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Millstone Power Station
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Dominion™

APR 28 2003

Docket No. 50-423
B18884

RE: 10 CFR 54
10 CFR 50.12, 54.15

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

Millstone Power Station, Unit No. 3
License Renewal - Request for Exemption
From the Requirements of 10 CFR 54.17(c)
Supplemental Information

In a letter dated December 13, 2002,⁽¹⁾ Dominion Nuclear Connecticut, Inc. (DNC) requested an exemption from the schedular requirements of 10 CFR 54.17(c) for Millstone Unit No. 3. Although Millstone Unit No. 3 will have operated for a substantial period of time, it will be 21 months short of meeting the 20-year requirement of 10 CFR 54.17(c) at the anticipated date of submittal of the application for renewal of its operating license.

Accordingly, in a telephone conference on March 5, 2003, the NRC identified that more information is needed to complete the staff's review of the request. DNC is providing further information in support of the conclusion that Millstone Unit No. 3 will have sufficient operating experience to achieve the underlying purpose of the rule.

Attachment 1 to this letter contains supplemental information that provides further basis for DNC's exemption request.

There are no regulatory commitments contained within this submittal.

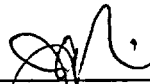
⁽¹⁾ J. A. Price letter to U.S. Nuclear Regulatory Commission, "Millstone Power Station, Unit No. 3 License Renewal - Request for Exemption From the Requirements of 10 CFR 54.17(c)," dated December 13, 2002.

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Should you have any questions regarding this exemption request, please contact Mr. J. E. Wroniewicz at (804) 273-2186.

Very truly yours,

DOMINION NUCLEAR CONNECTICUT, INC.



J. Alan Price
Site Vice President - Millstone

Attachments: (1)

cc: H. J. Miller, Region 1 Administrator
V. Nerses, NRC Senior Project Manager, Millstone Unit No. 3
Millstone Senior Resident Inspector

Docket No. 50-423
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Attachment 1

Millstone Power Station, Unit No. 3

License Renewal

Request for Exemption from the Requirements of 10 CFR 54.17(c)

Supplemental Information

**Millstone Unit No. 3
Request For Exemption from the Requirements of 10 CFR 54.17(c)
Supplemental Information**

Telephone Conference Summary

In a telephone conference between Dominion Nuclear Connecticut, Inc. (DNC) personnel and NRC Region I staff on March 5, 2003, the staff stated that the request for exemption from the schedular requirements of 10 CFR 54.17(c)⁽¹⁾ did not provide sufficient information to justify the basis for granting the schedular exemption. Specifically, the request did not address how the operating experience of Millstone Power Station, Unit No. 2, which is a Combustion Engineering Pressurized Water Reactor (PWR) design, can be applied to Millstone Power Station, Unit No. 3, which is a Westinghouse 4-Loop PWR design. The Nuclear Steam Supply System (NSSS) design and thermal output of these two designs are significantly different. Consequently, further information is needed to either justify the applicability of Millstone Unit No. 2's operating experience as the basis for the exemption request, or discuss how industry-wide Westinghouse 4-Loop operating experience can make up for Millstone Unit No. 3's lack of sufficient operating experience. The applicability of the Virginia Electric and Power Company (Dominion) Surry and North Anna plants operating experience as a basis for the exemption request also requires further justification. A few options were discussed in the telephone conference, including possibly using additional operating experience in the relevant areas of other PWR plants with Westinghouse 4-Loop NSSS designs that may have 20 or longer years of operating experience.

Supplemental Information

I. Background

In the submittal requesting an exemption from the schedular requirements of 10 CFR 54.17(c), DNC recognized the design differences between Millstone Unit No. 2 and Millstone Unit No. 3 and their effect on the license renewal process. In that submittal, it was concluded that Millstone Unit No. 2 operating experience, and the operating experience associated with Surry and North Anna plants, can be applied to the license renewal review of Millstone Unit No. 3. The primary basis for this conclusion was that the Millstone Unit No. 3 materials of construction, and the environmental conditions, to which the materials are exposed, are similar to Millstone Unit No. 2 and the Dominion plants and, therefore, the aging effects would also be similar. The aging management programs are also similar for both Millstone units.

The March 5, 2003, telephone conference identified that more details of the NSSS design and thermal output differences between Millstone Unit No. 2 and Millstone Unit

⁽¹⁾ J. A. Price letter to U.S. Nuclear Regulatory Commission, "Millstone Power Station, Unit No. 3 License Renewal - Request for Exemption From the Requirements of 10 CFR 54.17(c)," dated December 13, 2002.

No. 3 are needed in order for the NRC staff to make a determination for the exemption request. This supplemental information provides further basis for the DNC conclusion that the underlying intent of 10 CFR 54.17(c) is met by applying the operating experience associated with Millstone Unit No. 2, Surry Unit Nos. 1 and 2, and North Anna Unit Nos. 1 and 2 to the license renewal process for Millstone Unit No. 3.

II. Applicability of Millstone Unit No. 2 Operating Experience to Millstone Unit No. 3

A. Evaluation of Millstone Unit No. 2 and Millstone Unit No. 3 NSSS Designs

The Millstone Unit No. 2 NSSS is a Combustion Engineering 2-loop design consisting of two reactor coolant hot-legs, four cold-legs, two recirculating U-tube steam generators, and four reactor coolant pumps. The Millstone Unit No. 3 NSSS is a Westinghouse 4-loop design consisting of four reactor coolant hot-leg and cold-leg loops, four recirculating U-tube steam generators, and four reactor coolant pumps. The operating conditions and materials of construction for both Millstone Unit No. 2 and Millstone Unit No. 3 are similar. NSSS normal operating parameters are as follows:

| | <u>Millstone Unit No. 2</u> | <u>Millstone Unit No. 3</u> |
|------------------------------------|-----------------------------|-----------------------------|
| Reactor Thermal Power Rating (MWt) | 2700 | 3411 |
| Normal Operating Pressure (psia) | 2250 | 2250 |
| Reactor Inlet Temperature (F) | 549 | 557 |
| Reactor Outlet Temperature (F) | 600.5 | 617.2 |
| Total Steam Flow (E6 pph) | 11.8 | 15 |

Both Millstone Unit No. 2 and Millstone Unit No. 3 NSSS components are constructed of carbon and alloy steel, stainless steel, and nickel-based alloy materials. The surfaces in contact with primary coolant for both units are made of corrosion resistant materials, i.e., stainless steel or nickel-based alloy. The internal environment of primary system components for both units is chemistry-controlled borated water. The secondary-side of the steam generators is exposed to chemistry-controlled feedwater and steam on both units.

Based on the consistency between the NSSS construction materials and operating parameters as demonstrated above, DNC concludes that the associated Millstone Unit No. 2 operating experience is applicable to Millstone Unit No. 3, particularly in the identification of aging effects.

The Generic Aging Lessons Learned (GALL) Report, NUREG-1801, is a compilation of typical reactor plant components, materials, environments, aging effects and mechanisms, and aging management programs. The GALL Report is used as a basis document associated with the Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants, NUREG-1800, in the NRC review of license

renewal applications. The GALL Report contains the NRC's evaluations of aging effects on structures and components, identifies relevant aging management programs, and evaluates program attributes to manage aging effects. The GALL Report incorporates industry-wide operating experience on plant aging information obtained from industry reports addressing license renewal, Licensee Event Reports (LER), NRC Information Notices, NRC Generic Letters, and NRC Bulletins.⁽²⁾

The GALL Report only differentiates between PWR NSSS designs for the reactor vessel internals. The GALL Section IV.B2 "Reactor Vessel Internals (PWR) - Westinghouse" addresses the Westinghouse NSSS design reactor vessel internals, which applies to Millstone Unit No. 3. The GALL Section IV.B3 "Reactor Vessel Internals (PWR) - Combustion Engineering" addresses the Combustion Engineering NSSS design reactor vessel internals, which applies to Millstone Unit No. 2.

The other PWR NSSS components identified in the GALL Report are covered generically, whether Westinghouse design or Combustion Engineering design. The applicable GALL Report Sections are IV.A2 "Reactor Vessel (Pressurized Water Reactor)," IV.C2 "Reactor Coolant System and Connected Lines (Pressurized Water Reactor)," and IV.D1 "Steam Generator (Recirculating)."

DNC has completed preliminary reviews of Millstone Unit No. 3 NSSS components in accordance with the integrated plant assessment (IPA) methodology for license renewal. In conjunction with this effort, DNC has performed a review of the materials and environments specific to Millstone Unit No. 3 design and has found that these are consistent with the materials and environments addressed in the GALL Report in the applicable sections of Chapter IV "Reactor Vessel, Internals, and Reactor Coolant System." The aging management programs identified to manage the effects of aging for Millstone Unit No. 3 NSSS components are also comparable to the aging management programs identified in the GALL Report.

Since there is no distinction between NSSS vendor designs for these components, and the materials of construction and operating conditions are similar to those identified in the GALL Report, the industry operating experience within the GALL Report is applicable to Millstone Unit No. 2 and Millstone Unit No. 3.

B. Evaluation of Millstone Unit No. 2 and Millstone Unit No. 3 Thermal Output Differences

DNC evaluated the differences in thermal output for Millstone Unit No. 2 and Millstone Unit No. 3 with regard to aging effects. The differences in thermal output between Millstone Unit No. 2 and Millstone Unit No. 3 result in differences in neutron flux and fluence to which the reactor vessels and reactor vessel internals are exposed. The differences in thermal output do not significantly affect the reactor coolant temperature. In fact, the Millstone Unit No. 2 and Millstone Unit No. 3 reactor vessel operating temperatures are similar to each other and closely match those specified in the GALL Report for the PWR reactor vessel environment.

⁽²⁾ NUREG-1801, page 1, "Gall Report Evaluation Process"

In general, as a result of the higher power density, the Millstone Unit No. 3 reactor vessel and reactor vessel internals experience greater neutron flux than the Millstone Unit No. 2 reactor vessel and reactor vessel internals.

1. Reactor Vessel

Reactor vessel aging effects and aging management programs for PWR reactor vessels are addressed in GALL Report Table IV.A2 "Reactor Vessel (Pressurized Water Reactor)." The table entry for the Reactor Vessel Shell identifies a minimum fluence threshold value for the end of the renewed license term. Both Millstone Unit No. 2 and Millstone Unit No. 3 reactor vessel shells are expected to be exposed to neutron irradiation levels consistent with those identified in the GALL Report, and are subject to aging effects consistent to those identified in the GALL Report. The aging effects are similar for both the Millstone Unit No. 2 and Millstone Unit No. 3 reactor vessels and no unique aging effects are expected to occur, despite the differences in thermal output.

2. Reactor Vessel Internals

With regard to the reactor vessel internals, the higher core power density and correspondingly higher fluence for Millstone Unit No. 3 may result in the manifestation of certain aging effects earlier in plant life than would be the case for Millstone Unit No. 2. However, there are no unique aging effects for the Millstone Unit No. 3 reactor vessel internals. The same basic set of aging effects will require management for both units. As noted, GALL Section IV.B2 "Reactor Vessel Internals (PWR) - Westinghouse" addresses the Westinghouse NSSS design reactor vessel internals and is applicable to Millstone Unit No. 3. The industry-wide operating experience contained in the GALL Report is thereby applied to Millstone Unit No. 3 reactor vessel internals aging effects evaluations.

On an industry-wide basis, the EPRI Materials Reliability Program (MRP) addresses aging effects associated with neutron irradiation of PWR reactor vessel internals. The EPRI MRP considers the aging mechanisms that might cause degradation of reactor vessel internals components and is developing strategies to manage the resulting aging effects.⁽³⁾ The operating experience gained from the EPRI MRP can be applied to Millstone Unit No. 3 in assisting in the identification of plant-specific concerns regarding aging and in developing programs for management of those aging effects.

III. Dominion Operating Experience

DNC benefits from the similarity of the Surry and North Anna NSSS designs to the Millstone Unit No. 3 NSSS design. The Surry and North Anna NSSS designs are Westinghouse 3-loop PWRs consisting of three reactor coolant hot-leg and cold-leg loops, three recirculating U-tube steam generators, and three reactor coolant pumps. The operating conditions and materials of construction for both the Surry and North Anna NSSS and the Millstone Unit No. 3 NSSS are similar.

⁽³⁾ EPRI MRP-62, "Material Reliability Program Strategies for Management of Aging Effects in PWR Reactor Vessel Internals", Interim Report 1006582, February, 2002

NSSS normal operating parameters are as follows:

| | <u>Surry</u> | <u>North Anna</u> | <u>Millstone Unit No. 3</u> |
|------------------------------------|--------------|-------------------|-----------------------------|
| Reactor Thermal Power Rating (MWt) | 2546 | 2898 | 3411 |
| Normal Operating Pressure (psia) | 2250 | 2250 | 2250 |
| Reactor Inlet Temperature (F) | 540.4 | 552.3 | 557 |
| Reactor Outlet Temperature (F) | 605.6 | 621.2 | 617.2 |
| Total Steam Flow (E6 pph) | 10.5 | 12.8 | 15 |

Both the Surry and North Anna NSSS and the Millstone Unit No. 3 NSSS components are constructed of carbon and alloy steel, stainless steel, and nickel-based alloy materials. The NSSS component surfaces in contact with primary coolant are made of corrosion resistant materials, i.e., stainless steel or nickel-based alloy. The internal environment of primary system components is chemistry-controlled borated water. The secondary-side of the steam generators for the Surry and North Anna plants and Millstone Unit No. 3 are exposed to chemistry-controlled feedwater and steam.

The Surry and North Anna plants have applied for and been granted renewed operating licenses. A rigorous review of aging effects related to the Surry and North Anna NSSS has been performed and the NRC has accepted the results. The experienced gained from this effort is applied to the IPA for license renewal associated with Millstone Unit No. 3.

Based on the consistency between the NSSS designs, materials, and operating parameters as demonstrated above, DNC concludes that the operating experience associated with the Surry and North Anna plants is applicable to Millstone Unit No. 3, particularly in the identification of aging effects. Thus, operating experience for the Surry and North Anna plants can be applied towards Millstone Unit No. 3 in satisfying the 20-year requirement of 10 CFR 54.17(c).

IV. Industry Operating Experience

The above paragraphs demonstrate that while there are some design (Combustion Engineering NSSS versus Westinghouse 4-loop NSSS) and operating (e.g., thermal output) differences between Millstone Unit No. 2 and Millstone Unit No. 3, there are basic similarities in the materials of construction and operating parameters such that the aging mechanisms and effects are the same. Thus, operating experience for Millstone Unit No. 2 can be applied toward Millstone Unit No. 3 in satisfying the 20-year requirement of 10 CFR 54.17(c). As was indicated in the supplementary information accompanying the 1991 publication of 10 CFR 54,⁽⁴⁾ operating experience from other

⁽⁴⁾ 56 Federal Register at 64963, December 13, 1991

industry sources will also be used by the NRC in evaluating the adequacy of the licensee proposed activities to address age-related degradation.

DNC also evaluated operating experience in the relevant areas of other Westinghouse 4-loop plants that have 20 or longer years of operating experience. Westinghouse 4-loop plants and their years of operating experience are listed in Table 1. As can be seen from the table, there are 29 Westinghouse 4-loop plants currently operating nationally. Of these, 9 plants currently have greater than 20 years (as much as 29 years) of operating experience. As noted earlier in this document, the GALL Report incorporates industry-wide operating experience on plant aging information. Information contained within the GALL report is evaluated as part of the IPA process and incorporated into the License Renewal Application (LRA), as appropriate. Thus, Millstone Unit No. 3 will have the benefit of the industry-wide operating experience contained within the GALL. In addition, the Westinghouse Owners Group (WOG) has developed license renewal Generic Technical Reports (GTRs) related to NSSS components and supports. These license renewal evaluations are applicable to all domestic commercial nuclear power plants with Westinghouse NSSS designs, including Millstone Unit No. 3 and other 4-loop plants. WOG published the reports and four of the five reports have been reviewed and accepted by the NRC as part of the Generic License Renewal Program (GLRP), with final safety evaluation reports issued. The reports include an evaluation of industry operating experience (related to Westinghouse NSSS designs) and provide an additional source of information relevant to the identification of aging effects for Millstone Unit No. 3. These GTRs have been reviewed as part of the IPA process. Moreover, the NRC's review for the renewal of the McGuire Unit 1 license was completed in January 2003, with the issuance of an SER with no open items. This allows DNC to have the benefit of the NRC's review of a specific Westinghouse 4-loop plant with over 20 years of operating experience.

As part of the IPA performed for Millstone Unit No. 3 LRA development, DNC is reviewing NRC-issued License Renewal Interim Staff Guidance information, NRC Generic Communications, Institute of Nuclear Power Operations (INPO) Documents, and Westinghouse advisories and notifications related to Westinghouse 4-loop plants that have been issued since the issuance of the GALL Report (April 2001). New or unique aging related information concerning the Westinghouse 4-loop plants is considered in the development of the LRA for Millstone Unit No. 3.

V. Actual Years of Operating Experience

DNC currently plans to submit the LRA for Millstone Unit No. 3 in the first quarter of 2004. Based on the date of the issuance of the Operating License (OL), Millstone Unit No. 3 will have accumulated over 18 years of operating experience by the time the LRA is submitted to the NRC. With the NRC 22-month review schedule for the LRA, Millstone Unit No. 3 is expected to have over 20 years of operating experience by the time the NRC finishes their review of the LRA. Furthermore, by the time the Millstone Unit No. 3 LRA is submitted to the NRC, DNC will have the benefit of LRAs for six other Westinghouse 4-loop plants - Catawba and McGuire (with currently completed SERs) and D.C. Cook (expected to be filed in November 2003, and reflecting 25 and 29 years of operating experience for Cook Units 1 and 2 respectively). In addition, any new aging

concerns will be addressed as part of the annual update to the LRA required by 10 CFR 54.21(b), during NRC review of the application.

VI. Conclusion

The basis for establishing the 20-year limit contained in 10 CFR 54.17(c), as discussed in the 1991 Statements of Consideration for Part 54 (56 FR 64963), is "to ensure that substantial operating experience was accumulated by a licensee before a renewal application is submitted such that any plant-specific concerns regarding aging would be disclosed."

Although there are differences in design and thermal output between Millstone Unit No. 2 and Millstone Unit No. 3, both plants exhibit similar aging effects due to the similarity of materials of construction and operational environments. Thus, the operating experience from Millstone Unit No. 2 is applicable to Millstone Unit No. 3 for purposes of license renewal, specifically with regards to identifying aging effects. In addition to plant specific operating experience, Millstone Unit No. 3 also has the benefit of industry operating experience for other Westinghouse 4-loop plants. By the first quarter 2004, when DNC anticipates submitting the LRA for Millstone Unit No. 3, ten Westinghouse 4-loop plants will have accumulated 20 years or more of operating experience. Information contained within the GALL report is evaluated as part of the IPA process and incorporated into the LRA, as appropriate. Thus, Millstone Unit No. 3 will have the benefit of the industry-wide operating experience contained within the GALL. Additionally, as part of the IPA process, the lessons learned from other Westinghouse 4-loop plants, which have submitted LRAs to the NRC, are reviewed and incorporated into the Millstone Unit No. 3 LRA, as applicable. Also, by the time the NRC completes its review of the LRA, Millstone Unit No. 3 will likely have accumulated 20 years of operating experience. DNC concludes that, based on the similarity in aging effects between Millstone Unit No. 2 and Millstone Unit No. 3, the applicable Dominion operating experience with the Surry and North Anna plants, the industry-wide Westinghouse 4-loop plant operating experience, and the actual years of Millstone Unit No. 3 operating experience, Millstone Unit No. 3 has accumulated more than enough operating experience to satisfy the underlying purpose of the license renewal scheduler requirement of 10 CFR 54.17(c). Therefore, DNC believes that, pursuant to 10 CFR 50.12, special circumstances exist to warrant the approval of this request; namely, that the application of 10 CFR 54.17(c) to Millstone Unit No. 3 is not necessary to achieve the underlying purpose of the rule.

Table 1 - Westinghouse 4-Loop PWRs Operating in the United States

| Westinghouse 4-Loop Plant | Thermal Power Rating (MWt) | Date Operating License (OL) was Issued | Years of Operating Experience ⁽⁵⁾ |
|--------------------------------------|---|---|---|
| Braidwood 1 | 3411 | 07/02/1987 | 15 |
| Braidwood 2 | 3411 | 05/20/1988 | 14 |
| Byron 1 | 3411 | 02/14/1985 | 18 |
| Byron 2 | 3411 | 01/30/1987 | 16 |
| Callaway | 3565 | 10/18/1984 | 18 |
| Catawba 1 ⁽⁶⁾ | 3411 | 01/17/1985 | 18 |
| Catawba 2 ⁽⁶⁾ | 3411 | 05/15/1986 | 16 |
| Comanche Peak 1 | 3411 | 04/17/1990 | 12 |
| Comanche Peak 2 | 3445 | 04/06/1993 | 9 |
| D.C. Cook 1 | 3250 | 10/25/1974 | 28 |
| D.C. Cook 2 | 3411 | 12/23/1977 | 25 |
| Diablo Canyon 1 | 3338 | 11/02/1984 | 18 |
| Diablo Canyon 2 | 3411 | 08/26/1985 | 17 |
| Indian Point 2 | 3071 | 09/28/1973 | 29 |
| Indian Point 3 | 3025 | 04/05/1976 | 27 |
| McGuire 1 ⁽⁶⁾ | 3411 | 07/08/1981 | 21 |
| McGuire 2 ⁽⁶⁾ | 3411 | 05/27/1983 | 19 |
| Millstone 3 | 3411 | 11/25/1985 | 17 |
| Salem 1 | 3411 | 08/13/1976 | 26 |
| Salem 2 | 3411 | 05/20/1981 | 21 |
| Seabrook 1 | 3411 | 03/15/1990 | 13 |
| Sequoyah 1 | 3411 | 09/17/1980 | 22 |
| Sequoyah 2 | 3411 | 09/15/1981 | 21 |
| South Texas Project 1 | 3800 | 03/22/1988 | 15 |

⁽⁵⁾ Based on Operating License (OL) issuance date.

⁽⁶⁾ Plant has submitted License Renewal Application for NRC review.

| | | | |
|--------------------------|------|------------|----|
| South Texas Project 2 | 3800 | 03/28/1989 | 14 |
| Vogtle 1 | 3565 | 03/16/1987 | 16 |
| Vogtle 2 | 3565 | 03/31/1989 | 14 |
| Watts Bar 1 | 3411 | 02/07/1996 | 7 |
| Wolf Creek 1 | 3565 | 06/04/1985 | 17 |