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Dominion

JAN 2 2 2002

Docket No. 50-423
B18554

RE: 10 CFR 50.48
10 CFR 50 Appendix A GDC 3

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

Millstone Nuclear Power Station, Unit No. 3
Information Regarding Change to the Fire Protection Program

The purpose of this letter is to inform the Nuclear Regulatory Commission (NRC) Staff of a change to the fire protection program as it relates to fire suppression in the Cable Spreading Area (CSA) at Millstone Unit No. 3. Dominion Nuclear Connecticut, Inc. (DNC) has evaluated this change in accordance with Facility Operating License No. NPF-49 Condition 2.H and concludes that the change does not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire. In addition, the modification continues to meet the requirements of 10 CFR 50.48(a)(1) and 10 CFR 50 Appendix A, General Design Criterion 3 (GDC 3).

Background

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."

10 CFR 50 Appendix A, GDC 3 states in part:

> "Fire detection and fighting systems of appropriate capacity and capability shall be provided and designed to minimize the adverse effects of fires on structures, systems, and components important to safety."

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10 CFR 50.48(a)(1) requires that each operating nuclear plant must have a fire protection plan that satisfies GDC 3. Millstone Unit No. 3 was licensed after January 1, 1979, consequently NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Reactors, LWR Edition," was the basis document for the initial licensing basis review. Included in NUREG-0800 is Branch Technical Position (BTP) CMEB 9.5-1, "Guidelines for Fire Protection For Nuclear Power Plants." BTP CMEB 9.5-1 presented guidelines acceptable to the NRC Staff for implementing GDC 3 in the development of a fire protection program. Alternative approaches could be requested with suitable bases and justification.

BTP CMEB 9.5-1 Section C.7.c recommended an automatic water suppression system in the Cable Spreading Room (Fire Protection of Specific Plant Areas). During the initial licensing process, Millstone Unit No. 3 requested the NRC approve a deviation to this guidance to allow the use of an automatic gaseous suppression system (carbon dioxide - CO_2) in the Cable Spreading Room.

In a letter dated September 19, 1985,[(1)] the NRC issued Supplement No. 2 to the Millstone Nuclear Power Station, Unit No. 3 Safety Evaluation Report (SER). Section 9.5.1.6 of this report concluded that the CO_2 extinguishing system with good access for manual fire fighting with hose streams would provide an adequate level of protection for the cable spreading room and was, therefore, an acceptable deviation from staff guidelines.

The commitment to use CO_2 fire suppression in the CSA is documented in the Unit 3 Fire Protection Evaluation Report (FPER) which is part of the Updated Final Safety Analysis Report.

An inadvertent actuation of the CSA CO_2 system occurred on January 15, 1999.[(2)] As a result of this event, the CO_2 system was locked out and fire prevention compensatory measures for the CSA were put in place and remain in effect today. Subsequent testing, including a CO_2 discharge test, has confirmed the need to keep the CO_2 system locked out.

Intended Change to Fire Protection Program

As a result of further investigation into alternative methods for fire detection and suppression in the CSA, DNC has chosen to permanently abandon the CSA CO_2 system and intends to install a new Incipient Fire Detection (IFD) system in that area. An IFD system continuously monitors the protected area and detects airborne sub-micrometer pre-combustion particles at the earliest stage of a fire (incipient phase). The earlier a fire is detected, the higher the probability that damage will be limited. The

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(1) B. J. Youngblood letter to J. F. Opeka, "Issuance of Supplement No. 2 to NUREG-1031 - Millstone Nuclear Power Station, Unit No. 3," dated September 19, 1985.

(2) NNECO letter, "Millstone Nuclear Power Station, Unit No. 3, LER 99-002-00, Inadvertent Carbon Dioxide Fire Suppression System Actuation In The Cable Spreading Room," dated February 16, 1999.

NRC Staff previously approved this technology for use at Three Mile Island Unit No. 1 in an SER dated July 11, 1997.[3]

In addition to the installation of the IFD system, DNC continues to upgrade both the fire fighting equipment and the fire protection program. Examples include use of a thermal imaging camera, pre-staged ladders for access to cable trays, improved manual fire fighting equipment, and stricter controls over transient combustibles and ignition sources in the CSA. New fire fighting strategies and training also are being implemented to support the modifications associated with the IFD system installation.

<u>Conclusion</u>

DNC has performed a technical evaluation and concluded that the abandonment of the CSA CO_2 system and installation of an IFD system coupled with existing on-site fire brigade, enhanced fire fighting equipment and administrative controls is an acceptable change to the fire protection program and is permitted by Facility Operating License No. NPF-49 Condition 2.H. In addition, the evaluation concludes that continued compliance with 10 CFR 50.48(a)(1) and 10 CFR 50 Appendix A, GDC 3 will be maintained with this modification.

Attachment 1 provides information regarding the IFD system. DNC intends to complete installation of the IFD system prior to the next Unit 3 refueling outage (September 2002). We invite NRC Staff review and comment on this modification and request that any comments or questions regarding this change be communicated within 45 days of the date of this letter.

There are no regulatory commitments contained within this letter.

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

Very truly yours,

DOMINION NUCLEAR CONNECTICUT, INC.

J. Alan Price, Vice President
Nuclear Technical Services - Millstone

cc: See next page

(3) B. C. Buckley letter to J. W. Langenbach, "Three Mile Island Nuclear Generating Station, Unit 1, 10 CFR Part 50 Appendix R Exemption Request (TAC No. M96473)," dated July 11, 1997.

Attachment (1)

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

Attachment 1

Millstone Nuclear Power Station, Unit No. 3

Information on CSA Fire Suppression

Information on CSA Fire Suppression

General

A change to the fire protection program has been proposed that will eliminate the existing Cable Spreading Area (CSA) total flooding CO_2 fire suppression system. The design change includes installation of an early response Incipient Fire Detection System (IFD) alarming locally and in the Control Room. Dominion Nuclear Connecticut, Inc. (DNC) has evaluated this change and determined that it continues to meet the requirements of 10 CFR 50.48 and 10 CFR 50 Appendix A, General Design Criterion 3 (GDC 3).

Fire Detection

Primary fire detection in the CSA will be the IFD system supplemented by the existing area wide, ceiling mounted ionization and photoelectric smoke detectors. The existing smoke detection system will continue to alarm in the Control Room as will the new IFD system.

Part of the defense-in-depth philosophy for fire protection is the early detection of fires and controlling and/or extinguishing them quickly so as to limit their damage. Therefore, a critical factor in the protection of the CSA is the ability to detect a fire in the room. The earlier a fire is detected, the higher the probability that damage will be limited.

Fire development occurs in several stages. The common stages of fire development in a compartment are described in the SFPE Handbook[(1)] as ignition, growth, flashover, fully developed fire and decay. Of interest is the "ignition" fire development stage and what occurs prior to that stage. Ignition of a combustible material marks a stage where the material is capable of supporting self-sustained combustion with minimum external heating. The combustion can be smoldering, glowing or flaming. In turn, the ignition process itself consists of several stages. The material must be heated (internal or external), thermally degrade, produce combustible gases, mix the combustible gases with oxygen and ultimately ignite. It is during the thermal degradation stage that sub-micrometer pre-combustion particles are produced. This stage is called the "incipient" stage.

The IFD system is designed to detect sub-micrometer pre-combustion particles in the air. It is an active air sampling system designed to be more sensitive than conventional smoke detectors. The thermal particulate temperature reached during the incipient stage is half or less than half of the ignition temperature for many materials. For example, the thermal particulate temperature of polyethylene is less than half of its

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(1) Society of Fire Protection Engineers (SFPE) Handbook, Fire Protection Engineering, First Ed.

ignition temperature.[2] The ionization and photoelectric smoke detection system currently installed in the Unit No. 3 cable spreading area was designed to detect a fire after it has started to produce smoke particles.

Although the time scale for progression of a fire from the incipient stage to later stages varies, it is anticipated that the IFD system will alarm prior to the conventional smoke detection system, and allow fire fighting personnel to respond prior to any significant fire development.

Fire Suppression

From the standpoint of fire development and fire extinguishment timelines, an IFD system is expected to provide earlier warning and a greater probability of successfully extinguishing the fire. The IFD system is designed to detect a fire very early in its incipient stage. This allows fire fighting personnel to intervene before significant manual fire fighting efforts are required. The conventional smoke detection and CO_2 suppression scheme, although also considered adequate for ultimately extinguishing a fire, may result in a longer detection time (which may result in a larger fire) or a longer extinguishment time (due to larger fire or due to CO_2 discharge time).

Fire Scenarios

This section discusses potential fire scenarios in the CSA with an operable IFD system, enhanced fire fighting capabilities and administrative controls.

Insitu Cable Fire - Self Ignition

This scenario considers an insitu combustible fire involving cable insulation in cable tray. Ignition of the cable is through self heating via over-current or shorts. This is an unlikely scenario since the cables are provided with circuit fault protection devices. However, should such a fire scenario develop, the IFD system is expected to alarm very early into the cable heat up phase. Fire fighting personnel are expected to respond to the CSA to initiate a search of the cause of the IFD alarm (for example, through use of the thermal imaging camera). If smoke is observed, fire fighters will locate the seat of the fire and initiate suppression activities as necessary, using available manual fire fighting equipment. Because the IFD system is designed to detect a fire prior to smoke development, it is expected that there will be sufficient time to contain fire spread (if any) to a very small area of cable tray. Even if a fire is allowed to continue to grow, fire propagation is expected to be very slow since the cables are IEEE-383 qualified or flame retardant. Smoke development is only expected under this scenario if ignition occurred after IFD detection alarm and the subsequent fire is allowed to grow. This is not expected to occur given the early response by fire fighters. Any smoke that is developed is expected to be mostly contained within the boundary of the CSA and can

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(2) National Fire Protection Association (NFPA) Handbook, 18th Ed., Table A-6.

be manually removed using portable fans (smoke ejectors). If smoke migrates out of the CSA northwest and northeast doors then Control Room operator access to the alternate shutdown East and West Switchgear Rooms remains available via the Service Building stairwell.

Therefore, an insitu, self-ignited cable fire is expected to be detected in the incipient stage which will allow prompt fire fighting action. Manual suppression activities would be expected to limit the fire effects to a small area of cable tray.

Insitu Cable Fire -Transient Ignition

This scenario considers an insitu combustible fire involving cable insulation in cable tray. Ignition of the cable is by a transient source such as hotwork or an exposure fire involving a transient combustible. The hotwork ignition scenario is unlikely since there are administrative controls in place to cover exposed combustibles from the effects of hotwork and to place a firewatch. However, should such a fire scenario develop, the firewatch will notify the Control Room and utilize portable fire extinguishers. In the meantime, fire fighting personnel are expected to respond to the CSA to initiate manual fire fighting activities. Suppression activities are conservatively expected to take place approximately 15 minutes after arrival of fire fighting personnel. The fire brigade would utilize manual fire fighting equipment from the CSA area supplemented with equipment brought to the scene.

A sustained fire involving cable trays is expected to propagate very slowly given that the cables are IEEE-383 qualified or flame retardant. The CSA is constructed with reinforced concrete boundaries and has a relatively large gross volume of approximately 245,000 cubic feet. The large volume of the CSA is expected to dissipate a substantial amount of energy from a transient exposure fire and cable fire. Such a fire may also be deep-seated and expected to be contained within a small section of cable tray(s). A deep-seated fire may require manual suppression activities and the response of effective fire fighting personnel is critical. The fire fighters at Millstone are properly trained and equipped, and their manual suppression activities are expected to contain and extinguish the fire.

Smoke that is developed (if any) is expected to be contained for the most part within the boundary of the CSA. There is the possibility of some smoke migration to other areas of the Control Building. Significant smoke development may occur if the fire is unmitigated for some time period. If significant smoke develops, fire fighters can manually ventilate the CSA. Assuming the Control Building northwest stairwell is used as a smoke removal path, Control Room operator access to the alternate shutdown East and West Switchgear Rooms remains available via the Service Building stairwell.
Therefore, an insitu, transient-ignited cable fire is expected to be initially detected by the IFD and subsequently contained and extinguished by prompt manual suppression activities.

Transient Combustible Fire

This scenario considers a transient combustible fire involving a Class A material or flammable liquid. Administrative controls will carefully restrict the amounts and types of combustibles brought into the CSA. The scenario where material is brought into the CSA and ignites and burns is considered to be bounded by the *Insitu Cable Fire - Transient Ignition* scenario discussed above. The conclusions for this scenario are similar to the *Insitu Cable Fire -Transient Ignition* scenario.

Unmitigated Fire

This scenario considers a highly unlikely unmitigated fire. In this scenario cables are allowed to continue to burn for some time period without any active fire suppression actions. The consequences of an unmitigated fire is potential loss of CSA equipment and cables. This scenario has already been considered in the fire safe shutdown analysis. Because the CSA contains redundant trains of safe shutdown equipment that is not separated, alternate safe shutdown has been provided in separate plant fire areas. Therefore, an unmitigated fire in the CSA will not prevent the safe shutdown of the plant.

Conclusion

The IFD system and manual fire fighting efforts continues to meet the requirements of 10 CFR 50.48 and 10 CFR 50 Appendix A, GDC 3 and also is considered to be an acceptable alternative to NRC BTP CMEB 9.5-1.