide extinguishers
- One 50-lbs wheeled carbon dioxide extinguisher
- One 100-lbs wheeled carbon dioxide extinguisher
- Four 2-½ gallon water-mist extinguishers
- Two fire hose stations, 100-ft each with electrical safe nozzle (e-nozzle)
- Five booster reels, 100-ft each
- One dry fire hose bin with 200 feet of hose
- One dry "Y" fire pipe connection through north wall (valved).

In addition to the extinguishers, there are three ladders, one fire brigade locker and a thermal imaging camera available to the fire brigade inside the CSA. In close proximity to the CSA the following equipment is available:

- One fire hydrant located north of the diesel generator building
- Hydrant hose house No. 6 located north of the diesel generator building with various equipment
- Fire brigade locker in the service building
- Wheeled dry chemical extinguishers located east of the diesel generator building

Early warning of a potential fire allows brigade members to locate and investigate the area of concern before a deep-seated fire develops. Coverage for the recently installed IFD system is broken down into upper and lower level zone quadrants (as hazards dictate). Each panel (two total) will monitor two upper and two lower quadrants. Data readings at each panel indicate the order in which zones are alarmed, giving fire brigade members a primary area to concentrate their search. The use of a thermal imaging camera to search cable trays for heat if no smoke is visible is available to fire brigade members also. Regardless, if a cable fire went undetected and developed quickly into a deep-seated fire, fire brigade members would perform an initial investigation of the area and provide feedback to the brigade captain and control room operators. Operations and fire brigade personnel, working together, would locate the fire, determine the extent, isolate electrical power as necessary, and start extinguishment.

Depending on type and location of fire, brigade personnel using the above hoses and extinguishers, as needed, would provide effective extinguishment. Instructions for fighting a fire in the CSA are contained in the fire fighting strategy which provides instructions to the fire brigade relative to potential hazards, safety related equipment in the area, special hazards and precautions, fire suppression equipment availability, assembly area(s), response strategy, spill or leak potential and ventilation strategies. The manual response strategy is considered the primary (first) means of fire suppression for the CSA. The CO_2 suppression system will be utilized as the backup (secondary) means of fire suppression.

The MP3 Fire Protection Evaluation Report, Section 3.3, describes the fire brigade staffing and training. The site fire brigade has, as a minimum, five members per shift including the shift fire brigade captain. This five-member brigade is supported by an operations fire team advisor, knowledgeable in plant safety-related system operations. The five members of the fire brigade are trained in fire fighting techniques and are able to effectively fight and control plant fires. Supplemental assistance is also provided by local fire departments. Using the strategies and experience of the fire brigade, it is expected that manual suppression activities would limit the fire effects to a small area of cable tray. If a deep-seated fire could not be extinguished effectively with water, the CO2 system would be used. Additionally, although unlikely, the brigade captain may decide in conjunction with the operations personnel that CO2 should be used as the first means of suppression.

To validate the new procedure instructions, a simulated evacuation of the control room after a simulated discharge of CSA CO2 was accomplished with operators wearing SCBA. Critical timed design assumptions were met in this initial validation at the auxiliary shutdown panel in the west switchgear room. The use of SCBA, masks and voice amplifiers did not adversely affect access to isolation transfer switches or impede movement or visibility. Total elapsed time to don and checkout SCBA was approximately one minute and was completed in the control room prior to evacuation.

QUESTION 7:

In your submittal you note that water on the cable spreading room floor could leak through the floor onto the alternative shutdown areas below. Since plant operation in these areas may be required for a cable spreading room fire, this scenario appears to lead to lack of capability to safely shutdown the plant.

Has the risk associated with this event been analyzed? If so, what are the results? How will you assure safe plant shutdown? Include in your discussion the scenario of a fire in the CSA that leads to evacuation of the Main Control Room and fire fighting in the CSA leads to the loss of alternate shutdown.

RESPONSE TO QUESTION 7:

DNC has not performed any formal risk assessment for the planned changes to the fire protection program identified in our letter dated April 17, 2003. In that submittal, DNC discussed the capability of rapid removal of standing water in the context of reducing the probability of leakage into the spaces below the CSA. However, the use of the term "probability" was not a reflection of any quantitative risk insight having been developed. Use of water for manual fire fighting in the CSA was part of the original fire protection program defense-in-depth for the CSA. As such, water removal requirements were part of the original plant design and have been addressed in the fire fighting strategies. Based on observed CSA CO2 leakage to adjacent areas during the 1999 inadvertent discharge, DNC determined it prudent to address the potential for water leakage as part of the planned changes. Qualitatively, DNC has determined that the probability of gross leakage to the alternate plant shutdown area below the CSA is low for the reasons discussed in the following paragraphs.

BTP CMEB 9.5-1, Section C.5.a.(14), requires floor drains for areas where use of hand hose lines may cause damage to safety related equipment. Use of manual suppression with portable fire extinguishers or hose lines in the CSA was evaluated during original plant licensing and found to be acceptable. The staff approved a deviation for a lack of floor drains in the CSA in NRC SER, Supplement 4, which states that the calculations were reviewed regarding the accumulation of water in areas that use CO2 as the extinguishing agent.

There are numerous electrical and mechanical penetrations into the CSA from above and below. These penetrations are sealed to a 3-hour fire rating and a hydrophoric rating of four inches of water. An engineering evaluation concluded that the resultant water discharge expected during manual fire fighting activities in the CSA is bounded by the control building flooding analysis. In addition the penetration barriers and seals are qualified to ASTM E119 requirements and therefore are not adversely affected by the force of the water stream when hose lines are used.

Given that the IFD system provides detection in the incipient stage, fire fighting water use (if any) is expected to be minimal and most likely less than the amount postulated in the original engineering analysis. The fire fighting strategy for the CSA directs minimizing use of water as a priority by using misting or fog fire water streams, electrically safe nozzles and portable fire extinguishers. The fire brigade is trained in the classroom and with hands-on fire fighting exercises to minimize use of water and to spray water only where needed. CO2 extinguishers are also available for fire extinguishment as well as the manual CO2 system.

The strategies for the CSA also states that fire fighting water usage should be monitored for drainage, and discharge to the switchgear rooms should be avoided where possible. A water vacuum is provided to assist removal of standing water which is a priority after extinguishment. It is not expected that significant standing level of

water will result as the east CSA door is at floor level. Water will flow through this door and be directed to the nearby outside courtyard.

The following improvements have been made to the various penetrations in the CSA floor since original plant licensing:

- The cable blockouts between the CSA and the east and west switchgear areas have been improved by applying a 3" layer of Silguard 170 elastomer seal material.

- The boot seal joints were sealed with an adhesive sealant. The boot seals are located between the ductwork and the floor between the cable spreading area, the east and west switchgear and the control room.

- The spare conduit penetration caps were sealed with an adhesive sealant.

During a postulated unmitigated fire in the CSA that causes the control room to be abandoned, the operators will need to perform alternate shutdown activities in the switchgear rooms below the CSA. For the reasons discussed above, the risk of water leakage into the switchgear rooms below and likelihood of damaging safe shutdown equipment located there is considered very small. Therefore it has been concluded that manual fire fighting activities, as the primary source of suppression in the CSA, will not adversely impact the ability to safely shutdown the plant.

QUESTION 8:

You propose to remove water from the cable spreading room floor with a vacuum.

Given the concern of water leaking though the cable spreading room floor, justify how this method will meet the objectives of your Fire Protection Plan.

RESPONSE TO QUESTION 8:

The water vacuum used by the site fire brigade has a 17-gallon capacity, however it is equipped with an automatic discharge pump which allows water removal without interruption. Both the vacuum and pump operate simultaneously and moves water substantially faster than a normal shop vacuum. A hose attaches to the vacuum discharge and is routed directly to the outside courtyard for water removal as needed.

As discussed in our April 17, 2003 letter in Attachment 1, Section B.X., the CSA fire fighting strategy used by the fire brigade directs the rapid removal of water and also states the importance of using the minimum amount of hose stream water necessary to fight a CSA fire. Installation of the IFD system further increases the probability of detecting a fire early enough that water, required by fire suppression efforts is further

reduced. See also the discussion in response to question 7 regarding the bounding control building flooding analysis.