

**UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION**

**In the matter of** : **Docket No. 50-423**  
**Dominion Nuclear Connecticut, Inc.** :  
**Millstone Nuclear Power Station Unit 3** :  
**(License Amendment Request** :  
**Stretch Power Uprate)** : **March 17, 2008**

**CONNECTICUT COALITION AGAINST MILLSTONE AND NANCY BURTON**  
**PETITION TO INTERVENE AND REQUEST FOR HEARING**

The Connecticut Coalition Against Millstone and Nancy Burton (collectively, "CCAM") petition herewith to intervene and request a hearing in the proceedings involving the application of Dominion Nuclear Connecticut, Inc. ("Dominion") for a power uprate at Millstone Nuclear Power Station Unit 3, in accordance with the provisions of 10 C.F.R. § 2.309. Notice of the availability of a hearing was published in the Federal Register on January 15, 2008 (Volume 73, No. 10 at 2549).

By letter dated July 13, 2007, as supplemented on September 12, 2007, Dominion submitted to the Nuclear Regulatory Commission ("NRC") an application for "Stretch Power Uprate." The proposed license amendment would allow an increase in the maximum authorized power level from 3411 megawatts thermal (MWt) to 3650 MWt and make various changes to the Technical Specifications.

The petitioners assert in this filing that the application has grave potential to increase safety risks and diminish safety margins at Millstone Unit 3. The likelihood of a serious accident will be increased due to the phenomenon of Flow Accelerated Corrosion and, in the event of an accident, the unique and already "stretched" containment of Millstone Unit 3 would be unable to capture the radiation released. The petitioners further assert that the estimated 9 per cent (and likely higher) increase in levels of radionuclides

released to the environment above current levels will result in a corresponding 9 per cent (and likely higher) increase in human health risks and that such increase is unacceptable, particularly in light of known existing high cancer incidences in the communities surrounding Millstone which have never been analyzed by Dominion or the NRC .

## **I. Standing**

### **A. As to CCAM**

The petitioner Connecticut Coalition Against Millstone is a public-interest organization founded in 1998 to educate the public about the Millstone Nuclear Power Station and engage in activities to protect the public health and safety of the community otherwise at risk from Millstone operations. Burton Declaration at ¶¶9.

For example, the Coalition has participated in numerous presentations and legal challenges before the U.S. Nuclear Regulatory Commission and state and federal courts concerning the Millstone 3 spent fuel pool; the loss of two spent fuel rods; dry cask storage, Millstone relicensing, the Millstone Clean Water Act permit, and Millstone's devastation of indigenous species of fish through operation of its giant intakes. It sponsors rallies and public-outreach activities in the communities surrounding Millstone. It maintains a goat herd for monitoring Millstone strontium-90 and other radioactive releases. It supports Millstone whistleblowers. It maintains a website, [www.MothballMillstone.org](http://www.MothballMillstone.org), which is devoted to alerting the public about issues of concern regarding Millstone. Burton Declaration at ¶¶10.

CCAM consists of statewide safe-energy and environmental groups, nuclear

whistleblowers and others. Burton Declaration ¶11.

Petitioner Nancy Burton is Director of CCAM and is duly authorized to appear on its behalf and on behalf of its membership in this proceeding. Burton Declaration at ¶12.

The name, address and telephone of Ms. Burton are as follows:

Nancy Burton  
147 Cross Highway  
Redding Ridge CT 06876  
Tel. 203-938-3952

Cynthia M. Besade is a member of CCAM. Besade Declaration at ¶25.

Ms. Besade resides at a location within 10 miles downwind of Millstone. Besade Declaration at ¶3. As such, she is at heightened risk of adverse health effects and the consequences of a nuclear accident attributable to the proposed Unit 3 power uprate. Besade Declaration at ¶21 and ¶22. Ms. Besade authorizes Ms. Burton as the Coalition's delegated representative to represent her rights and interests in this proceeding. Besade Declaration at ¶29.

CCAM has representational standing as a petitioner in this proceeding. An organization has standing to sue on behalf of its members when a member would have standing to sue in his or her own right, the interests at issue are germane to the organization's purpose and participation of the individual is not necessary to the claim or requested relief. Hunt v. Washington State Apple Advertising Commission, 432 U.S. 333, 343 (1977). The NRC has applied this standard to find standing where an individual demonstration interest in a nuclear reactor licensing proceeding sufficient to establish standing by showing his or her residence is within the geographical area that might be affected by an accidental release of fission products. Virginia Elec. And Power Co. (North Anna Nuclear Power Station, Units 1 and 2), ALAB-522, 9 NRC 54, 56(1979 ("close proximity [to a facility] has always been deemed to be enough, standing alone,

to establish the requisite interest” to confer standing.) The Commission has adopted a “rule of thumb” in reactor licensing proceedings that “persons who reside or frequent the area within a 50-mile radius of the facility” are presumed to have standing. Sequoyah Fuels Corp. and General Atomics (Gore, Oklahoma Site), CLI-94-12, 40 NRC 64, 75 n.22 (1994).

Ms. Besade possesses standing as an individual residing 10 miles downwind of Millstone. CCAM possesses representational standing by virtue of Ms. Besade’s election to have her rights and interests represented in this matter by CCAM through its designated representative.

B. As to Nancy Burton

The petitioner Ms. Burton resides seasonally in Mystic, Connecticut, a location within approximately ten miles downwind of Millstone. Burton Declaration at ¶2. As a seasonal resident of Mystic, Connecticut, she is subject to exposure to radioisotopes released by the Millstone Nuclear Power Station to the air and water as well as emergency evacuation in the event of a nuclear emergency. Burton Declaration at ¶3. Dominion Nuclear Connecticut, Inc.’s application to the U.S. Nuclear Regulatory Commission for a 7+ per cent power uprate at the Millstone Unit 3 nuclear reactor proposes to release radionuclides to the environment during routine operations at levels 9 per cent (or more) above current levels. Burton Declaration at ¶4. Ms. Burton’s risk of suffering adverse health effects from such releases will rise by a corresponding 9 per cent (or more) if the application is granted and the uprate proceeds. Burton Declaration at ¶5. At the same time, the application will put heightened stress on the unique, under-sized and aging Unit 3 containment and associated cooling components which will also heighten the risk of critical equipment failure and nuclear accident and thereby expose her to heightened risk of death or serious injury from the cascading consequences of such an event.

Burton Declaration at ¶6.

Ms. Burton has standing to participate in these proceedings as a person who “reside[s] or frequent[s] the area within a 50-mile radius” of Millstone. Sequoyah, Id.

## **II. Contentions**

### **Introduction**

Contentions 1 through 5 concern technical aspects of the application. They are supported by the Declaration of Arnold Gundersen, who holds Bachelor’s and Master’s degrees in nuclear engineering and served as lead licensing engineer at Millstone Unit 3 during the 1970s. His Declaration and attached Curriculum Vitae are attached hereto as Exhibit A. It is Mr. Gundersen’s professional opinion, following a complete review of the evidence presented and by relying on his nuclear safety and engineering experience in his review, that the issues raised in Contentions 1 through 5 are serious safety considerations germane to the subject of the license application in this case. Similarly, after reviewing all the evidence presented, it is Mr. Gundersen’s professional opinion that Dominion is ill-prepared to increase the power at Millstone Unit 3. Finally, since Dominion’s proposed power increase is above NRC regulatory “criteria,” and given the new stresses upon the one-of-a-kind formerly sub-atmospheric containment, it is Mr. Gundersen’s professional opinion that the evidence clearly shows the entire application should be given the more rigorous review of the Extended Power Uprate (EPU) License Evaluation. Gundersen Declaration at ¶57. Accordingly, the present Stretch Power Uprate license amendment request should be denied.

Contention 6 addresses the absence of standards for NRC review of a Stretch Power Uprate application.

Contention 7 addresses the incompleteness of Millstone’s License Amendment request (“LAR”).

Contention 8 addresses the health effects of significantly heightened radiation releases attributable to the Millstone 3 uprate application.

Contention 9 addresses the significantly heightened environmental impacts of heightened radiological releases to the environment.

Initially, it is critical to note that the NRC has adopted neither standards nor specific guidance for consideration and review of applications for Stretch Power Uprates (hereinafter “SPU”) applications.

The NRC acknowledges the lack of specific guidance applicable to SPUs as follows:

Since many of the available stretch power uprates have already been approved by the NRC, and since only a limited number of stretch power uprate applications are expected in the future, there is no specific guidance for stretch power uprates.<sup>1</sup>

The lack of standards and specific guidance form the basis for Contention 6.

In the absence of specific guidance or standards, the NRC “uses previously approved stretch power uprates, along with RS-100, for guidance.”<sup>2</sup> The NRC does not identify which “previously approved stretch power uprates” it uses. Moreover, the use of “previously approved power uprates” did not satisfy the site specific issues pertinent to Millstone Unit 3; the NRC review to date has generated no fewer than Requests for Additional Information (RAIs). Dominion’s responses to many of these RAIs have been incomplete, as admitted by Dominion. See Contention 7.

On its website, the NRC identifies two criteria which must be met for power uprate applications to be considered as SPUs:

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<sup>1</sup><http://www.nrc.gov/reactors/operating/licensing/power-uprates.html>

<sup>2</sup> Id.

1. An increase in the reactor power that is “up to 7 per cent” and
2. “. . . are within the design capacity of the plant.”

NRC consideration of the permissible percentage increase proposed in an SPU application is “plant-specific and depends on the operating margins included in the design of the particular plant.”<sup>3</sup>

Given the magnitude of the proposed power increase, the uniqueness of the Millstone Unit 3 containment design, the containment’s unusually small size and the fact that the design margins of the containment have already been dramatically reduced by changes made to Millstone 3 by its predecessor owner, Northeast Utilities, such factors make it necessary for the NRC to reject the current SPU application and conduct the more thorough and intensive Extended Power Uprate (“EPU”) review.

**Contention 1: The proposed power level for which Dominion has applied to uprate Millstone Nuclear Power Station Unit 3 exceeds the NRC’s SPU regulatory “criteria.” The SPU application fails to satisfy the first NRC “criterion”<sup>4</sup> that the NRC has set the power limit for SPUs at “. . . up to 7% . . .” (Emphasis added.)**

#### **Basis for the Contention**

NRC has set the power limit for a SPU at 7 per cent. The application proposes a power uprate that exceeds 7 per cent and hence is disqualified.

#### **Statement of Alleged Facts or Expert Opinion Which Support the Contention and on Which the Petitioners Intend to Rely in Proving the Contention at the Hearing**

Dominion has characterized its proposed increase in power at Millstone Unit 3 as a SPU and it asserts that Millstone 3 meets all the criteria for the power increase.

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<sup>3</sup> Id.

<sup>4</sup> Id.

As Dominion stated in its letter to the NRC initiating its application for license amendment for the power uprate:

DNC [Dominion] developed this LAR (License Amendment Request) utilizing the guidelines in NRC Review Standard, RS-001, "Review Standard for Extended Power Uprates." In addition, requests for additional information (RAIs) regarding the SPU and Extended Power Uprate (EPU) applications for other nuclear units were reviewed for applicability. Information that addresses many of those RAIs is included in this MPS3 [Millstone Nuclear Power Station Unit 3] SPU LAR. RS-001 states that a SPU is characterized by power level increases up to 7 per cent and does not generally involve major modifications. Plant modifications are addressed in Section 1.0 of the License Report (LR)(Attachment 5) and are not considered to be major. Since **the requested uprate is 7 per cent** and does not involve major plant modifications, it is considered to be a SPU.<sup>5</sup> [Emphasis added.]

Gundersen Declaration at ¶12.

However, Dominion's proposed power increase at Millstone Unit 3 exceeds 7 per cent, the limit established by the NRC. Dominion's application understates and misrepresents its own proposed power increase.

Millstone Unit 3 is currently licensed to operate at 3411 thermal megawatts (MWt). This number signifies how much heat the reactor is generating and is accurate to four significant figures or numbers. Gundersen Declaration at ¶14.

The proposed power level of 3650, for which Dominion has applied, exceeds the NRC 7% limit that would qualify the power uprate for the less rigorous review of a SPU.

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<sup>5</sup> Letter, Dominion to NRC, SPU Filing, July 13, 2007.

Dominion has applied for a power increase to 3650 MWt, which is a full 300 KW above what is allowable by the NRC criteria for a SPU. Gundersen Declaration at ¶14.

Multiplying the current licensed power by the NRC's maximum allowable 7% SPU increase yields 3649.7MWt, which is below the power level of 3650 for which Dominion has applied. ( $3411 \times 1.07 < 3650$ ) Gundersen Declaration at ¶14.

The 7% NRC limit is accurate to two significant figures. When multiplying a two significant figure number by a four significant figure number, mathematical methodology demands the calculation be rounded down, not up, as Dominion has done in its application. By rounding its proposed reactor power level to a higher power level, Dominion's requested power increase exceeds the NRC's criteria for a SPU. Thus, this unscientific rounding up of the thermal megawatt power to a higher power level causes the reactor power to exceed the SPU limit of "up to 7%" by a full 300 KW. Gundersen Declaration at ¶14.

Because the mathematical evidence shows that Dominion's proposed power level increase for Millstone Unit 3 exceeds the 7% regulatory limit set by the NRC, Dominion's application is disqualified for a SPU. Gundersen Declaration at ¶15.

While on its face this mathematical discrepancy may not appear to be a huge number, the 300 KW discrepancy between the NRC's 7 per cent limit and Dominion's application for a 3650 megawatt thermal increase at Millstone 3 is a significant number that will yield approximately an additional \$1 Million in profit for each additional electric megawatt produced each year. Gundersen Declaration at ¶16.

Industry data<sup>6</sup> shows that the profit from each megawatt of electricity generated from uprated power increases the profit yield to each electric generating corporation by

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<sup>6</sup> *Condenser Long Term Plan*, Enrico Betti, Vermont Yankee, Memo FILE UND2002-042 07; MSD2002/002.

approximately \$1,000,000 per year. Gundersen Declaration at ¶¶16.

Therefore, the data show us that by rounding up the power level increase at Millstone 3 in excess of 7 per cent, Dominion's Millstone Unit 3 will generate additional profits of approximately \$330,000 each year until 2045. Stated in total dollars, the round up to a power increase in excess of 7 per cent will yield Dominion an extra \$10,000,000 during the uprated license extension to 2045. Gundersen Declaration at ¶¶16.

Dominion's application for a greater-than 7 per cent increase in power generation is unprecedented for a SPU. Table 1<sup>7</sup> entitled "Westinghouse Uprates Ranked in Ascending Order," is a list of all Westinghouse dry containment reactors whose thermal power exceeds 2000 Mwt. Gundersen Declaration at ¶¶18. Table 1 ranks the SPUs from smallest to largest. NRC data provided in Table 1 show that no other reactor of this type has ever been granted a SPU in excess of 7% as Dominion has proposed for Millstone Unit 3. Gundersen Declaration at ¶¶19. The NRC has never allowed a Westinghouse reactor - such as Millstone Unit 3 - to be licensed for a SPU with a power level as great as that proposed for Millstone 3 by Dominion.<sup>8</sup> Moreover, no other dry containment Westinghouse reactor with a reactor power level greater than 2000 MWt has been granted a SPU uprate beyond 6.9 per cent. Gundersen Declaration at ¶¶17.

Because Dominion seeks a power level greater than 7 per cent, its application is disqualified.

**References to Specific Sources and Documents of Which the Petitioners Are Aware and on Which Petitioners Intend to Rely to Establish Those Facts or Expert**

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<sup>7</sup> See Gundersen Declaration at page 9.

<sup>8</sup> See NRC Approved Applications for Power Uprates  
<http://www.nrc.gov/reactors/operating/licensing/power-uprates/approved-applications.html>

## Opinion

The Petitioners will rely on the sources and documents referenced in the Gundersen Declaration. The Petitioners reserve the right to expand their sources and documents during the proceeding through discovery and otherwise as appropriate.

### **A Genuine Dispute Exists with the Applicant on a Material Issue of Law or Fact**

Dominion applied to the NRC for a Millstone Unit 3 power uprate of 7 per cent, the maximum allowed by NRC “criteria” for a SPU. In fact, Dominion’s application is for a power uprate in excess of 7 per cent. Therefore, a genuine dispute exists with Dominion on a material issue of fact.

### **The Contention Is Within the Scope of the Amendment Under Consideration**

Whether the application is disqualified as a proper SPU application because it requests a power uprate in excess of 7 per cent is clearly an issue within the scope of the amendment under consideration because the 7 per cent limit was set by the NRC..

### **If Proven, the Contention Would Entitle Petitioners to Relief**

If the Petitioners are correct that the application seeks a power increase above the maximum 7 per cent NRC “criterion,” the relief requested by the petitioners - denial of the SPU application and submission and review of an application for Extended Power Uprate - should be granted.

**Contention 2: Dominion’s application fails to meet the NRC’s second “criterion” for a SPU application because Millstone Unit 3 already has had its design margins dramatically and substantially reduced.**

## Basis for the Contention

Dominion's application entirely fails to consider the significant reduction in structural operating margins already in place at Millstone 3 prior to the present application for power uprate.

## Statement of Alleged Facts or Expert Opinion Which Support the Contention and on Which the Petitioners Intend to Rely in Proving the Contention at the Hearing

Whether NRC can grant a SPU application "depends on the operating margins in the design of a particular plant," according to the NRC.<sup>9</sup> As stated, Dominion's license amendment request asserts that since it "does not involve major plant modifications, it is considered to be a SPU."<sup>10</sup>

However, Dominion's application entirely fails to consider the significant reduction in structural operating margins already in place at Millstone 3 prior to the present application for power uprate. Gundersen Declaration at ¶21.

Indeed, the Millstone Unit 3 containment structure and its component systems have already been "stretched" by previous changes to its design basis when the containment was converted from sub-atmospheric containment to dry containment more than a decade ago. It is the petitioners' contention, as substantiated by their expert, Arnold Gundersen, that "the proposed changes to containment systems and structures that have already been reanalyzed and fine tuned once over a decade ago constitute a dramatic decrease in . . . 'the **operating margins** included in the design of a particular plant.'" (Emphasis added.) Gundersen Declaration at ¶22.

The containment is the safety related building that houses the nuclear reactor. It "contains" or collects the steam and radioactive material which may be released from

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<sup>9</sup> <http://www.nrc.gov/reactors/operating/licensing/power-uprates.html>

<sup>10</sup> Letter, Dominion to NRC, SPU Filing, July 13, 2007.

the reactor after an accident. Gundersen Declaration at ¶¶23. A photograph taken of the small and crowded interior of the Millstone Unit 3 containment during its initial fuel load in 1986 appears in the Gundersen Declaration at page 12.

Mr. Gundersen has particularized first-hand knowledge of the Millstone Unit 3 containment. He served as the Northeast Utilities lead licensing engineer on Millstone Unit 3 during the 1970s. He was responsible for coordinating all of the analysis for the PSAR (Preliminary Safety Analysis Report) which formed the original Design Basis of Millstone Unit 3, including its containment. This work involved interfacing with Millstone's structural mechanical, electrical, construction and operations personnel as well as the architect Stone & Webster and the NSSS vendor Westinghouse.

Millstone Unit 3 was originally designed to be a "sub-atmospheric containment." Gundersen Declaration at ¶¶24. The unique design approach of the sub-atmospheric containment maintained the pressure inside the containment at a "negative pressure" with respect to the atmosphere. Thus, the difference between the pressure outside the containment and inside the containment (pressure differential) was approximately four pounds - a dramatic pressure differential for a structure of this size. Gundersen Declaration at ¶¶25.

Millstone Unit 3's containment is unique: Millstone Unit 3 was the only Westinghouse four-loop nuclear reactor in the nation to have sub-atmospheric containment, according to the NRC Sourcebook.<sup>11</sup>

Serious concerns regarding NU's decision to design and build this unique sub-atmospheric containment arose among both the engineering and operations staff while Mr. Gundersen served as NU's lead licensing engineer on Unit 3. Gundersen

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<sup>11</sup> NRC Sourcebook, page 4-26, paragraph B

Declaration at ¶26. Critical issues of concern included the following:

- A. The operations staff working within the containment was repeatedly subjected to the adverse effects of the high temperature and low oxygen.
- B. The small size of the containment building severely limited space for equipment and also complicated accident analysis.
- C. Significant construction problems relating to the placement of concrete and rebar were caused by the containment's small size.
- D. Minimal analytical data regarding the long-term strength of the building's concrete and its continual exposure to the combination of high temperatures, low pressure, and low specific humidity within the sub-atmospheric containment as it ages led to doubts and questions regarding the strength of this critical safety-related structure in the event of a nuclear accident.

Gundersen Declaration at ¶27.

Despite these major concerns, NU decided in 1976 to continue with the licensing process for Millstone Unit 3 as a sub-atmospheric containment rather than risk delaying the license by changing the design. At the same time, the company made the strategic decision to modify Unit 3's license to operate by converting the containment to a standard "dry" containment - but defer the amendment until after Unit 3 became operational because it is easier to amend a nuclear power plant license after the nuclear power plant is operational. Gundersen Declaration at ¶28.

Thus, when Millstone Unit began generating power in 1986, it had sub-atmospheric containment. Millstone Unit 3's original Design Basis with its one-of-a-kind four-loop sub-atmospheric containment was modified after it became operational in 1986.

Gundersen Declaration at ¶29.

The purpose of this one-of-a-kind four loop sub-atmospheric containment was to

lower peak design pressure (maximum pressure inside the containment after a design basis accident) in the event of a nuclear accident and to rapidly reduce out-leakage (leakage out of the containment) after an accident. Gundersen Declaration at ¶30.

More particularly, the containment building is designed to capture steam, energy and radiation after a nuclear accident. In order to capture this post-accident energy, the containment pressure increases. Thus, containment buildings are designed to specific pressure levels that must be considered during all power level design changes.

Gundersen Declaration at ¶30A.

At Millstone Unit 3, the 1975 initial peak containment design pressure was 39.4 psig (pounds per square inch, gauge). However, prior to Millstone Unit 3's start-up in 1986, NU reanalyzed the peak pressure and dropped it to 36.1 psig.<sup>12</sup> Then on February 26, 1990, NU applied to the NRC to modify Unit 3's license by changing the Design Basis pressure of the containment from 9.8 psia (pounds per square inch, absolute) to 14.0 psia. Gundersen Declaration at ¶30B-D.

When NU applied for the 1990 license change, it claimed that the sole basis for the change was to reduce the risk of injury to operations personnel who struggled to work at the reduced pressures inside this unique containment, which Mr. Gundersen compares to working at the top of the Grand Teton Mountains in temperatures in excess of 100 degrees. Gundersen Declaration at ¶31. On page 2 of the initial application, NU stated:

. . . very little is known about the health effects of people working in high-temperature, low pressure environments.

Gundersen Declaration at ¶31A.

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<sup>12</sup> Amendment 17 to FSAR.

While it is correct that worker health was a staff concern dating back to 1975, it was not the only concern driving NU's application. Gundersen Declaration at ¶31B.

Another major staff concern was the fact that the containment concrete is being exposed to these very same conditions and there is no data to review regarding the ability of concrete to withstand such a unique high-temperature low-pressure environment. Disturbingly, NU was silent on this major concern throughout its application to modify its license and convert the sub-atmospheric containment to dry containment. Gundersen Declaration at ¶31C. (The sub-atmospheric containment utilized active motors and pumps running to keep the containment pressure below the outside air; dry containment relies solely on its volume to contain the initial release of radioactive steam after an accident and to reduce the peak accident pressure. It is a passive structure without any additional active mechanical means to mitigate immediate post accident pressure.)

The changes to the design of Millstone Unit 3's one-of-a-kind containment actually changed the Design Basis for the nuclear power plant. From the time the initial PSAR was filed with the NRC, the peak accident pressure of Millstone Unit 3 was repeatedly "fine-tuned" by NU. Indeed, each time a new containment pressure analysis was derived, NU applied less conservative assumptions in order to achieve more operational flexibility. **These decisions decidedly increased public exposure to radiation if there were an accident.** Gundersen Declaration at ¶32A-C.

In order to accomplish the 1990 modification of Millstone Unit 3, NU changed numerous design criteria and further reduced design margins by taking further credits for systems that were in the original accident scenario Design Basis. Gundersen Declaration at ¶32D

Indeed, Northeast Utilities acknowledged that these modifications to the original

design “constitute an Unreviewed Safety Question.”<sup>13</sup> Gundersen Declaration at ¶133.

In its 1990 application to the NRC, NU requested to increase the Design Basis for the normal pressure inside the containment from 9.8 psia to 14.0 psia, which resulted in the increase of the post-accident peak containment pressure from 36.0 to 38.57 psig. Since Millstone Unit 3 was originally designed with this unique sub-atmospheric containment design, in the event of an accident the containment was designed to leak radiation to the environment for only an hour until it was able to drop pressure back down and once again contain any releases inside the containment building. The 1990 modifications changed the ability of the containment building to release radiation for only an hour and instead allowed the containment to leak at 0.65 weight per cent per day after an accident. Bypass leakage was also increased from 0.01 to 0.042 weight per cent per day as a result of the change, and the modification to the containment pressure increased the calculated exposure to a person in the Exclusion Area Boundary from 16.8 rem to 19.5 rem. Gundersen Declaration at ¶133A-D.

**References to Specific Sources and Documents of Which the Petitioners Are Aware and on Which Petitioners Intend to Rely to Establish Those Facts or Expert Opinion**

The Petitioners will rely on the sources and documents referenced in the Gundersen Declaration. The Petitioners reserve the right to expand their sources and documents during the proceeding through discovery and otherwise as appropriate.

**A Genuine Dispute Exists with the Applicant on a Material Issue of Law or Fact**

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<sup>13</sup> An “unreviewed safety question means a change which involves any of the following: (1) The probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the safety analysis report may be increased; (2) A possibility for an accident or malfunction of a different type than any evaluated previously in the safety analysis report may be created; or (3) The margin of safety as defined in the basis for any technical safety requirement is reduced. <http://www.nuclearglossary.com>.

The petitioners dispute Dominion's assertions that operating margins in the design of Millstone Unit 3 are adequate to safely achieve the requested 7+ per cent power uprate, given the significant reduction in structural operating margins already in place at Millstone 3 prior to the present application for power uprate. Thus, a genuine dispute exists with Dominion on a material issue of fact.

**The Contention Is Within the Scope of the Amendment Under Consideration**

Whether operating margins in the design of Millstone Unit 3 are adequate to safely achieve the requested 7+ per cent power uprate is an issue critical to resolution of the application request and hence it is clearly an issue within the scope of the amendment under consideration.

**If Proven, the Contention Would Entitle Petitioners to Relief**

If the Petitioners are correct that a significant reduction in structural operating margins was already in place at Millstone 3 prior to the present application for power uprate, then the present application should be disqualified, the request denied and a more intensive and comprehensive review must commence under EPU standards. This is the relief requested by petitioners.

**Contention 3: When compared to all other Westinghouse Reactors, Millstone Unit 3 is an "outlier" or "anomaly." Dominion's proposed uprate is the largest per cent power uprate for a Westinghouse reactor, while Millstone Unit 3 also has the smallest containment for any Westinghouse reactor of roughly comparable output.**

**Basis for Contention**

If approved, Dominion's power increase to Millstone Unit 3 would be the largest-ever

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uprate approved to Millstone 3's unique containment with the "smallest" volume ever licensed, as discussed above. The consequences of increasing the nuclear reactor power in this unique, very small sub-atmospheric-designed containment are grave: The proposed power uprate increase at Millstone Unit 3 means that in the event of a nuclear accident at Unit 3, more than 7 per cent additional energy must be absorbed into this one-of-a-kind containment. Analytical "tweaking" of pressure limits and real concerns about the integrity of the concrete containment form a further basis for concern that the suitability of Millstone Unit 3 for a 7+ per cent power increase has not been adequately analyzed as a SPU application

**Statement of Alleged Facts or Expert Opinion Which Support the Contention and on Which the Petitioners Intend to Rely in Proving the Contention at the Hearing**

Millstone Unit 3 has what is considered a small containment. Mr. Gundersen evaluated data from the publicly available "NRC Sourcebook" and compiled information regarding 25 Westinghouse nuclear reactors, all of which have "dry" atmospheric containment, in order to illustrate the fact that Millstone Unit 3's containment is small in comparison to other Westinghouse designed nuclear reactors. Gundersen Declaration at ¶34.

In Table 2,<sup>14</sup> Mr. Gundersen has shown, in ascending order by size, the free containment volume (in millions of cubic feet) of these 25 Westinghouse reactors. In this grouping, Millstone Unit 3 clearly stands out as one of the smallest such containment buildings in the country. For that matter, the only nuclear power plants with a reactor containment smaller than Millstone Unit 3's have power outputs that are 800 to 1200 MWt less than the power output of Millstone Unit 3 *prior to Dominion's proposed uprate*. Moreover, of the 11 identical 3411 MWt Westinghouse four-loop nuclear

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<sup>14</sup> Gundersen Declaration at page 19.

reactors, Millstone Unit 3's containment is smaller by as much as half a million cubic feet. Gundersen Declaration at ¶35.

The ratio of the initial licensed power level to the containment volume at each of the same 25 nuclear reactors is clearly shown in Table 3.<sup>15</sup> This ratio comparison is the real indicator of Millstone Unit 3's small containment. By applying these ratio criteria in comparison with all 25 reactors, Table 3 clearly shows that Millstone Unit 3 has the smallest power-to-volume ratio of any dry Containment Westinghouse reactor in the nation. Gundersen Declaration at ¶36.

Dominion's proposed 7+ per cent power increase for Millstone Unit 3 widens even further the size gap between Millstone Unit 3 and the other reactors, thus making Millstone Unit 3's containment even "smaller" in comparison to every other dry containment Westinghouse reactor in the country. Gundersen Declaration at ¶37.

Table 4<sup>16</sup> shows how the initial licensed power levels of all 25 reactors adjusted as a result of NRC-approved "stretch" increases. (The Millstone figures reflects Mr. Gundersen's adjustment of the power level number for Millstone Unit 3 for the proposed uprate.) Thus, Table 4 shows that the new power-to-volume ratio created by the proposed uprate indicates that Millstone Unit 3's containment would be even "smaller" if Dominion's proposed power increase is approved. Gundersen Declaration at ¶38.

(A "smaller" containment does not mean that the physical containment has shrunk in size, but rather that more reactor power and, in the case of an accident, more radioactive releases, are being squeezed by volume into the same small containment building as a result of the proposed power increase.) Gundersen Declaration at ¶40.

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<sup>15</sup> Gundersen Declaration at page 20.

<sup>16</sup> Gundersen Declaration at page 21.

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If approved, Dominion's power increase to Millstone Unit 3 would be the largest-ever uprate approved to Millstone 3's unique containment with the "smallest" volume ever licensed, as discussed above. Gundersen Declaration at ¶41.

The consequences of increasing the nuclear reactor power in this unique, very small sub-atmospheric-designed containment are grave: The proposed power uprate increase at Millstone Unit 3 means that in the event of a nuclear accident at Unit 3, more than 7per cent additional energy must be absorbed into this one-of-a-kind containment. Gundersen Declaration at ¶42.

In Mr. Gundersen's expert opinion, core samples from within the containment should be analyzed to assure that the containment's integrity has not been jeopardized by operating Millstone Unit 3 under these conditions during the first four years of its operational life during the time period while concrete curing shrinkage is known to occur. Gundersen Declaration at ¶43.

Other serious concerns regarding Millstone Unit 3's operation beyond its Design Basis due to the analytical "tweaking" of its one-of-a-kind sub-atmospheric containment abound.

A further concern is of the reactor power level Dominion has applied in its new analysis to support the proposed power increase application. Gundersen Declaration at ¶44.

Specifically, Dominion used a 7.01 per cent increase as the basis for energy added to the containment during an accident - as shown above, 7.01 exceeds the NRC limits for consideration for a SPU. Gundersen Declaration at ¶44A.

More importantly, Dominion already has a history of exceeding its licensed reactor power at the Millstone Nuclear Power Station. Dominion was recently cited by the

NRC<sup>17</sup> for:

Failure to maintain reactor core thermal power less than or equal to 3411 megawatts thermal (MGTH). Specifically, during performance of turbine overspeed protection system testing, the Unit 3 reactor's four-minute power average exceeded 3479 MWTH. [Unit 3's license limit is 3411 MGTH, also written Mwt.][Gundersen Declaration at ¶44C.]

Such a power level increase would also increase the energy available in an accident scenario by the same additional 2 per cent. Gundersen Declaration at ¶44D.

It is Mr. Gundersen's opinion, given Dominion's history of exceeding its licensed power level, that any analysis of Millstone Unit 3's containment should use a 9 per cent additional power level in order to most accurately reflect the condition of this one-of-a-kind containment to withstand any additional pressures during an accident. Gundersen Declaration at ¶44D.

**References to Specific Sources and Documents of Which the Petitioners Are Aware and on Which Petitioners Intend to Rely to Establish Those Facts or Expert Opinion**

The Petitioners will rely on the sources and documents referenced in the Gundersen Declaration. The Petitioners reserve the right to expand their sources and documents during the proceeding through discovery and otherwise as appropriate.

**A Genuine Dispute Exists with the Applicant on a Material Issue of Law or Fact**

The petitioners dispute Dominion's assertion of the integrity and adequacy of the unique Millstone 3 containment to function safely with the requested 7+ per cent power uprate in light of the structural limitations of the containment, concrete shrinkage and Dominion's history of exceeding its licensed power level. Thus, a genuine dispute exists

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<sup>17</sup> See NRC Integrated Inspection Report issued on February 7, 2008 for the period October 1, 2007 to December 31, 2007, ML 080380599.

with Dominion on a material issue of fact.

### **If Proven, the Contention Would Entitle Petitioners to Relief**

If the Petitioners are correct that the structural limitations of the unique Millstone Unit 3 containment, concrete shrinkage and Dominion's history of exceeding its licensed power level present substantial safety issues which have not been adequately evaluated, Dominion's request should be denied and a more intensive and comprehensive review must commence under EPU standards. This is the relief requested by petitioners.

**Contention 4: Construction problems due to the unique sub-atmospheric containment design, coupled with the impact upon the containment concrete by the operation of the containment building at very high temperature, very low pressure and very low specific humidity, place the calculations used to predict stress on that concrete containment in uncharted analytical areas.**

### **Basis for Contention**

Dominion's license amendment fails to adequately assess the long-term impact a 7+ per cent power uprate will have on the concrete containment due to its high temperature, low pressure and low specific humidity environment and in light of documented construction challenges.

### **Statement of Alleged Facts or Expert Opinion Which Support the Contention and on Which the Petitioners Intend to Rely in Proving the Contention at the Hearing**

As previously stated, in its 1990 licensing application to change its containment pressure, NU never mentioned its staff's previous concerns about possible stress to the containment's concrete due to the impact of its operation at high temperatures, low pressures and low specific humidity. While it is a well-known fact throughout the

industry that concrete continues to shrink for up to 30 years as it matures after being poured, Mr. Gundersen was unable to uncover any NU or Dominion studies of the long-term impact of such phenomenon on Millstone Unit 3's concrete containment due to its unique high temperature, low pressure and low specific humidity environment.

Gundersen Declaration at ¶45.

It is Mr. Gundersen's expert opinion that insofar as the proposed change is neither simple nor standard that an EPU review is more appropriate than a SPU review.

Gundersen Declaration at ¶46. The containment analysis for Millstone Unit 3 is further complicated by the fact that for the first four years of its operation, Millstone Unit 3 operated at the high temperature, low pressure, low specific humidity unique to its sub-atmospheric containment and thereby may have compromised the structural integrity of the concrete. Gundersen Declaration at ¶47.

Additional serious issues exist with regard to the Millstone Unit 3 structural integrity. In addition to being the lead licensing engineer for NU at its Millstone Unit 3 nuclear plant during the 1970s, Mr. Gundersen served as both a vice president and the senior vice president of a company that provided goods and services to Millstone 3 during the 1980s. Gundersen Declaration at ¶48.

In his capacity as an officer of the firm contracted to conduct structural analytical support to Millstone Unit 3 during its construction phase, Mr. Gundersen oversaw a group of 60 structural engineers at the Millstone Unit 3 site in 1984. Gundersen Declaration at ¶48A.

Engineers reporting to Mr. Gundersen during the construction phase informed him of other structural problems involving Millstone Unit 3's unique containment. Gundersen Declaration at ¶48B.

Due to the design of the containment, the size and amount of rebar near major

containment penetrations (locations through the containment where pipes such as steam lines and feedwater lines enter and exit the containment) created strategic geometry problems in the ability of the construction contractors to pour adequate amounts of concrete around the rebar in the tight configuration. Gundersen Declaration at ¶48C.

The unique containment design placed an enormous amount of rebar in several different directions around the containment penetrations, making it extraordinarily difficult for concrete to slip by the rebar. Concrete voids between the rebar were a major concern. To “solve” this problem, NU qualified a procedure for the construction workers to apply long vibrating shafts into the rebar to get the concrete to slide around the rebar and create a heterogeneous block without voids. Gundersen Declaration at ¶48D.

This vibration method caused the sand to separate from the concrete if applied too long and would create voids if applied for too short a time. Gundersen Declaration at ¶48E.

While the procedure was qualified and construction workers were trained in how to operate the vibrating rods, the structural engineers under Mr. Gundersen's supervision were concerned that there was no way to test the containment penetrations after the concrete had hardened to assure there were no voids. Gundersen Declaration at ¶48F.

The complex geometry at penetrations and the presence of concrete and steel intertwined made any ultrasonic exam impossible. Gundersen Declaration at ¶48G.

Core drilling was impossible as it would weaken the containment. Gundersen Declaration at ¶48H.

Given the structural limitations of the original design, and given that the containment was modified by licensing changes in 1990, it is imperative that this license modification be given a more thorough investigation than what is normally provided during a SPU

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approval process. Gundersen Declaration at ¶481.

**References to Specific Sources and Documents of Which the Petitioners Are Aware and on Which Petitioners Intend to Rely to Establish Those Facts or Expert Opinion**

The Petitioners will rely on the sources and documents referenced in the Gundersen Declaration. The Petitioners reserve the right to expand their sources and documents during the proceeding through discovery and otherwise as appropriate.

**A Genuine Dispute Exists with the Applicant on a Material Issue of Law or Fact**

Given the structural limitations of the original design, given that the containment was modified by licensing changes in 1990, and given documented construction challenges, the petitioners dispute Dominion's assertion that the application qualifies for SPU approval.

**If Proven, the Contention Would Entitle Petitioners to Relief**

If the Petitioners are correct that the structural limitations of the unique Millstone Unit 3 containment, the fact that the containment was modified by licensing changes in 1990 and containment construction challenges present substantial safety issues which have not been adequately evaluated, Dominion's request should be denied and a more intensive and comprehensive review must commence under EPU standards. This is the relief requested by petitioners.

**Contention 5: The impact of flow-accelerated corrosion at Dominion's proposed higher power level for Millstone Unit 3 has not been adequately analyzed nor addressed.**

**Basis for Contention**

Flow accelerated corrosion increases the likelihood of pipe failure. Given that

Dominion exceeded Millstone Unit 3 licensed power less than a year ago, the petitioners are concerned that pipe already worn thin by the 7+ per cent power increase might break when power is increased further and that Dominion has not adequately analyzed nor addressed this issue.

**Statement of Alleged Facts or Expert Opinion Which Support the Contention and on Which the Petitioners Intend to Rely in Proving the Contention at the Hearing**

Dominion's proposed power uprate will change Millstone Unit 3's reactor coolant flow by approximately 7+ per cent. It will impact the flow in and out of the reactor and the steam and condensate/feedwater flow on the secondary side off the plant will also be increased by approximately 7+ per cent. These flow increases in turn increase "flow accelerated corrosion," thus causing pipes to wear out much faster. Gundersen Declaration at ¶49A-C.

This flow-accelerated corrosion is a non-linear phenomenon and is a significant risk due to the application of a 7+ per cent increase on a plant that is already in the second half of its engineered design life. Gundersen Declaration at ¶49D.

Disturbingly, in its application, Dominion did not propose hiring any new personnel at Millstone Unit 3 to deal with flow accelerated corrosion following the unit's proposed power uprate - despite the fact that components will require more inspections because the uprate will cause those components to wear out much faster. Gundersen Declaration at ¶49E.

In general, flow accelerated corrosion increases the likelihood of pipe failure. Gundersen Declaration at ¶49F.

Equally important, given that Dominion exceeded Millstone Unit 3 licensed power less than a year ago, is the concern that pipe already worn thin by the 7+ per cent power increase might break when power is increased further. Gundersen Declaration at

¶49G.

It does not appear that the containment has been analyzed to withstand this increased energy. Gundersen Declaration at ¶49H.

Millstone Unit 3's program for assessing flow accelerated corrosion in Dominion's proposed uprate of the plant fails to comply with 10 C.F.R. 50 Appendix B, XVI, which states:

10 C.F.R. Appendix B to Part 50 - Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants, XVI. Corrective Action that reads:

Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. The identification of the significant condition adverse to quality, the cause of the condition, and the corrective action taken shall be documented and reported to appropriate levels of management.

Gundersen Declaration at ¶50.

The power increase at Millstone Unit 3 will be accomplished by increasing the flow of water through both the primary and secondary sides of the nuclear power plant. This increased flow through the pipes causes pipes to wear out faster by the phenomenon called flow accelerated corrosion (FAC). Gundersen Declaration at ¶51.

The basic two causes of FAC are erosion-corrosion of the pipe walls and cavitation-corrosion of the pipe wall. Electrolytic attack may also occur. Wall thinning from FAC is non-linear and is a local issue, caused by local geometry like "elbows" and flow restrictions, local turbulence and local metallurgical conditions (welds and impurities) in

the pipe. Once local corrosion has started, changes in turbulence in the local area can intensify the corrosive attack. This localized nature of the corrosion is evident in a FAC pipe failure at Dominion's Surry nuclear power plant in 1986. There, a feed-water elbow had holes in one area, yet the nearby pipe wall was much less worn. Similar FAC piping failures have occurred at San Onofre in 1991 and 1993, Fort Calhoun in 1997, and Mihama in Japan in 2004. While this is an "old issue," it has not been resolved and instead has continued to plague the nuclear industry for three decades. Gundersen Declaration at ¶

Due to the localized nature of the FAC, it is difficult to predict where and when a piping component might fail. The difficulty in developing accurate predictive models for FAC is the reason why, as recently as 2004, several workers were killed at Mihama I nuclear power plant. **While prediction of what might fail is difficult, it is certain, however, to say that the rate at which piping components will wear out as a result of the proposed increase in power at Millstone Unit 3 will exceed the 7+% power increase due to the non-linear nature of FAC.** Gundersen Declaration at ¶53.

Dominion's application does not adequately address the guidance of NRC NUREG-1800, which requires that a FAC program address the scope, analytical tools, benchmarking of the computer model, preventative activities, what is monitored, what is inspected, trend analysis, acceptance criteria, operating experience, inspection techniques as well as data collection. Gundersen Declaration at ¶54.

Furthermore, Dominion's Millstone Unit 3 LRA has provided inadequate information to determine if Dominion has the management systems and staff in place to properly evaluate FAC if NRC approves Dominion's proposed power increase to the nuclear power plant. The application did not discuss the increases in staff needed in order to maintain the nuclear power plant in a safe condition if the proposed power increase is

approved. Clearly, the increase in corrosion rates caused by the proposed 7+ per cent power level increase will require extra analysis, extra inspection and extra maintenance, yet the application is silent on the need to increase Millstone Unit 3's inspection and maintenance staff. Gundersen Declaration at ¶55.

Without such programmatic and staffing information, it is not possible to further assess the adequacy of any actions Dominion might have to mitigate the consequences of flow accelerated corrosion caused by the proposed power uprate at Millstone Unit 3.

**References to Specific Sources and Documents of Which the Petitioners Are Aware and on Which Petitioners Intend to Rely to Establish Those Facts or Expert Opinion**

The Petitioners will rely on the sources and documents referenced in the Gundersen Declaration. The Petitioners reserve the right to expand their sources and documents during the proceeding through discovery and otherwise as appropriate.

**A Genuine Dispute Exists with the Applicant on a Material Issue of Law or Fact**

Flow-accelerated corrosion is a non-linear phenomenon and is a significant risk due to the application of a 7+ per cent increase on a plant that is already in the second half of its engineered design life. Flow-accelerated corrosion will require increases in staff to undertake more frequent inspection and maintenance of vital systems and components subject to accelerated corrosion. Dominion's application is silent on the need to increase Millstone Unit 3's inspection and maintenance staff. Thus, a genuine dispute exists with Dominion on a material issue of fact, to wit: the sufficiency of Dominion's application to assess the adequacy of any actions Dominion might have to mitigate the consequences of flow accelerated corrosion caused by the proposed power uprate at Millstone Unit 3.

**If Proven, the Contention Would Entitle Petitioners to Relief**

If the Petitioners are correct that the serious new risks posed by the phenomenon of

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flow accelerated corrosion attributable to the proposed 7 + per cent Millstone Unit 3 uprate necessitate additional staffing in maintenance and inspection structural and the absence of programmatic and staffing information from the application making it impossible to further assess the adequacy of any actions Dominion might have to mitigate the consequences of flow accelerated corrosion caused by the proposed power uprate at Millstone Unit 3, Dominion's request should be denied and a more intensive and comprehensive review must commence under EPU standards. This is the relief requested by petitioners.

**Contention 6: Dominion's application for a Millstone Unit 3 7+ per cent uprate cannot be and should not be analyzed as a SPU application insofar as the NRC has not adopted standards nor regulatory requirements for reviewing SPU applications.**

**Basis for Contention**

The NRC acknowledges on its current (March 17, 2008) website posting the lack of specific guidance applicable to SPUs as follows:

Since many of the available stretch power uprates have already been approved by the NRC, and since only a limited number of stretch power uprate applications are expected in the future, **there is no specific guidance for stretch power uprates.**<sup>18</sup>

In the absence of specific guidance or standards, the NRC "uses previously approved stretch power uprates, along with RS-100, for guidance."<sup>19</sup> The NRC does not

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<sup>18</sup> <http://www.nrc.gov/reactors/operating/licensing/power-uprates.html>

<sup>19</sup> *Id.*

identify which “previously approved stretch power uprates” it uses. Moreover, the use of “previously approved power uprates” did not satisfy the site specific issues pertinent to Millstone Unit 3; the NRC review to date has generated no fewer than

**Statement of Alleged Facts or Expert Opinion Which Support the Contention and on Which the Petitioners Intend to Rely in Proving the Contention at the Hearing**

The NRC lacks specific guidance or standards which nuclear reactor licensees must meet in order to qualify for approval of SPU applications. The only known “standard” is that less scrutiny is paid to Stretch Power Urate applications than Extended Power Urate applications in that RS-100 (“Review Standard for Extended Power Urates”)<sup>20</sup> is specifically applicable to EPU.

The self-described purpose of RS-001 is as follows:<sup>21</sup>

The purpose of this review standard is to provide guidance for the staff’s review of extended power urate (EPU) applications to enhance the consistency, quality and completeness of the reviews.

This review standard also informs licensees of the guidance documents the staff uses when reviewing EPU applications. **These documents provide acceptance criteria for the areas of review.** This should allow licensees to prepare EPU applications that are complete with respect to the areas that are within the staff’s scope of review. . . .

[Emphasis added.]

Thus, while the NRC holds nuclear reactor licensees seeking EPUs to standards with identified acceptance criteria, SPU applicants need no demonstrate their applications meet such acceptance criteria.

In the case of Millstone Unit 3 uprate, because of the unique, one-of-a-kind small-

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<sup>20</sup> RS-001 is available in the NRC’s ADAMS system, ML023610659.

<sup>21</sup> RS-001 Unnumbered page 2.

sized concrete containment which has been steadily “tweaked” and previously “stretched,” the absence of meaningful standards will expose plant workers and the public to heightened risks because of the opportunity of the licensee to avoid taking actions to meet EPU standards.

This is particularly unacceptable in the case of Millstone Unit 3 because Dominion is seeking a power uprate in excess of 7 per cent which technically necessitates the filing of an EPU application

**References to Specific Sources and Documents of Which the Petitioners Are Aware and on Which Petitioners Intend to Rely to Establish Those Facts or Expert Opinion**

The Petitioners will rely on the SPU application, RAIs generated during NRC review of the SPU and RS-001. The Petitioners reserve the right to expand their sources and documents during the proceeding through discovery and otherwise as appropriate.

**A Genuine Dispute Exists with the Applicant on a Material Issue of Law or Fact**

Dominion asserts incorrectly that it seeks a 7 per cent uprate as a SPU while in fact it is seeking an uprate in excess of 7 per cent which automatically by NRC “criteria” thrusts it into the category of EPUs which are required to meet the NRC acceptance criteria.

**If Proven, the Contention Would Entitle Petitioners to Relief**

If the petitioners prove that Dominion’s application for a Millstone Unit 3 7+ per cent uprate cannot be and should not be analyzed as a SPU application insofar as the NRC has not adopted standards nor regulatory requirements for reviewing SPU applications, Dominion’s request should be denied and a more intensive and comprehensive review must commence under EPU standards. This is the relief requested by petitioners.

**Contention 7: Dominion has neglected to provide all information to the NRC staff**

as it has requested and therefore its application for Millstone Unit 3 uprate should be considered to be incomplete and inadequate.

### **Basis for Contention**

Dominion's application for a Millstone Unit 3 7+ per cent power uprate is incomplete, making a proper and thorough review impossible.

### **Statement of Alleged Facts or Expert Opinion Which Support the Contention and on Which the Petitioners Intend to Rely in Proving the Contention at the Hearing**

During the period of NRC Staff review of the Dominion application for Millstone Unit 3 uprate, the NRC Staff has issued numerous Requests for Additional Information ("RAIs") to Dominion. In numerous instances throughout its license amendment application, Dominion has neglected to provide information requested and/or deferred submission of requested submission to future dates. Neither the NRC Staff nor the petitioners are able to adequately review the application absent such submissions. Accordingly, the application should be rejected as incomplete.

### **References to Specific Sources and Documents of Which the Petitioners Are Aware and on Which Petitioners Intend to Rely to Establish Those Facts or Expert Opinion**

The petitioners intend to rely on the following documents to prove this contention:

A. Dominion Nuclear Connecticut, Inc. Millstone Power Station Unit 3 Response to Request for Additional Information Regarding Stretch Power Uprate License Amendment Request Response to Question AADB-07-0012 (January 10, 2008)(ML080100604) ("A modification **will be developed** to implement this assumption." Page 1)(Emphasis added,)

B. Dominion Nuclear Connecticut, Inc. Millstone Power Station Unit 3 Response to Request for Additional Information Regarding Stretch Power Uprate License Amendment Request Response to Questions EEEB-07-0049 through EEEB-07-0057

(January 10, 2008)(ML080100600):

EEEEB-07-0052 [NRC Staff Question]

For the Main Steam Valve Building, Engineered Safety Features Building, and Auxiliary Building, the license amendment request, in Section 2.3.1, indicates that SPU conditions may affect the EQ [Environmental Qualification] of electrical equipment. Provide the complete evaluations of the affected equipment, including an in-depth discussion of the assumptions and methodology.

DNC [Dominion] Response

**The evaluations for the continued acceptability of the EQ equipment with increased accident temperature in the Main Steam Valve Building (MSVB) and the increased radiation TID in selected Engineered Safety features and Auxiliary Building zones are *ongoing*. The results will be available by *March 31, 2008*.** [Emphasis added.]

C. Dominion Nuclear Connecticut, Inc. Millstone Power Station Unit 3 Response to Request for Additional Information Regarding Stretch Power Uprate License Amendment Request Response to Questions EMCB-07-0060 through EMCB-07-0081 (January 14, 2008)(ML080140570):

DNC Response [to NRC Question EMCB-07-0072]:

Several steam generator and pressurizer locations have maximum stress ranges that exceed the 3Sm limit in NB-3222.2 . . . **A summary showing that each of these requirements have [sic] been satisfied will be provided. . . .**

**Documentation of the final results of the elastic-plastic analysis is under development. A summary of the results will be provided by February 28, 2008.** [Emphasis added.]

EMCB-07-0078

Discuss in detail the method for avoiding adverse flow effects during power ascension and after achieving SPU conditions. Include systems to be monitored, data to be collected and methods of data collection. Specify hold points and duration, inspections, plant walkdowns, vibration data locations, and planned data evaluation.

DNC Response:

. . . The Power Ascension Test Procedure, **which is currently under development**, will be used during the return of MPS3 to power operation after the Fall 2008 refueling outage. [Emphasis added.]

D. Dominion Nuclear Connecticut, Inc. Millstone Power Station Unit 3 Response to Request for Additional Information Regarding Stretch Power Uprate License Amendment Request Response to Question CPNB-07-0048 (January 10, 2008)(ML080100611):

DNC Response [NRC Staff Question CPNB-007-0048]

. . . There are plans to mitigate the hot leg and cold leg RPV nozzles; however, the technology and schedule for doing this are not yet finalized.

E. Dominion Nuclear Connecticut, Inc. Millstone Power Station Unit 3 Response to Request for Additional Information Regarding Stretch Power Uprate License Amendment Request Response to Question SBPB-07-0082 (January 11, 2008)(ML080110695):

SBPB-07-0082 [NRC Staff Question]

In Attachment 5, Section 2.5.6.3, Solid Waste Management Systems, the licensee states "Implementation of SPU is anticipated to increase the potential for occurrence of the crud induced power shift (CIPS) phenomena. Details

associated with the fuel cleaning process proposed to manage and/or preclude CIPS require finalization.”

The Petitioners reserve the right to expand their sources and documents during the proceeding through discovery and otherwise as appropriate.

**A Genuine Dispute Exists with the Applicant on a Material Issue of Law or Fact**

While Dominion represented implicitly in its initial application letter dated July 13, 2007 that its application for Millstone Unit 3 power uprate was complete: its letter urges prompt positive action by the NRC:

DNC [Dominion] requests approval of this proposed amendment by June 30, 2008, with the amendment effective as of the date of issuance and implementation to be completed within 12 months of issuance. Approval by June 30, 2008 will support the refueling outage currently scheduled to begin in the fall of 2008.<sup>22</sup>

Submitting an incomplete application is inconsistent with an expectation of prompt approval. The petitioners dispute the completeness of the application. Thus, a dispute exists with Dominion on a material issue of fact.

**If Proven, the Contention Would Entitle Petitioners to Relief**

If, as the petitioners contend, the application is incomplete in material aspects, the petitioners are entitled to the relief they seek: rejection of the application.

**Contention 8: The uprate will result in heightened releases of radionuclides and consequent exposures to plant workers and to the public estimated by Dominion to be 9 per cent but likely in excess of 9 per cent above current levels and such increases will result in corresponding 9 per cent (or more) increases of the risk of**

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<sup>22</sup> Dominion Letter to NRC requesting license amendment for Millstone Unit 3 power uprate, July 13, 2007, at page 2.

harmful health effects. Dominion's application for Millstone 3 uprate makes no provision for new shielding or other techniques to mitigate increased radionuclide release levels. Since Millstone first went online in 1970, cancer incidences in the communities surrounding Millstone have become the highest in the state for many types of cancer; the Millstone host communities suffer high incidences of fetal distress, stillbirth, premature birth, genetic defects and childhood cancer. Cancer is widespread among current and former Millstone workers. Under these circumstances, Dominion's application is entirely inadequate to assure that the uprate will not endanger plant workers or the public to an unsafe and unacceptable degree. Dominion's application must be rejected.

#### **Basis for Contention**

Dominion proposes to increase power generation at Millstone Unit 3 by 7+ per cent. Dominion's application states that the proposed uprate will be accompanied by increases of at least 9 per cent in levels of radionuclide production and dispersion through increased concentrations of radionuclides in effluent releases. Such increases may be even greater than predicted by Dominion because of the new dynamics of plant operations under the uprate which will accelerate the rate of coolant flow and increase heat levels leading and slow response time by plant personnel. Such increased releases will correspond with similar increases in health risks to plant workers and the public. Dominion's application entirely fails to make any attempt to evaluate the high cancer incidences among its workforce at Millstone and within the surrounding community. Therefore, its application is inadequate and incomplete and must be rejected.

**Statement of Alleged Facts or Expert Opinion Which Support the Contention and on Which the Petitioners Intend to Rely in Proving the Contention at the Hearing**

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Dominion's application to amend its license to allow a power generation uprate at Millstone Unit 3 addresses anticipated increases in its releases of radionuclides within the plant and to the environment in Attachment 2 to its application (8.0 Radiological Environmental Impacts) and Attachment 5 (2.10 Health Physics). Thus, health effects of exposure to increased releases of radionuclides attributable to the proposed uprate is an issue clearly within the scope of these proceedings.

Attachment 5 to the application dated July 13, 2007 states in pertinent part as follows in Section 2.10.1.2.1.3:

The normal operation radiation levels in most of the plant areas are expected [with the Stretch Power Urate] to increase by approximately 9 per cent, i.e., the percentage increase between the current licensed power level of 3411 Mwt and the conservatively analyzed core power level of 3723 MWt used for the SPU assessment. The exposure to plant personnel and to the offsite public is also expected to increase by the same percentage.

Attachment 2 to the application dated July 13, 2007 states in pertinent part at Section 8.1.3 ("Gaseous Waste"):

The proposed SPU [Stretch Power Urate] would result in a small increase (approximately 9.5% for noble gases, and 9.1% for particulates, iodine and tritium) in the equilibrium radioactivity in the reactor coolant, which in turn increases the activity in the waste disposal systems and the activity released from the Station.

Ernest J. Sternglass, Ph.D., Professor Emeritus of the University of Pittsburgh School of Medicine and a pioneering researcher, scientist and authoritative author in the field of health effects of radiation exposure, is petitioners' expert on this issue as it relates to the Millstone Unit 3 power uprate application. Dr. Sternglass has submitted a

Declaration, which is annexed hereto as Exhibit B together with his Curriculum Vitae.

Having considered Dominion's admissions of 9 (or more) per cent increased levels above current levels of radionuclide production and dispersion as a direct consequence of the proposed uprate, Dr. Sternglass declares as follows:

7. I agree with the conclusion of the 2005 National Academy of Sciences report, "Health Risks from Exposure to Low Levels of Ionizing Radiation" (BEIR VII - Phase 2), in which it is stated that there is no safe level or threshold of ionizing radiation exposure and that the smallest dose of low-level ionizing radiation has the potential to cause an increase in health risks to humans.

8. If the Millstone Unit 3 nuclear reactor is permitted to release radionuclides to the environment at levels 9 per cent greater than current levels, it is likely that there will be a closely corresponding increase in adverse effects on human health.

9. One would expect this to be the case based on our present experience and the accepted nearly linear relation between radiation exposure and adverse health effects - including illness, death and harm to developing fetuses - at this range.

The projected 9 (or more) per cent increase in radionuclide release as a direct consequence of the Millstone Unit 3 uprate is substantial. It is more likely that the increase will approach 10 per cent or greater, given the enhanced dynamics of Unit 3 operations with faster-moving coolant and heightened temperatures.<sup>23</sup>

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<sup>23</sup> It is believed that it is credibly postulated that the recently approved 20 per cent power generation uprate at the Vermont Yankee Nuclear Power Plant will result in a corresponding 40 per cent increase in radionuclide generation and dispersion to the environment. Applying Dr. Sternglass's analysis, the Vermont Yankee uprate will also have the effect of increasing health risks among the exposed population by 40 per cent. Thus, the relationship between percentage of increased power generation and

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Cancer incidences among the population surrounding Millstone are known to be substantial.

Cynthia M. Besade, a member of petitioner CCAM, is very familiar with cancer incidences in the host communities of Waterford and East Lyme: she grew up in the “avenues” neighborhood of Waterford and has become aware of numerous cancer clusters in the residential neighborhood located near Millstone. Ms. Besade declares:

5. My father, Joseph H. Besade, was a licensed nuclear pipefitter for 20 years (1973-1993) at Millstone; he was fired as a whistleblower and succumbed to a devastating form of cancer - brought about by his radiation exposure at Millstone, according to what his treating physician told him shortly before his death in my presence - at the age of 66.

6. In the neighborhood where I grew up, known as the Southwest School neighborhood or the neighborhood of “the avenues,” countless families have suffered losses of children and other family members to cancer.

7. Niantic River Road, near where I grew up, is one of numerous streets in the community surrounding Millstone with cancer clusters; others are Seabreeze Drive, Shore Road, Mullen Hill Road, Dayton Road, Spithead Road, Nile Hill Road, Great Neck Road in Waterford and East Pattagansett Road, Roxbury Road, Pennsylvania Avenue, Carriage Hill, Main Street, Grand Street, Black Point in East Lyme.

8. On Hillcrest Drive in Waterford, for example, I have been informed that eight (8) of 12 homes are occupied by families of cancer victims, some with more than one case per home. Near Pleasure Beach in Waterford, directly across

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production of increased levels of radionuclides is non-linear.

Jordan Cove from Millstone, at least three young people I know of have succumbed to brain cancer.

9. In the public schools surrounding Millstone, numerous students have succumbed to brain cancer, leukemia and other forms of cancer; survivors include children with brain cancer and ovarian cancer.

10. Since Dominion Nuclear Connecticut assumed ownership of Millstone on April 1, 2001, dozens of infants and fetuses whose parents reside near Millstone have died prematurely, according to obituaries published in The Day newspaper and other sources.

11. I have been informed that three (3) members of the current senior class of East Lyme High School have been diagnosed with cancer; one has died recently.

12. Zachary Hartley, whose mother swam in Niantic Bay during her pregnancy, was born with a life-threatening cancer in his face in 1997; that year, Millstone admitted catching a fish contaminated with cesium-137, a potent carcinogen, in Niantic Bay, and it reported the cesium-137 as plant-derived to state authorities.

13. Numerous fatal cases of rhabdomyosarcoma, a supposedly rare disease, have been diagnosed among children in the towns surrounding Millstone.

14. Among workers at Millstone, cancer is common; for example, my father was one of nine (9) co-workers in nuclear pipe-fitting at Millstone who succumbed to cancer.

15. I am aware that no fewer than sixteen (16) workers at Millstone were diagnosed with cancer within the past several years; several have since died.

16. From the time I was a teenager, it was not uncommon for my friends and classmates' mothers to develop breast cancer and die.

17. Breast cancer has killed many, many women, including many women in their thirties and forties, in the towns surrounding Millstone.

18. Everywhere I go in the New London area, I encounter people who are suffering from cancer or whose family members are suffering from cancer or who have lost a family member or friend or neighbor to cancer.

14. Among workers at Millstone, cancer is common; for example, my father was one of nine (9) co-workers in nuclear pipe-fitting at Millstone who succumbed to cancer.

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18. Everywhere I go in the New London area, I encounter people who are suffering from cancer or whose family members are suffering from cancer or who have lost a family member or friend or neighbor to cancer.

**References to Specific Sources and Documents of Which the Petitioners Are Aware and on Which Petitioners Intend to Rely to Establish Those Facts or Expert Opinion**

The petitioners intend to rely on Dr. Sternglass's books and studies as they relate to Millstone; health studies by the Radiation and Public Health Project as they relate to Millstone; and the book entitled "Millstone and Me: Sex, Lies and Radiation in Southeastern Connecticut (Michael Steinberg, 1998). The Petitioners reserve the right to expand their sources and documents during the proceeding through discovery and otherwise as appropriate.

### **A Genuine Dispute Exists with the Applicant on a Material Issue of Law or Fact**

Dominion's application is absent any analysis of the health effects of the proposed Millstone Unit 3 uprate on its workforce, which exhibits a high cancer rate, and the community, which exhibits a high cancer rate. The petitioners contend that the heightened health risks associated with the proposed power generation uprate present a significant safety issue which requires analysis in these proceedings.

### **If Proven, the Contention Would Entitle Petitioners to Relief**

If the petitioners prove their contention, the petitioners are entitled to the relief they seek: rejection of the application.

**Contention 9: Dominion's application for a 7+ per cent power generation uprate at Millstone Unit 3 will result in significant new releases of radioactive material to the environment and it will result in discharges of significant volumes of water to the Long Island Sound at heightened temperatures, both of which consequences are inadequately addressed in the application.**

#### **Basis of Contention:**

Dominion's application for a Millstone Unit 3 power uprate proposes significant adverse environmental impacts which have not been adequately analyzed. These include increased releases of radioactive contaminants to the air and water. Some of these radioisotopes, such as tritium, remain biologically active for more than 200 years. The half-life of a radioisotope of krypton is 3 million years. Heightened thermal releases will adversely impact the biological health of the Long Island Sound and its marine species. The increases radioactive releases will contaminate the food supply at increased levels. When Dominion sampled the milk of goats living within five miles of

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Millstone in 2001, the levels of strontium-90 reached as high as 55 picocuries per liter, an extraordinarily high level.<sup>24</sup>

**Statement of Alleged Facts or Expert Opinion Which Support the Contention and on Which the Petitioners Intend to Rely in Proving the Contention at the Hearing**

Millstone Nuclear Power Station releases annually approximately 1.74 million gallons and 145 millicuries of fission and activation products as liquid waste.<sup>25</sup>

Millstone Nuclear Power Station releases annually an estimated 560 Ci for noble gases, 0.21 Ci for particulates, 0.19 Ci for Iodines and 1200 Ci for Tritium as gaseous waste.<sup>26</sup>

While the volumes of gaseous and liquid radioactive waste will remain constant under the Millstone Unit 3 power uprate proposal, their concentrations of radionuclides will increase by an estimate 9 (or more) per cent.

Under the Millstone Unit 3 power uprate proposal, the total BTU's (British Thermal Units) in Millstone Unit 3's thermal discharge will increase by an estimated 7 per cent.<sup>27</sup>

These increases are significant and pose an unanalyzed risk of environmental harm.

**References to Specific Sources and Documents of Which the Petitioners Are Aware and on Which Petitioners Intend to Rely to Establish Those Facts or Expert Opinion**

The petitioners intend to rely on environmental reports submitted by Dominion and Millstone's predecessor owner to the NRC and Connecticut Department of

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<sup>24</sup> Dominion's Millstone Nuclear Power Station Environmental Monitoring Report 2001

<sup>25</sup> Attachment 2 to LRA at page 35 (8.1.2 Liquid Waste)

<sup>26</sup> Attachment 2 to LRA at page 36 (8.1.3 Gaseous Waste)

<sup>27</sup> Attachment 2 to LRA at page 23 (7.2.2 MPS3 Cooling Water Systems)

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Environmental Protection; NRC documents pertaining to the April 17, 2005 Class II emergency declared at Millstone Unit 3; and NRC inspection reports and other pertinent documents. The Petitioners reserve the right to expand their sources and documents during the proceeding through discovery and otherwise as appropriate.

**A Genuine Dispute Exists with the Applicant on a Material Issue of Law or Fact**

The environmental impact of significantly increased levels of radioactive materials released into the environment is clearly within the scope of this proceeding. Supplement to the LRA is entitled the "Environmental Supplement" and it addresses this issue.

However, contrary to Dominion's assessment of insignificant environmental impact, the petitioners contend that the proposed Millstone Unit 3 power uprate will have devastating environmental consequences, such as overheating the Long Island Sound and thereby destroying critical fish habitat and contaminating fruits and vegetables raised locally for sale for human consumption. Thus, a genuine dispute exists with Dominion on a material issue of fact.

**If Proven, the Contention Would Entitle Petitioners to Relief**

If the petitioners prove this contention, they are entitled to the relief which they seek: rejection of the application.

**Conclusion**

The petitioners have established herein their standing to intervene in these proceedings. The petitioners have submitted nine admissible contentions. The petitioners have established the legal and factual basis and public need for a hearing on this application.

**NANCY BURTON**

A handwritten signature in black ink, appearing to read "Nancy Burton", is written over a horizontal line.

Nancy Burton  
147 Cross Highway  
Redding Ridge CT 06876  
Tel. 203-938-3952  
NancyBurtonCT@aol.com

**UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION**

<b>In the matter of</b>	<b>:</b>	<b>Docket No. 50-423</b>
<b>Dominion Nuclear Connecticut, Inc.</b>	<b>:</b>	
<b>Millstone Nuclear Power Station Unit 3</b>	<b>:</b>	
<b>(License Amendment Request</b>	<b>:</b>	
<b>Stretch Power Uprate)</b>	<b>:</b>	<b>March 17, 2008</b>

**DECLARATION OF NANCY BURTON**

I, Nancy Burton, declare as follows:

1. I am above the age of eighteen (18) years and I believe in the obligation of an oath.
  2. I reside at 147 Cross Highway in Redding, Connecticut, and at 6 Allyns Alley in Mystic, Connecticut, the latter location being within approximately 10 miles downwind of the Millstone Nuclear Power Station.
  3. As a seasonal resident of Mystic, Connecticut, I am subject to exposure to radioisotopes released by the Millstone Nuclear Power Station to the air and water as well as emergency evacuation in the event of a nuclear emergency.
  4. Dominion Nuclear Connecticut, Inc.'s application to the U.S. Nuclear Regulatory Commission for a 7+ per cent power uprate at the Millstone Unit 3 nuclear reactor proposes to release radionuclides to the environment during routine operations at levels 9 per cent (or more) above current levels.
  5. My risk of suffering adverse health effects from such releases will rise by a corresponding 9 per cent (or more) if the application is granted and the uprate proceeds.
  6. At the same time, the application will put heightened stress on the unique, under-sized and aging Unit 3 containment and associated cooling components which will also
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heighten the risk of critical equipment failure and nuclear accident and thereby expose me to heightened risk of death or serious injury from the cascading consequences of such an event.

7. Therefore, I oppose the license amendment because of the unacceptable new risks it presents.

8. For purposes of this Declaration, I rely in part on the Declarations being filed contemporaneously herewith by Arnold Gundersen and Ernest J. Sternglass, Ph.D. and my own scrutiny of the application.

9. I am Director of the Connecticut Coalition Against Millstone, a public-interest organization founded in 1998 to educate the public about the Millstone Nuclear Power Station and engage in activities to protect the public health and safety of the community otherwise at risk from Millstone operations.

10. For example, the Coalition has participated in numerous presentations and legal challenges before the U.S. Nuclear Regulatory Commission and state and federal courts concerning the Millstone 3 spent fuel pool; the loss of two spent fuel rods; dry cask storage, Millstone relicensing, the Millstone Clean Water Act permit, and Millstone's devastation of indigenous species of fish through operation of its giant intakes. It sponsors rallies and public-outreach activities in the communities surrounding Millstone. It supports Millstone whistleblowers. It maintains a website, [www.MothballMillstone.org](http://www.MothballMillstone.org), which is devoted to alerting the public about issues of concern regarding Millstone.

11. The Connecticut Coalition Against Millstone consists of statewide safe-energy and environmental groups, nuclear whistleblowers and others.

12. As Director of the Coalition, I am duly authorized to appear on its behalf and on behalf of its membership in this proceeding.

13. In addition to my role as delegated representative of the Coalition in this proceeding, I petition to intervene and request a hearing in my personal capacity.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this 17<sup>th</sup> day of March, 2008 at Redding, Connecticut.



Nancy Burton

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

1. In the matter of : Docket No. 50-423  
Dominion Nuclear Connecticut, Inc. :  
Millstone Nuclear Power Station Unit 3 :  
(License Amendment Request :  
Stretch Power Uprate) : March 16, 2008

DECLARATION OF CYNTHIA M. BESADE

I, Cynthia M. Besade, declare as follows:

1. I am above the age of eighteen (18) years and I believe in the obligation of an oath.
2. I reside at 270 Gay Hill Road, Uncasville, Connecticut.
3. My present home is located within 10 miles north-northeast of the Millstone Nuclear Power Station.
4. However, I grew up at 21 Fifth Avenue in Waterford, Connecticut, a location within two (2) miles and downwind of the Millstone Nuclear Power Station and where some members of my family still reside.
5. My father, Joseph H. Besade, was a licensed nuclear pipefitter for 20 years (1973-1993) at Millstone; he was fired as a whistleblower and succumbed to a devastating form of cancer - brought about by his radiation exposure at Millstone, according to what his treating physician told him shortly before his death in my presence - at the age of 66.
6. In the neighborhood where I grew up, known as the Southwest School neighborhood or the neighborhood of "the avenues," countless families have suffered losses of children and other family members to cancer.
7. Niantic River Road, near where I grew up, is one of numerous streets in the community surrounding Millstone with cancer clusters; others are Seabreeze Drive, Shore Road, Mullen Hill Road, Dayton Road, Spithead Road, Nile Hill Road, Great Neck Road in Waterford and East Pattagansett Road, Roxbury Road, Pennsylvania Avenue, Carriage Hill, Main Street, Grand Street, Black Point in East Lyme.
8. On Hillcrest Drive in Waterford, for example, I have been informed that eight (8) of 12 homes are occupied by families of cancer victims, some with more than one case per home. Near Pleasure Beach in Waterford, directly across Jordan Cove from Millstone, at least three young people I know of have succumbed to brain cancer.
9. In the public schools surrounding Millstone, numerous students have succumbed to brain cancer, leukemia and other forms of cancer; survivors include children with brain cancer and ovarian cancer.
10. Since Dominion Nuclear Connecticut assumed ownership of Millstone on April 1, 2001, dozens of infants and fetuses whose parents reside near Millstone have died prematurely, according to obituaries published in The Day newspaper and other sources.
11. I have been informed that three (3) members of the current senior class of East Lyme High School have been diagnosed with cancer; one has died recently.
12. Zachary Hartley, whose mother swam in Niantic Bay during her pregnancy, was born with a life-threatening cancer in his face in 1997; that year, Millstone admitted catching a fish contaminated with cesium-137, a potent carcinogen, in Niantic Bay, and it reported the cesium-137 as plant-derived to state authorities.
13. Numerous fatal cases of rhabdomyosarcoma, a supposedly rare disease, have been diagnosed among children in the towns surrounding Millstone.
14. Among workers at Millstone, cancer is common; for example, my father was one of nine (9) co-workers in nuclear pipe-fitting at Millstone who succumbed to cancer.
15. I am aware that no fewer than sixteen (16) workers at Millstone were diagnosed with cancer within the past several years; several have since died.
16. From the time I was a teenager, it was not uncommon for my friends and classmates' mothers to develop breast cancer and die.
17. Breast cancer has killed many, many women, including many women in their thirties and forties, in the towns surrounding Millstone.
18. Everywhere I go in the New London area, I encounter people who are suffering from cancer or whose family members are suffering from cancer or who have lost a family member or friend or neighbor to cancer.
19. I believe that Millstone is largely responsible for the high cancer rates in my community; cancer was not a plague on our community until after Millstone started operating.

20. I oppose Dominion's application for a license amendment for a Millstone Unit 3 7+ per cent power uprate.

21. According to Dominion's own projections, the license amendment, if granted, will result in an estimated 9 per cent increase in radionuclide releases to the environment, including the air I and my family and friends and neighbors breathe, and such releases will increase health risks by the same proportion.

22. The license amendment, if granted, will also heighten safety risks, including the risk of a catastrophic accident, because of unacceptable stresses on the aging Unit 3 reactor, containment, pipes, valves and other mechanical components.

20. Between 1980 and 1981, I worked at Millstone as a security guard and my responsibilities including patrolling the site.

21. In such capacity, I observed Unit 3 while it was under construction but during a protracted period when construction was suspended because of cost overruns.

22. I recall observing rust on the unfinished structures and I was informed by tradesmen working at the site that major sandblasting work had to be undertaken to eliminate corrosion and rust which had built up because of the structure's prolonged exposure to salt air and salt water due to its proximity to Long Island Sound.

23. We do not need the electricity to be generated by the proposed uprate; a modest conservation program would achieve far greater results without exposing my community to heightened risk of cancer, disease, infant mortality, genetic mutations and catastrophic accident.

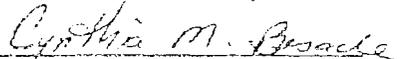
24. Of all my many friends, neighbors and acquaintances in the community, I know of no sane person who favors this license amendment.

25. I am a member of the Connecticut Coalition Against Millstone.

26. I hereby authorize Nancy Burton to represent my rights and interests in this matter as Director of the Coalition and its designated representative.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this 16th day of March, 2008 at Uncasville, Connecticut.

  
Cynthia M. Besade

UNITED STATES  
NUCLEAR REGULATORY COMMISSION

*In the matter of*

DOMINION NUCLEAR CONNECTICUT INC. )  
MILLSTONE POWER STATION UNIT 3 )  
LICENSE AMENDMENT REQUEST )  
STRETCH POWER UPRATE )

Docket No. 50-423

DECLARATION OF ARNOLD GUNDERSEN SUPPORTING  
CONNECTICUT COALITION AGAINST MILLSTONE IN ITS PETITION FOR  
LEAVE TO INTERVENE, REQUEST FOR HEARING, AND CONTENTIONS

I, Arnold Gundersen, declare as follows:

1. My name is Arnold Gundersen. I am sui juris. I am over the age of 18-years-old.  
I have personal knowledge of the facts contained in this Declaration.
2. I reside at 376 Appletree Point Road, Burlington, Vermont.
3. The Connecticut Coalition Against Millstone has retained me as an expert witness in the above captioned matter.
4. I have a Bachelor's and a Master's Degree in Nuclear Engineering from Rensselaer Polytechnic Institute (RPI) cum laude.
5. I began my career as a reactor operator and instructor at RPI in 1971 and progressed to the position of Senior Vice President for a nuclear licensee. I am a vetted expert witness on nuclear safety and engineering issues. My more than 37-years of professional nuclear experience include and are not limited to: nuclear

safety expert witness testimony; nuclear engineering management and nuclear engineering management assessment; prudency assessment; nuclear power plant licensing, licensing and permitting assessment, and review; nuclear safety assessments, public communications, contract administration, assessment and review; systems engineering, structural engineering assessments, cooling tower operation, cooling tower plumes, nuclear fuel rack design and manufacturing, nuclear equipment design and manufacturing, in-service inspection, criticality analysis, thermohydraulics, radioactive waste processes and storage issue assessment, decommissioning, waste disposal, source term reconstructions, thermal discharge assessment, reliability engineering and aging plant management assessments, archival storage and document control technical patents, federal and congressional hearing testimony, and employee awareness programs.

6. My Curriculum Vitae delineating my qualifications is attached.
7. My Declaration is intended to support Connecticut Coalition Against Millstone's Petition For Leave To Intervene, Request For Hearing, and Contentions.
8. The Five Contentions my Declaration supports are:
  - A. The proposed power level for which Dominion Nuclear has applied to uprate Millstone Power Station Unit 3 exceeds the NRC Stretch Power Uprate (SPU) regulatory criteria.

- B. The design margins for the Millstone Unit 3 Containment, which help to protect public health and safety, have been significantly reduced by license amendments granted in 1991, and Dominion's proposed power increase, if granted, will further reduce Containment margins designed for safety.
- C. When compared to all other Westinghouse Reactors, Millstone Unit 3 is an outlier or anomaly. Dominion's proposed uprate is the largest percent power increase for a Westinghouse reactor. Additionally, Millstone Unit 3 also has the smallest Containment for any Westinghouse reactor of roughly comparable output.
- D. Construction problems due to the unique Sub-Atmospheric Containment Design, coupled with the impact upon the Containment concrete by the operation of the Containment Building at very low pressure, very high pressure and very low specific humidity, place the calculations used to predict the stress on that concrete Containment in uncharted analytical areas.
- E. The impact of flow-accelerated corrosion at Dominion Nuclear's proposed higher power level for Millstone Unit 3 have not been adequately analyzed and addressed.

9. As an expert witness, who happens to hold both a Bachelor's and Master's degree in Nuclear Engineering, have more than 35-years of nuclear industry engineering experience, and as a former Northeast Utilities employee worked on Millstone Nuclear Power Station Unit 3, in my professional opinion the Dominion Nuclear application fails to satisfy *any of the NRC criteria* to be accepted as a Stretched Power Uprate. A thorough review of the evidence presented by Dominion Nuclear and compared and contrasted with NRC Stretched Power Uprate requirements clearly shows that the Dominion Nuclear Stretched Power Uprate application should in fact be treated as an Extended Power Uprate (EPU) application.
10. According to the NRC, there are two criteria<sup>1</sup> that must be met for a licensee to be considered for a Stretch Power Uprate (SPU):
- A. An increase in the reactor power that is **“up to 7 percent”**  
and
  - B. **“... are within the design capacity of the plant”**
  - C. Furthermore, the NRC states that achieving a Stretch Power Uprate **“depends on the operating margins included in the design of a particular plant”**. [Emphasis added]
11. In my opinion, the magnitude of Dominion Nuclear's proposed power increase, the uniqueness of the initial Millstone 3 Power Plant Containment design, the Containment's unusually small size, and the fact that the design margins of the Containment have already been dramatically reduced by changes made to

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<sup>1</sup> [www.nrc.gov/reactors/operating/licensing/power-uprates](http://www.nrc.gov/reactors/operating/licensing/power-uprates)

Millstone 3 in 1990 by Northeast Utilities, makes it necessary for the NRC to conduct the more thorough and intensive Extended Power Uprate review.

12. Dominion Nuclear has characterized this proposed increase in power at Millstone Unit 3 (Millstone Power Station Unit 3) as a Stretch Power Uprate (SPU), and Dominion Nuclear claims that Millstone 3 meets all the criteria for a Stretched Power Uprate. According to Dominion's letter filing for the power increase:

"DNC developed this LAR utilizing the guidelines in NRC Review Standard, RS- 001, "Review Standard for Extended Power Uprates." In addition, requests for additional information (RAIs) regarding SPU and Extended Power Uprate (EPU) applications for other nuclear units were reviewed for applicability. Information that addresses many of those RAIs is included in this MPS3 SPU LAR. RS-001 states that a SPU is **characterized by power level increases up to 7 percent and does not generally involve major modifications**. Plant modifications are addressed in Section 1.0 of the License Report (LR) (Attachment 5) and are not considered to be major. Since the requested uprate is 7 percent and does not involve major plant modifications, it is considered to be a Stretched Power Uprate."<sup>2</sup>  
[emphasis added]

13. Contention 1: To begin with, the Dominion Nuclear application fails to satisfy the first NRC criteria<sup>3</sup> that the NRC has set the power limit for SPU's at "**... up to 7% ...**". Yet Dominion Nuclear notifies its acceptance of the NRC's specific criteria in stating "**...a SPU is characterized by power level increases up to 7 percent ...**". Most importantly, Dominion's proposed power increase at Millstone Unit 3 in fact exceeds the seven percent limit established by the NRC and accepted by Dominion Nuclear.

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<sup>2</sup> Letter, Dominion Nuclear to NRC, SPU Filing, February 2007

<sup>3</sup> [www.nrc.gov/reactors/operating/licensing/power-uprates](http://www.nrc.gov/reactors/operating/licensing/power-uprates)

14. Millstone Power Station Unit 3 is currently licensed to operate at 3411 thermal megawatts (MWt). This number signifies how much heat the reactor is generating and is accurate to four significant figures (numbers).
- The proposed power level of 3650, for which Dominion Nuclear has applied, exceeds the NRC 7% limit that would qualify the power uprate for the less rigorous review of a Stretched Power Uprate.
  - Dominion Nuclear has applied for a power increase to 3650 MWt, which is a full 300 KW above what is allowable by the NRC regulations for a Stretch Power Uprate.
  - Let's look at the math. Multiply the current licensed power by the NRC's maximum allowable 7% SPU increase. The calculation total equals 3649.7 MWt, which is below the reactor power level of 3650 MWt for which Dominion Nuclear has applied.  $3411 \times 1.07 < 3650$
  - The 7% NRC limit is accurate to two significant figures. When multiplying a two significant figure number by a four significant figure number *mathematical methodology demands the calculation be rounded down not up* as Dominion Nuclear has done in its application.
  - By rounding its proposed reactor power level to a higher power level the requested Dominion Nuclear reactor power increase exceeds the regulatory limit for a Stretched Power Uprate (SPU). Thus, this unscientific rounding up of the thermal megawatt power to a higher power

level causes the reactor power to exceed the legal Stretched Power Uprate limit of “up to 7 %” by a full 300 KW.

15. The mathematical evidence shows that Dominion Nuclear proposed power level increase for its Millstone Power Station Unit 3 exceeds the 7% regulatory limit clearly established by the NRC. Therefore, it is my opinion that the Dominion Nuclear’s Millstone Unit 3 *is disqualified* for a Stretched Power Uprate.
16. Moreover, while on the face, this mathematical discrepancy may not appear to be a huge number, the 300 KW discrepancy between the NRC 7% limit and Dominion Nuclear’s application for a 3650 megawatt thermal increase at Millstone 3 is a significant number that will yield approximately an additional \$1 Million in profit for each additional electric megawatt produced per year.
  - In other words, industry data<sup>4</sup> shows that the profit from each megawatt of electricity generated from uprated power increases the profit yield to each electric generating corporation by approximately \$1,000,000 per year.
  - Therefore the data show us that by rounding up the power level increase at Millstone 3 in excess of 7%, Dominion Nuclear’s Millstone Power Station Unit 3 will earn additional profits of approximately \$330,000 each year until 2045.
  - Stated in total dollars, the round up to a power increase in excess of 7% will yield Dominion Nuclear an extra \$10,000,000 during the

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<sup>4</sup> *Condenser Long Term Plan, Enrico Betti, Vermont Yankee, Memo FILE UND2002-042 07; MSD 2002/002.*

updated license extension to 2045.

17. In the first place, according to the NRC document *Approved Applications for Power Uprates*<sup>5</sup>, the NRC has never allowed a Westinghouse reactor to be licensed for a Stretched Power Uprate with a power level increase as great as that proposed for Millstone Unit 3 by Dominion Nuclear. In the second place, no other Dry Containment<sup>6</sup> Westinghouse reactor with a reactor power level greater than 2000 MWt has been granted a Stretched Power Uprate beyond 6.9 percent.
18. Table 1, inserted below, which is entitled Westinghouse Uprates Ranked in Ascending Order, is a list of all Westinghouse Dry Containment reactors whose thermal power exceeds 2000 MWt.
19. Table 1 ranks the Stretched Power Uprate from smallest to largest, and the NRC data provided in Table 1 shows that no other reactor of this type has ever been granted a Stretched Power Uprate in excess of seven percent like Dominion Nuclear has proposed for Millstone Power Station Unit 3.

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<sup>5</sup> NRC *Approved Applications for Power Uprates* <http://www.nrc.gov/reactors/operating/licensing/power-uprates/approved-applications.html>

<sup>6</sup> A Dry Containment is a cylindrical structure with a hemispherical dome that relies solely on its large volume to contain the initial release of radioactive steam after an accident, and to reduce the peak accident pressure. It is a robust passive structure without any additional active mechanical means by which to mitigate immediate post accident pressure. Dry Containment does not rely upon ice or water suppression, nor is it maintained at a large sub-atmospheric pressure in order to reduce the peak accident pressure.

**Westinghouse Uprates Ranked in Ascending Order**

<b>Name</b>	<b>Initial power</b>	<b>Power Uprate %</b>	<b>Current Power</b>
Indian Point 2	2758	1.4	2797
Commanche Peak 1	3425	1.4	3473
Commanche Peak 2	3425	1.4	3473
STP 1	3800	1.4	3853
STP 2	3800	1.4	3853
Diablo Canyon 1	3338	2	3405
Diablo Canyon 2	3338	2	3405
Salem 1	3411	3.4	3527
Salem 2	3411	3.4	3527
Robinson 2	2300	4.5	2403
Shearon Harris	2775	4.5	2900
Vogtle 1	3411	4.5	3564
Vogtle 2	3411	4.5	3564
Wolf Creek	3411	4.5	3564
Turkey Point 3	2200	4.5	2300
Turkey Point 4	2200	4.5	2300
Callaway	3565	4.5	3725
Braidwood 1	3411	5	3581
Braidwood 2	3411	5	3581
Byron 1	3411	5	3581
Byron 2	3411	5	3581
Farley 1	2652	5	2785
Farley 2	2652	5	2785
Indian Point 3	3025	6.2	3213
Seabrook	3411	6.9	3646
Millstone 3	3411	7.01	3650

**Table 1**

20. Contention 2: The current application by Dominion Nuclear fails to meet the NRC's second criteria for a Stretched Power Uprate application, because the Millstone Power Station Unit 3 already had its design margins dramatically reduced.
21. According to the NRC, achieving a Stretch Power Uprate "...**depends on the operating margins included in the design of a particular plant.**"<sup>7</sup> [emphasis added] Dominion has stated that since the Millstone Power Station Unit 3 application "...does not involve major plant modifications, it is considered to be a SPU". Dominion has erroneously neglected to consider the significant reduction in structural **operating margins** already in place at Millstone Unit 3 prior to its application for a power uprate.
22. The Millstone Power Station Unit 3 Containment structure and its requisite systems have already been "stretched" by previous changes to its design basis when the Containment was converted from Sub-Atmospheric Containment to Dry Containment more than a decade ago. I believe that the proposed changes to Containment systems and structures that have already been reanalyzed and fine tuned once over a decade ago constitutes a dramatic decrease in "...the **operating margins** included in the design of a particular plant."
23. The Containment is the safety related building, which houses the nuclear reactor. As such, it "contains", or in other words collects, the steam and

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<sup>7</sup> NRC *Approved Applications for Power Uprates* <http://www.nrc.gov/reactors/operating/licensing/power-uprates/approved-applications.htm>

radioactive material that may be released from the reactor after an accident.

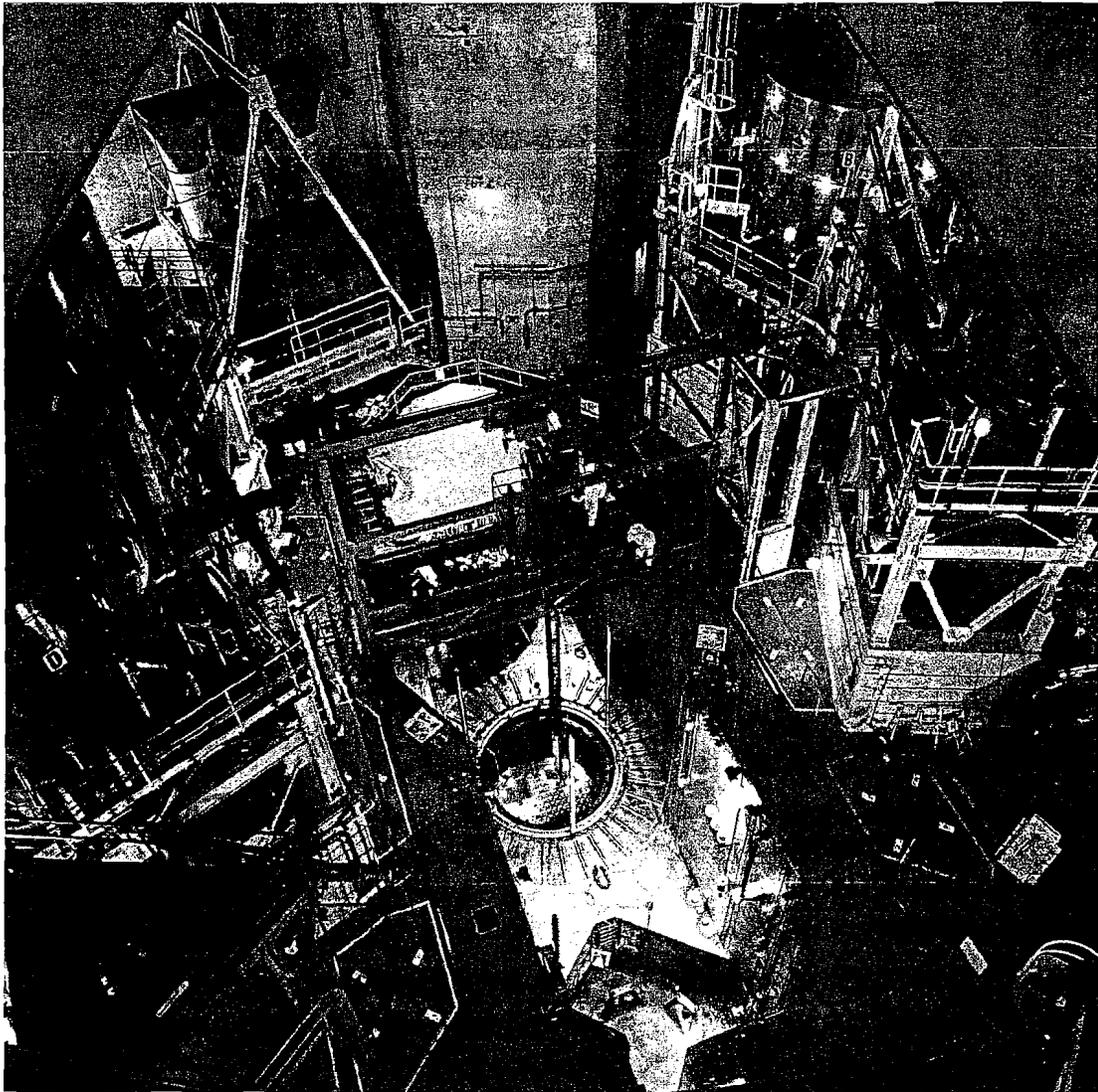
Please see the photo below of the inside of the Millstone Power Station Unit 3 Containment during initial fuel load in 1986.

24. As the Northeast Utilities lead licensing engineer on Millstone Power Station Unit 3 during the 1970s, I was responsible for coordinating all of the analysis for the PSAR (Preliminary Safety Analysis Report), which formed the original design basis of the Millstone Power Station Unit 3 including its Containment. This interface was among Millstone's structural mechanical, electrical, construction, and operations personnel as well as the architect Stone & Webster and the NSSS vendor Westinghouse. Millstone Power Station Unit 3 was originally designed to be "Sub-Atmospheric Containment." [In this instance my testimony is that of a fact witness<sup>8</sup> in addition to my overall testimony as an expert witness in this Declaration.]
25. The unique design approach of the Sub-Atmospheric Containment maintained the pressure inside the Containment at a "negative pressure" with respect to the atmosphere. Thus the difference between the pressure outside the Containment and inside the Containment (pressure differential) was approximately four pounds. Speaking as an expert witness nuclear engineer, this pressure

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<sup>8</sup> According to the Department of Justice United States Attorneys' Manual Title 3, Chapter 3-19.111 An expert witness qualifies as an expert by knowledge, skill, experience, training or education, and may testify in the form of an opinion or otherwise. (See Federal Rules of Evidence, Rules 702 and 703). The testimony must cover more than a mere recitation of facts. It should involve opinions on hypothetical situations, diagnoses, analyses of facts, drawing of conclusions, etc., all which involve technical thought or effort independent of mere facts. And according to Chapter 3-19.112 Fact Witness A fact witness is a person whose testimony consists of the recitation of facts and/or events, as opposed to an expert witness, whose testimony consists of the presentation of an opinion, a diagnosis, etc  
[http://www.usdoj.gov/usao/eousa/foia\\_reading\\_room/usam/title3/19musa.htm#3-19.111](http://www.usdoj.gov/usao/eousa/foia_reading_room/usam/title3/19musa.htm#3-19.111)

differential is quite dramatic for a structure of this size. According to the NRC Sourcebook<sup>9</sup>, page 4-26, paragraph B, Sub-atmospheric Containment, Millstone Unit 3 was the only Westinghouse four-loop plant in the nation to have Sub-Atmospheric Containment.



26. Due to critical engineering and operations concerns during my employment as

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<sup>9</sup> NRC Sourcebook, page 4-26, paragraph B

the lead licensing engineer for Northeast Utilities on Millstone Power Station Unit 3, both the engineering and operations staff at Northeast Utilities (NU) expressed sincere regret as early as 1975 regarding NU's decision to design and build this unique Sub-Atmospheric Containment.

27. Critical issues of concern to both the engineering and operations staff regarding the Sub-Atmospheric Containment were:

- A. The operations staff working within the Containment was repeatedly subjected to the adverse effects of the high temperature and low oxygen.
- B. The small size of the Containment Building severely limited space for equipment and also complicated accident analysis.
- C. Significant construction problems relating to the placement of concrete and rebar were caused by the Containment's small size.
- D. Minimal analytical data regarding the long-term strength of the building's concrete and its continual exposure to the combination of high temperatures, low pressure, and low specific humidity within the sub-atmospheric Containment as it aged lead to doubts and questions regarding the strength of this critical safety-related structure in the event of a nuclear accident.

28. Despite these major concerns, NU decided in 1976 to continue with the licensing process for Millstone Unit 3 as a Sub-atmospheric Containment rather than risk delaying the license by changing the design. At the same time, the company made the strategic decision to modify Millstone Unit 3's license to

operate, by converting the Containment to a standard “Dry” Containment, but only after the nuclear power plant became operational because it is easier to amend a power plant license after a plant is operational.

29. Millstone Power Station Unit 3 began generating power in 1986, and at that time had Sub-Atmospheric Containment. However, Millstone Unit 3’s original design basis with its one-of-a-kind four loop Sub-Atmospheric Containment was modified after it became operational in 1986.
30. The purpose of this one-of-a-kind four loop Sub-Atmospheric Containment was to lower peak design pressure<sup>10</sup> in case of a nuclear accident and to rapidly reduce out-leakage<sup>11</sup> after an accident.
  - A. More specifically, the Containment Building is designed to capture steam, energy, and radiation after an accident. In order to capture this post-accident energy, the Containment pressure increases. Thus, Containment Buildings are designed to specific pressure levels that must be considered during all power level design changes.
  - B. At Millstone Unit 3 the 1975 initial peak Containment design pressure was 39.4 psig<sup>12</sup>.
  - C. However, prior to Millstone Unit 3’s start-up<sup>13</sup>, NU reanalyzed the peak pressure and dropped it to 36.1 psig.
  - D. Then on February 26, 1990, NU applied to modify the Millstone Power

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<sup>10</sup> Maximum pressure inside the Containment after a design basis accident

<sup>11</sup> Leakage out of the Containment

<sup>12</sup> psig - pounds per square inch, gauge

<sup>13</sup> Amendment 17 to FSAR

Station Unit 3 license by changing the design basis pressure of the Containment from 9.8 psia to 14.0 psia<sup>14</sup>.

31. When NU applied for the 1990 license change, it claimed that the sole basis for the change was to reduce the risk of injury to operations personnel who struggled to work at the reduced pressures inside this unique Containment. Such an environment is roughly equivalent to working at the top of the Grand Teton Mountains in temperatures in excess of 100 degrees.
  - A. On page 2 of the initial application, NU stated, "... very little is known about the health effects of people working in high-temperature, low pressure environments."
  - B. While it is true that this was indeed a staff concern dating back to 1975, it was only ONE of other equally important concerns.
  - C. Another major staff concern was the fact that the Containment concrete is being exposed to these very same conditions and there is no data to review regarding the ability of concrete to withstand such a unique high-temperature low-pressure environment. Disturbingly, NU was silent on this major concern throughout its application to modify its license and convert the Sub-Atmospheric Containment to Dry Containment.
32. These changes to the design of Millstone Unit 3's one-of-a-kind Containment actually changed the design basis for the plant.
  - A. From the time the initial PSAR was filed with the NRC, the peak accident pressure of Millstone Unit 3 was repeatedly *fine tuned* by NU.

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<sup>14</sup> psia - pounds per square inch, absolute

- B. From a nuclear engineering standpoint, the critical concern in my mind is that each time a new Containment pressure analysis was derived, NU applied less conservative assumptions in order to achieve more operational flexibility and decidedly increasing public exposure to radiation if there were an accident.
  - C. In order to accomplish the 1990 modification of Millstone Unit 3, NU changed numerous design criteria and further reduced design margins by taking further credits for systems that were in the original accident scenario design basis.
33. On page 5 of the application to increase Millstone Unit 3's Containment pressure, Northeast Utilities acknowledged that these modifications to the original design "...constitute an Unreviewed Safety Question."<sup>15</sup>
- A. In this February 26, 1990 application to the NRC, NU requested to increase the design basis for the normal pressure inside the Containment from 9.8 psia to 14.0 psia, which resulted in the increase of the post-accident peak Containment pressure from 36.0 to 38.57 psig.
  - B. Since Millstone Unit 3 was originally designed with this unique Sub-Atmospheric Containment Design, in the event of an accident the Containment was designed to leak radiation to the environment for only an hour until it was able to drop the pressure back down and once again

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<sup>15</sup> An unreviewed safety question means a change which involves any of the following: (1) The probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the safety analysis report may be increased; (2) A possibility for an accident or malfunction of a different type than any evaluated previously in the safety analysis report may be created; or (3) The margin of safety as defined in the basis for any technical safety requirement is reduced. <http://www.nuclearglossary.com>

contain any radiation releases inside the Containment Building.

- C. The 1990 modifications changed the ability of the Containment Building to release radiation for only an hour and instead allowed the Containment to leak at 0.65 weight percent per day after an accident.
- D. Bypass leakage was also increased from 0.01 to 0.042 weight percent per day as a result of the change, and the modification to the Containment pressure increased the calculated exposure to a person at the Exclusion Area Boundary from 16.8 rem to 19.5 rem.

34. Contention 3: Earlier in this Declaration, I also mentioned that the Millstone Power Station Unit 3 Containment has what is considered a *small* Containment. To illustrate the fact that Millstone Unit 3's Containment is small in comparison to other Westinghouse designed nuclear reactors, I evaluated data from the publicly available "NRC Sourcebook" and compiled information regarding 25 Westinghouse Reactors, which all have "Dry" Atmospheric Containment<sup>16</sup>.

35. Table 2, inserted below, shows, in ascending order by size, the free Containment volume (in millions of cubic feet) of these 25 Westinghouse Reactors.

- A. The Containment for Millstone Unit 3 clearly stands out as one of the smallest such Containment Buildings in the country.

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<sup>16</sup> Since they are not comparable with Dominion Nuclear's Millstone Power Station Unit 3, I have not included the Westinghouse Reactors with Ice Containments, or several three-loop Reactors with Sub-Atmospheric Containment in the compilation. Also, not included for the same reason are decommissioned reactors and reactors whose thermal power is less than 2000 MWt.

- B. For that matter, the only nuclear power plants with a Reactor Containment that is smaller than Millstone Power Station Unit 3 have power outputs that are 800 to 1200 MWt less than the power output of Millstone Unit 3 *prior to the Dominion's proposed uprate.*
  - C. Moreover, of the 11 identical 3411 MWt Westinghouse four-loop Reactors, Millstone is smaller by as much as half a million cubic feet.
36. The ratio of the initial licensed power level to the Containment Volume at each of the same 25 nuclear reactors is clearly shown in Table 3. This ratio comparison is the real indicator of Millstone Unit 3's small Containment. By applying these ratio criteria in comparison with all 25 reactors, Table 3 clearly shows that Millstone Power Station Unit 3 has the smallest Power to Volume ratio of any Dry Containment Westinghouse reactor in the nation.
37. Dominion Nuclear's proposed 7+% power increase to Millstone Power Station Unit 3 widens even further the size gap between Millstone Unit 3 and the other reactors, thus making Millstone Power Station Unit 3's Containment even "smaller" in comparison to every other Dry Containment Westinghouse reactor in the country.
38. Table 4 shows how the initial licensed power levels of all 25 reactors adjusted as a result of NRC approved "stretch" increases.
- A. Accordingly, I have adjusted the power level number for Millstone Unit 3 in order to reflect the amount proposed by Dominion Nuclear's application to uprate Millstone 3's power.

## Ascending Comparison of Containment Volumes

<b>Name</b>	<b>Volume xE6</b>	<b>Initial power</b>
Turkey Point 3	1.55	2200
Turkey Point 4	1.55	2200
Farley 1	2.03	2652
Farley 2	2.03	2652
Robinson 2	2.1	2300
Millstone 3	2.35	3411
Shearon Harris	2.5	2775
Wolf Creek	2.5	3411
Callaway	2.5	3565
Indian Point 2	2.6	2758
Indian Point 3	2.6	3025
Salem 1	2.6	3411
Salem 2	2.6	3411
Vogtle 1	2.7	3411
Vogtle 2	2.7	3411
Seabrook	2.7	3411
Diablo Canyon 1	2.83	3338
Diablo Canyon 2	2.83	3338
Braidwood 1	2.9	3411
Braidwood 2	2.9	3411
Byron 1	2.9	3411
Byron 2	2.9	3411
Commanche Peak 1	2.98	3425
Commanche Peak 2	2.98	3425
STP 1	3.3	3800
STP 2	3.3	3800

**Table 2**

### Containment Volume Compared to Initial Power

<b>Name</b>	<b>Volume xE6</b>	<b>Initial power</b>	<b>Initial Power/Volume</b>
Indian Point 2	2.6	2758	1,060.8
Robinson 2	2.1	2300	1,095.2
Shearon Harris	2.5	2775	1,110
Commanche Peak 1	2.98	3425	1,149.3
Commanche Peak 2	2.98	3425	1,149.3
STP 1	3.3	3800	1,151.5
STP 2	3.3	3800	1,151.5
Indian Point 3	2.6	3025	1,163.5
Braidwood 1	2.9	3411	1,176.2
Braidwood 2	2.9	3411	1,176.2
Byron 1	2.9	3411	1,176.2
Byron 2	2.9	3411	1,176.2
Diablo Canyon 1	2.83	3338	1,179.5
Diablo Canyon 2	2.83	3338	1,179.5
Vogtle 1	2.7	3411	1,263.3
Vogtle 2	2.7	3411	1,263.3
Seabrook	2.7	3411	1,263.3
Farley 1	2.03	2652	1,306.4
Farley 2	2.03	2652	1,306.4
Salem 1	2.6	3411	1,311.9
Salem 2	2.6	3411	1,311.9
Wolf Creek	2.5	3411	1,364.4
Turkey Point 3	1.55	2200	1,419.4
Turkey Point 4	1.55	2200	1,419.4
Callaway	2.5	3665	1426
Millstone 3	2.38	3411	1,433.2

**Table 3**

### Containment Volume Compared to Uprate License Power

Name	Volume xES	Initial power	Power Uprate %	Current Power	Current Power/V
Indian Point 2	2.6	2758	1.4	2797	1,075.76923
Robinson 2	2.1	2300	4.5	2403	1,144.28571
Shearon Harris	2.5	2775	4.5	2900	1,160
Commanche Peak 1	2.98	3425	1.4	3473	1,165.43624
Commanche Peak 2	2.98	3425	1.4	3473	1,165.43624
STP 1	3.3	3800	1.4	3853	1,167.57576
STP 2	3.3	3800	1.4	3853	1,167.57576
Diablo Canyon 1	2.83	3338	2	3405	1,203.18021
Diablo Canyon 2	2.83	3338	2	3405	1,203.18021
Braidwood 1	2.9	3411	6	3581	1,234.82759
Braidwood 2	2.9	3411	6	3581	1,234.82759
Byron 1	2.9	3411	6	3581	1,234.82759
Byron 2	2.9	3411	6	3581	1,234.82759
Indian Point 3	2.6	3025	6.2	3213	1,235.76923
Vogtle 1	2.7	3411	6.2	3564	1,320
Vogtle 2	2.7	3411	6.2	3564	1,320
Seabrook	2.7	3411	6.9	3646	1,350.37037
Salem 1	2.6	3411	3.4	3527	1,356.53846
Salem 2	2.6	3411	3.4	3527	1,356.53846
Farley 1	2.03	2652	6	2785	1,371.92118
Farley 2	2.03	2652	6	2785	1,371.92118
Wolf Creek	2.5	3411	4.5	3564	1,425.6
Turkey Point 3	1.55	2200	4.5	2300	1,483.87097
Turkey Point 4	1.55	2200	4.5	2300	1,483.87097
Callaway	2.5	3565	4.5	3725	1,490
Millstone 3	2.35	3411	7.01	3650	1,553.19149

Table 4

39. An examination of Table 4, inserted above, shows that the new Power to Volume ratio created by the proposed uprate indicates that Millstone Unit 3's Containment would be even "smaller" if Dominion's proposed power increase is approved.
40. A smaller Containment does not mean that the physical Containment has shrunk in size, but rather that more reactor power, and, in the case of an accident, more radioactive releases are being squeezed by volume into the same small Containment Building as a result of this proposed power increase.
41. If approved, Dominion's power increase to Millstone Unit 3 would be the largest ever power uprate approved to Millstone 3's unique Containment with the "smallest" volume ever licensed as discussed above.
42. What is the net effect of increasing the reactor power in this unique very small Sub-Atmospheric designed Containment? I believe that the proposed power increase at Millstone Power Station Unit 3 means that in the event of a nuclear accident at Unit 3, more than 7% additional energy must be absorbed into this one-of-a-kind Containment.
43. I believe that Core samples from within the Containment should be analyzed to assure that the Containment's integrity has not been jeopardized by operating Millstone Unit 3 under these conditions during the first four years of its operational life during the time period while concrete curing shrinkage is

known to occur.

44. In addition to my concerns regarding Millstone Unit 3's operation beyond its design basis due to the analytical tweaking of its one-of-a-kind Sub-Atmospheric Containment, I am also concerned about the reactor power level Dominion has applied in its new analysis in order to support the proposed increase application.

A. Specifically, Dominion Nuclear used a 7.01 percent increase as the basis for energy added to the Containment during an accident. As I have already shown in this Declaration, that 7.01 percent exceeds the NRC limits for consideration for a Stretched Power Uprate.

B. More importantly, Millstone Power Station Unit 3 already has a history of exceeding its licensed reactor power. According to the NRC Integrated Inspection Report on Millstone<sup>17</sup>, Dominion Nuclear was cited for:

"failure to maintain reactor core thermal power less than or equal to 3411 megawatts thermal (MGTH). Specifically, during performance of turbine overspeed protection system testing, the Unit 3 reactor's four minute power average exceeded 3479 MWTH." [Unit 3's license limit is 3411 MGTH also written MWt]

C. This higher power level, for which Dominion Nuclear was cited, is a full 2% higher than level of power Millstone Unit 3 is licensed to produce.

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<sup>17</sup> Inspection Report on Millstone, ML 080380599, February 7, 2008 for the period 10/012007 to 12/31/2007, Pages 4, 5, 21, and 22

- D. Such a power level increase would also increase the energy available in an accident scenario by the same additional two percent.
- E. Given Dominion's history of exceeding its licensed power level, it is my opinion that any analysis of Millstone Unit 3's Containment should use a 9% additional power level in order to most accurately reflect the condition of this one-of-a-kind Containment to withstand any additional pressures during an accident.

45. Contention 4: In its 1990 licensing application to change its Containment pressure, NU never mentioned its staffs' previous concerns about possible stress to the Containment's concrete due to the impact of its operation at high temperatures, low pressures, and low specific humidity. While it is a well known fact throughout the industry that concrete continues to shrink for up to 30-years as it matures after being poured, I was unable to uncover any NU or Dominion studies the long term impact Millstone Unit 3's concrete Containment due to its unique high temperature, low pressure, and low specific humidity environment.
46. Since nothing about this proposed change is either simple or standard, it is therefore my professional opinion that an Extended Power Uprate (EPU) review is more appropriate than a Stretched Power Uprate (SPU) review.

47. Furthermore, the Containment analysis for Millstone Unit 3 is further complicated by the fact that for the first four years of its operation, Millstone Power Station Unit 3 operated at the high, temperature, low pressure, low specific humidity unique to its Sub-Atmospheric Containment and therefore which may have compromised the structural integrity of the concrete.
48. In addition to being the lead licensing engineer at for NU at its Millstone Unit 3 nuclear plant during the 1970s, I have also been both a vice president and the senior vice president of a company that provided goods and services to Millstone 3 during the 1980s.
- A. In my capacity as an officer of the firm contracted to conduct structural analytical support to Millstone Unit 3 during its construction phase, I oversaw a group of sixty structural engineers at the Millstone Unit 3 site in 1984.
  - B. Engineers reported to me during the construction phase informed me of other structural problems involving Millstone Unit 3's unique Containment.
  - C. Due to the design of this Containment, the size and amount of rebar near major Containment penetrations created strategic geometry problems in the ability of the construction contractors to pour adequate amounts of concrete around the rebar in this tight configuration.
  - D. This unique Containment design placed an enormous amount of rebar in

several different directions around the Containment penetrations<sup>18</sup>, making it extraordinarily difficult for concrete to slip by the rebar.

Concrete voids between the rebar were a major concern. To "solve" this problem, NU qualified a procedure for the construction workers to apply long vibrating shafts into the rebar to get the concrete to slide around the rebar and create a heterogeneous block without voids.

- E. This vibration method caused the sand to separate from the concrete if applied too long, and would create voids if applied for too short of a time.
- F. While the procedure was qualified and construction workers were trained in how to operate the vibrating rods, my structural engineers were concerned that there was no way to test the Containment penetrations after the concrete had hardened to assure there were no voids.
- G. The complex geometry at penetrations and the presence of concrete and steel intertwined made any ultrasonic exam impossible.
- H. Core drilling was, of course, impossible, as it would weaken the Containment.
- I. Given the structural limitations of the original design, and given that licensing changes in 1990 modified the Containment, it is imperative that this license modification be given a more thorough investigation than what is normally provided during a *Stretch* Power Uprate approval

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<sup>18</sup> Containment penetrations - Locations through the Containment wall where pipes like steam lines and feedwater lines enter and exit the Containment.

process.

49. Contention 5: Flow Accelerated Corrosion is another critical issue that should be considered the review of Dominion's proposed power increase application.

- A. Dominion's proposed power uprate will change Millstone Power Station Unit 3's reactor coolant flow by approximately 7%.
- B. It will impact the flow in and out of the reactor and the steam and condensate/feedwater flow on the secondary side of the plant will also be increased by 7%.
- C. These flow increases in turn increase "Flow Accelerated Corrosion" thus causing pipes to wear out much faster.
- D. This Flow Accelerated Corrosion is a non-linear phenomenon, and in my opinion is a significant risk due to the application of a 7% power increase on a plant that is already in the second-half of its engineered design life.
- E. Disturbingly, in its application, Dominion did not propose hiring any new personnel at Millstone Power Station Unit 3 to deal with *flow accelerated corrosion* following the unit's proposed power uprate. This despite the fact that components will require more inspections because an uprate will cause those components to wear out much faster.
- F. In general, Flow Accelerated Corrosion increases the likelihood of pipe failure.

G. Equally important, given Millstone Power Station Unit 3 exceeded licensed power less than a year ago, is the concern that pipe already worn thin by the seven percent power increase might break when power is increased further.

H. I saw no evidence that the Containment has been analyzed to withstand this increased energy.

50. I believe that Millstone Unit 3's program for assessing Flow Accelerated Corrosion in Dominion's proposed uprate of the plant fails to comply with 10 CFR50 Appendix B, XVI which states:

10 CFR Appendix B to Part 50 – Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants, XVI. Corrective Action that reads:

“Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. The identification of the significant condition adverse to quality, the cause of the condition, and the corrective action taken shall be documented and reported to appropriate levels of management.”

51. The power increase at Millstone Power Station Unit 3 will be accomplished by increasing the flow of water through both the primary and secondary sides of

the power plant. This increased flow through the pipes causes pipes to wear out faster by a phenomenon called Flow Accelerated Corrosion (FAC).

52. The basic two causes of FAC are erosion-corrosion of the pipe walls and cavitation- corrosion of the pipe wall. Electrolytic attack may also occur. Wall thinning from FAC is non-linear and is a local issue, caused by local geometry like Elbows and flow restrictions, local turbulence, and local metallurgical conditions (welds and impurities) in the pipe. Once local corrosion has started, changes in turbulence in the local area can intensify the corrosive attack. This localized nature of the corrosion is evident in a FAC pipe failure at the Surry plant in 1986. There a feed-water elbow had holes in one area, yet the nearby pipe wall was much less worn. Similar FAC piping failures have occurred at San Onofre in 1991 and 1993, Fort Calhoun in 1997, and Mihama in Japan in 2004. While this is an *old issue*, it has not been resolved, and instead has continued to plague the nuclear industry for more than three decades.
  
53. Due to the localized nature of the FAC, it is difficult to predict where and when a piping component might fail. The difficulty in developing accurate predictive models for FAC is the reason why, as recently as 2004, several workers were killed at Japan's Mihama I nuclear power plant. While prediction of what might fail is difficult, it is certain, however, to say that the rate at which piping components will wear out as a result of the proposed increase in power at Millstone 3 will exceed the 7 percent power increase due to the non-linear nature of FAC.

54. In my opinion, Dominion's application does not adequately address the guidance of NRC NUREG-1800, which requires that a FAC program address the scope, analytical tools, benchmarking of the computer model, preventative activities, what is monitored, what is inspected, trend analysis, acceptance criteria, operating experience, inspection techniques as well as data collection.
55. Furthermore, I believe Dominion's proposed License amendment for Millstone Power Station Unit provides inadequate information to determine if Millstone Nuclear Power Station Unit 3 has the management systems and staff in place to properly evaluate FAC if NRC approves Dominion's proposed power increase to the plant.
- A. The application did not discuss the increases in staff necessitated in order to maintain the plant in a safe condition if the proposed power increase is approved.
  - B. Clearly the increase in the increased corrosion rates caused by the proposed 7% power level increase will require extra analysis, extra inspection, and extra maintenance, yet the application is silent on the need to increase Millstone Unit 3's inspection and maintenance staff.
56. Without such programmatic and staffing information, I am unable to further assess the adequacy of any actions Dominion Nuclear might have to mitigate

the consequences of Flow Accelerated Corrosion caused by the proposed power uprate at Millstone Nuclear Power Station Unit 3.

57. In conclusion: following a complete review of the evidence presented and by relying upon my nuclear safety and nuclear engineering experience in my review of the documents referenced herein above, it is my professional opinion that the issues discussed above are serious safety considerations germane to the subject of the license application in this case. Similarly after reviewing all the evidence presented, it is my professional opinion that Dominion Nuclear is ill prepared to increase the power at Millstone Nuclear Power Station Unit 3. Finally, since Dominion's proposed power increase is above NRC regulatory criteria and given the new stresses upon the one-of-a-kind formerly Sub-Atmospheric Containment, I believe that the evidence clearly shows the entire application should be given the more rigorous review of the Extended Power Uprate License Evaluation.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this day, March 15, 2008 at Burlington, Vermont.

 3/15/08

Arnold Gunderson, MSNE

## CURRICULUM VITAE

Arnold Gundersen  
March 2008

### Family Data

Date of Birth:

Place of Birth:

Wife:

Children:

Home address:

Telephones:

E-Mail/ Internet:

### Education And Training

ME NE Masters of Engineering Nuclear Engineering  
Rensselaer Polytechnic Institute, 1972  
U.S. Atomic Energy Commission Fellowship  
Thesis: Cooling Tower Plume Rise

BS NE Bachelor of Science Nuclear Engineering  
Rensselaer Polytechnic Institute, 1971  
Cum Laude, 3.74 out of 4.0  
James J. Kerrigan Scholar

RO Licensed Reactor Operator, U.S. Atomic Energy Commission  
License # OP-3014

### Special Qualifications – including and not limited to:

Nuclear Safety Expert Witness; 37-years of nuclear industry experience and oversight; former nuclear industry Senior Vice President; nuclear engineering management and nuclear engineering management assessment; prudency assessment; nuclear power plant licensing, licensing and permitting assessment, and review; nuclear safety assessments, public communications, contract administration, assessment and review; former Licensed Reactor Operator; systems engineering, structural engineering assessments, cooling tower operation, cooling tower plumes, nuclear fuel rack design and manufacturing, nuclear equipment design and manufacturing, in-service inspection, criticality analysis, thermohydraulics, radioactive waste processes and storage issue assessment, decommissioning, waste disposal, source term reconstructions, thermal discharge assessment, reliability engineering and aging plant management assessments, archival storage and document control technical patents, federal and congressional hearing testimony, and employee awareness programs.

### Special Remediation Expertise

Director of Engineering, Vice President of Site Engineering, and the Senior Vice President of Engineering at Nuclear Energy Services (NES).

- Department of Energy chose NES to write *DOE Decommissioning Handbook* because NES had a unique breadth and depth of nuclear engineers and nuclear physicists on staff.
- Personally wrote the “Small Bore Piping” chapter of the DOE’s first edition Decommissioning Handbook, personnel on my staff authored other sections, and I reviewed the entire Decommissioning Handbook.
- Served on the Connecticut Low Level Radioactive Waste Advisory Committee for 10 years from its inception
- Managed groups performing analyses on dozens of dismantlement sites in order to thoroughly remove radioactive material from nuclear plants and their surrounding environs.
- Managed groups assisting in decommissioning the Shippingport nuclear power reactor. Shippingport was the first large nuclear power plant ever decommissioned. The decommissioning of Shippingport included remediation of the site after decommissioning.
- Managed groups conducting site characterizations (preliminary radiation surveys prior to commencement of removal of radiation) at the radioactively contaminated West Valley site in upstate New York.
- Personnel reporting to me assessed dismantlement of the Princeton Avenue Plutonium Lab in New Brunswick, NJ. The lab’s dismantlement assessment was stopped when we uncovered extremely toxic and carcinogenic underground radioactive contamination.
- Personnel reporting to me worked on decontaminating radioactive thorium at the Cleveland Avenue nuclear licensee in Ohio. The thorium had been used as an alloy in turbine blades. During that project, previously undetected extremely toxic and carcinogenic radioactive contamination was discovered below ground after an aboveground gamma survey had purported that no residual radiation remained on site.

### Publications

Co-author — *DOE Decommissioning Handbook, First Edition*, 1981-1982, Authorship solicited by DOE

Co-author — *Decommissioning the Vermont Yankee Nuclear Power Plant: An Analysis of Vermont Yankee’s Decommissioning Fund and Its Projected Decommissioning Costs*, November 2007, Presented to Vermont State Senator Ginny Lyons and Vermont State Auditor Tom Salmon

Co-author — *Decommissioning Vermont Yankee – Stage 2 Analysis of the Vermont Yankee Decommissioning Fund – The Decommissioning Fund Gap*, December 2007, Presented to Vermont State Senators and Legislators

Co-author — *Vermont Yankee Comprehensive Vertical Audit – VYCV A – Recommended Methodology to Thoroughly Assess Reliability and Safety Issues at Entergy Nuclear Vermont Yankee*, January 30, 2008 to Testimony to Vermont State Senate Finance Committee

### **Patents**

Energy Absorbing Turbine Missile Shield – U.S. Patent # 4,397,608 – 8/9/1983

### **Committee Memberships**

ANSI N-198, Solid Radioactive Waste Processing Systems

Three Rivers Community College Nuclear Academic Advisory Board

Founding Member of Connecticut Low Level Radioactive Waste Advisory Committee (Member for 10 years)

Founding Member National Nuclear Safety Network

### **Honors**

James J. Kerrigan Scholar 1967–1971

Tau Beta Pi (Engineering Honor Society), RPI, 1969  
(1 of 5 in Sophomore class of 700)

B.S. Degree, Cum Laude, RPI (3.74 GPA) 1971

U.S. Atomic Energy Commission Fellowship, 1972

Publicly commended to U.S. Senate by NRC Chairman, Ivan Selin, in May 1993

“It is true...everything Mr. Gundersen said was absolutely right; he performed quite a service.”

Teacher of the Year – 2000, Marvelwood School

### **Nuclear Consulting and Expert Witness Testimony**

#### **Peach Bottom Reactor Litigation**

Evaluated extended 28-month outage caused by management breakdown and deteriorating condition of plant.

#### **Commonwealth Edison**

In depth review and analysis for Commonwealth Edison to analyze the efficiency and effectiveness of all Commonwealth Edison engineering organizations, which support the operation of all of its nuclear power plants.

#### **Western Atlas Litigation**

Evaluated neutron exposure to employees and license violations at this nuclear materials license.

### Three Mile Island Litigation

Evaluated unmonitored releases to the environment after accident, including containment breach, letdown system and blowout. Proved releases were 15 times higher than government estimate and subsequent government report.

### PennCentral Litigation

Evaluated license violations and material false statements by management at this nuclear engineering and materials licensee.

### Federal Congressional Testimony

Publicly recognized by NRC Chairman, Ivan Selin, in May 1993 in his comments to U.S. Senate, "It is true...everything Mr. Gundersen said was absolutely right; he performed quite a service."

### State of Connecticut

Assisted the State in drafting Whistle-blower Protection legal statutes, the strongest in the United States.

### Nuclear Regulatory Commission (NRC)

Assisted the NRC Inspector General in investigating illegal gratuities paid to NRC Officials by Nuclear Energy Services (NES) Corporate Officers. In a second investigation, assisted the Inspector General in showing that material false statements (lies) by NES corporate president caused the NRC to overlook important license violations.

### International Nuclear Safety Testimony

Worked for ten days with the President of the Czech Republic (Vaclav Havel) and the Czech Parliament on their energy policy for the 21st century. Continue to work with Czech Friends of the Earth on Czech Energy and Environmental Issues

### State of Vermont Public Service Board

Expert witness retained by New England Coalition to testify to the Public Service Board on the reliability, safety, technical, and financial ramifications of a proposed increase in power (called an uprate) to 120% at Entergy's 31-year-old Vermont Yankee Nuclear Power Plant. April 2003 to present

### U.S. Senators Jeffords and Leahy (2003 to 2005)

Provided the Senators and their staff with periodic overview regarding technical, reliability, compliance, and safety issues at Entergy Nuclear Vermont Yankee (ENVY).

### 10CFR 2.206 filed with the Nuclear Regulatory Commission

Filed 10CFR 2.206 petition with NRC requesting confirmation of Vermont Yankee's compliance with all General Design Criteria.

State of Vermont Legislative Testimony to Senate Finance Committee

Testimony to the Senate Finance Committee, 2006 regarding Vermont Yankee decommissioning costs, reliability issues, design life of the plant, and emergency planning issues.

Finestone v FPL

Plaintiffs' Expert Witness for Federal Court Case with Attorney Nancy LaVista, from the firm Lytal, Reiter, Fountain, Clark, Williams, West Palm Beach, FL.

This case involved twenty-six families in a cancer cluster alleging illegal radiation releases from nearby nuclear power plant caused children's cancers.

Production request, discovery review, preparation of deposition questions and attendance at Defendant's experts for deposition, preparation of expert witness testimony, preparation for Daubert Hearings, ongoing technical oversight, source term reconstruction.

U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board (NRC-ASLB) Expert witness retained by New England Coalition to provide Atomic Safety and Licensing Board with an independent analysis of the integrity of the Vermont Yankee Nuclear Power Plant condenser. (2006)

U.S. Senators Bernie Sanders and Congressman Peter Welch (2007)

Briefed Senator Sanders, Congressman Welch and their staff members regarding technical and engineering issues, reliability and aging management concerns, regulatory compliance, waste storage, and nuclear power reactor safety issues confronting the U.S. nuclear energy industry.

State of Vermont Environmental Court

Expert witness retained by New England Coalition to review Entergy and Vermont Yankee's analysis of alternative methods to reduce the heat discharged by Vermont Yankee into the Connecticut River. Provided Vermont's Environmental Court with analysis of alternative methods systematically applied throughout the nuclear industry to reduce the heat discharged by nuclear power plants into nearby bodies of water. This report included the review of condenser and cooling tower modifications. (Docket 89-4-06-vtec 2007)

Appeal to the Vermont Supreme Court

Expert Witness Testimony in support of New England Coalition's Appeal to the Vermont Supreme Court Concerning: Degraded Reliability at Entergy Nuclear Vermont Yankee as a Result of the Power Uprate. New England Coalition represented by Attorney Ron Shems of Burlington, VT (March 2006 to 2007)

U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board (NRC-ASLB)

MOX Limited Appearance Statement to Judges Michael C. Farrar (Chairman), Lawrence G. McDade, and Nicholas G. Trikouros for the he "Petitioners": Nuclear Watch South, the Blue Ridge Environmental Defense League, and Nuclear Information & Resource Service have filed Contention 2: Accidental

Release of Radionuclides, requesting a hearing concerning faulty accident consequence assessments made for the MOX plutonium fuel factory proposed for the Savannah River Site. (September 14, 2007)

U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board (NRC-ASLB) Expert Witness Supporting Pilgrim Watch's Petition For Contention 1: specific to issues regarding the integrity of Pilgrim Nuclear Power Station's underground pipes and the ability of Pilgrim's Aging Management Program to determine their integrity. (January 26, 2008)

Vermont State Senate – 2008 Legislative Session

- Senate Finance – testimony regarding Entergy Nuclear Vermont Yankee Decommissioning Fund
- Senate Finance – testimony on the necessity for a Comprehensive Vertical Audit (CVA) of Entergy Nuclear Vermont Yankee
- Natural Resources Committee – testimony regarding the placement of high-level nuclear fuel on the banks of the Connecticut River in Vernon, VT

**Experience**

**Teaching and Academic Administration**

Rensselaer Polytechnic Institute (RPI) - Advanced Nuclear Reactor Physics Lab

Community College of Vermont - Mathematics Professor - 2007 to present

Burlington High School

Mathematics Teacher – 2001 to present

Physics Teacher – 2004 to 2006

The Marvelwood School – 1996-2000

Chairman: Physics and Math Department

Taught both physics and mathematics.

Director of Summer School and Director of Residential Life

Awarded Teacher of the Year – June 2000

The Forman School & St. Margaret's School - Mathematics

**Nuclear Engineering 1970 to 1990**

Nuclear Energy Services, Division of PCC (Fortune 500 company) 1979 to 1990

Corporate Officer and Senior Vice President - Technical Services

Responsible for overall performance of the company's Inservice Inspection (ASME XI), Quality Assurance (SNTC 1A), and Staff Augmentation Business Units.

Senior Vice President of Engineering

Responsible for the overall performance of the company's Site Engineering, Boston Design Engineering and Engineered Products Business Units. Integrated the Danbury based, Boston based and site engineering functions to provide products such as fuel racks, nozzle dams, and transfer mechanisms and services such as materials management and procedure development.

Vice President of Engineering Services

Responsible for the overall performance of the company's field engineering, operations engineering, and engineered products services. Integrated the Danbury based and field based engineering functions to provide numerous product and services required by nuclear utilities.

General Manager of Field Engineering

Managed and directed NES' multi-disciplined field engineering staff on location at various nuclear plant sites. Site activities included structural analysis, procedure development, technical specifications and training. Have personally applied for and received one patent.

Director of General Engineering

Managed and directed the Danbury based engineering staff. Staff disciplines included structural, nuclear, mechanical and systems engineering. Responsible for assignment of personnel as well as scheduling, cost performance, and technical assessment by staff on assigned projects. This staff provided major engineering support to the company's nuclear waste management, spent fuel storage racks, and engineering consulting programs.

New York State Electric and Gas Corporation (NYSE&G) — 1976 to 1979

Supervisor, Reliability Engineering

Organized and supervised reliability engineers to upgrade performance levels on seven operating coal units and one that was under construction. Applied analytical techniques and good engineering judgments to improve capacity factors by reducing mean time to repair and by increasing mean time between failures.

Lead Power Systems Engineer

Supervised the preparation of proposals, bid evaluation, negotiation and administration of contracts for two 1300 MW NSSS Units including nuclear fuel, and solid-state control rooms. Represented corporation at numerous public forums including TV and radio on sensitive utility issues. Responsible for all nuclear and BOP portions of a PSAR, Environmental Report, and Early Site Review.

Northeast Utilities Service Corporation (NU) — 1972 to 1976

Engineer

Nuclear Engineer assigned to Millstone Unit 2 during start-up phase. Lead the high velocity flush and chemical cleaning of condensate and feedwater systems and obtained discharge permit for chemicals. Developed Quality Assurance Category 1 Material, Equipment and Parts List. Modified fuel pool cooling system at Connecticut Yankee, steam generator blowdown system and diesel generator lube oil system for Millstone. Evaluated Technical Specification Change Requests.

Associate Engineer

Nuclear Engineer assigned to Montague Units 1 & 2. Interface Engineer with NSSS vendor, performed containment leak rate analysis, assisted in preparation of PSAR

and performed radiological health analysis of plant. Performed environmental radiation survey of Connecticut Yankee. Performed chloride intrusion transient analysis for Millstone Unit 1 feedwater system. Prepared Millstone Unit 1 off-gas modification licensing document and Environmental Report Amendments 1 & 2.

Rensselaer Polytechnic Institute (RPI) — 1971 to 1972

Critical Facility Reactor Operator, Instructor

Licensed AEC Reactor Operator instructing students and utility reactor operator trainees in start-up through full power operation of a reactor.

Public Service Electric and Gas (PSE&G) — 1970

Assistant Engineer

Performed shielding design of radwaste and auxiliary buildings for Newbold Island Units 1 & 2, including development of computer codes.

Vetted as expert witness in nuclear litigations, federal, international, and state hearings including but not limited to: Three Mile Island, US Federal Court, US NRC ASLB, Vermont State Public Service Board, Czech Senate, Connecticut State Legislature, Western Atlas Nuclear Litigation, U.S. Senate Nuclear Safety Hearings, Peach Bottom Nuclear Power Plant Litigation, and OIG NRC.

### **Public Service, Cultural, and Community Activities**

Sunday School Teacher, Christ Episcopal Church, Roxbury, CT

Parents Association Washington Montessori School

High School Guest Lecturer on Nuclear Safety Issues (30+ times)

Episcopal Marriage Encounter: Basic Training & Group Leadership Training, Presenting Team [with wife] – Provided weekend communication and dialogue workshops weekend retreats/seminars, Administrative Couple – supervised Connecticut Episcopal Marriage Encounter – 5 years

Co-Founder Parents Association Berkshire School

Co-Chair Annual Appeal Berkshire School

Featured Nuclear Safety Expert for Television, Newspaper and Radio, including but not limited to CNN (Earth Matters), The Crusaders, WPTZ VT, WZBG CT, Front Page, Mark Johnson Show, WKVT, WDEV, Seven Days

Founding Board Member NNSN – National Nuclear Safety Network

Ongoing Public Testimony to Committees of the Vermont State Legislature

Tutoring of Refugee Students – Lost Boys of the Sudan and others

Certified Foster Parent State of Vermont – 2004 to 2007

Working with Burlington Electric Department (BED) on solar modifications to Burlington High School (BHS)

Mentoring former students regarding college and employment questions and applications.

Exhibit B

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

In the matter of : Docket No. 50-423  
Dominion Nuclear Connecticut, Inc. :  
Millstone Nuclear Power Station Unit 3 :  
(License Amendment Request :  
Stretch Power Uprate) : March 15, 2008

DECLARATION OF ERNEST J. STERNGLASS, Ph.D. IN SUPPORT OF  
CONNECTICUT COALITION AGAINST MILLSTONE AND NANCY BURTON  
PETITION TO INTERVENE AND REQUEST FOR HEARING

I, Ernest J. Sternglass, Ph.D., declare as follows:

1. I am Professor Emeritus of the University of Pittsburgh School of Medicine.
2. I have devoted decades to research into the health effects of ionizing radiation and I have authored numerous books and scientific papers on the subject.
3. I submit this Declaration in support of the Connecticut Coalition Against Millstone and Nancy Burton's Petition to Intervene and Request for Hearing in the matter of the application by Dominion Nuclear Connecticut, Inc. to the U.S. Nuclear Regulatory Commission of an application to amend the operating license of Millstone Unit 3 nuclear reactor to allow a 7+ per cent power uprate.
4. I am familiar with the fact that Attachment 5 to the application dated July 13, 2007 states in pertinent part as follows in Section 2.10.1.2.1.3:

The normal operation radiation levels in most of the plant areas are expected [with the Stretch Power Uprate] to increase by approximately 9 per cent, i.e., the percentage increase between the current licensed power level of 3411 Mwt and the conservatively analyzed core power level of 3723 MWt used for the SPU assessment. The exposure to plant personnel and to the offsite public is also

expected to increase by the same percentage.

5. I am further familiar with the fact that Attachment 2 to the application dated July 13, 2007 states in pertinent part at Section 8.1.3 ("Gaseous Waste"):

The proposed SPU {Stretch Power Uprate] would result in a small increase (approximately 9.5% for noble gases, and 9.1% for particulates, iodine and tritium) in the equilibrium radioactivity in the reactor coolant, which in turn increases the activity in the waste disposal systems and the activity released from the Station.

6. The purpose of this Declaration is to provide information regarding the association between heightened releases of radiation to the environment and heightened risks of harm to human health.

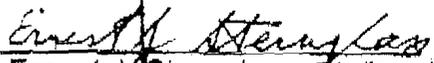
7. I agree with the conclusion of the 2005 National Academy of Sciences report, "Health Risks from Exposure to Low Levels of Ionizing Radiation" (BEIR VII - Phase 2), in which it is stated that there is no safe level or threshold of ionizing radiation exposure and that the smallest dose of low-level ionizing radiation has the potential to cause an increase in health risks to humans.

8. If the Millstone Unit 3 nuclear reactor is permitted to release radionuclides to the environment at levels 9 per cent greater than current levels, it is likely that there will be a closely corresponding increase in adverse effects on human health.

9. One would expect this to be the case based on our present experience and the accepted nearly linear relation between radiation exposure and adverse health effects - including illness, death and harm to developing fetuses - at this range.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this 15<sup>th</sup> day of March, 2008 at Pittsburgh, Pennsylvania.

  
Ernest J. Sternglass, Ph.D.

## ***CURRICULUM VITA***

ERNEST J. STERNGLOSS, Ph.D.

Professor Emeritus of Radiology  
University of Pittsburgh School of Medicine  
Pittsburgh PA 15213

### **EDUCATION**

B.E.E. Electrical Engineering, Cornell University, 1944  
M.S. Engineering Physics, Cornell University, 1950  
Ph.D. Engineering Physics, Cornell University, 1953

### **HONORS**

Vice-President, Cornell Chapter, Eta Kappa Nu, Electrical Engineering  
Honorary Society, 1943-44  
McMullen Research Fellowship, Cornell University 1949-51  
Sigma Xi, National Research Honorary Society  
Sigma Pi Sigma, National Physics Honorary Society  
Fellow, American Physical Society  
President, Federation of American Scientists, Pittsburgh Chapter,  
1962-63  
Westinghouse Research Fellowship, Institute of Theoretical Physics,  
University of Paris, 1957-58.  
Westinghouse Research Fellowship, Institute of Theoretical Physics,  
Stanford University, 1966-1967  
Citation for Excellence, Scientific Exhibit, Annual Meeting of the  
Radiological Society of North America, 1979  
Citation for Excellence, Scientific Exhibit, Annual Meeting of the  
American Roentgen Ray Society, 1981  
George Brussel Award for Public Service, 1982  
Honorary Professor Emeritus of Radiology, University of Pittsburgh, 1983  
Leo Goodman Award for Public Service, 1985

### **PROFESSIONAL EXPERIENCE**

Chief Scientist, Radiation and Public Health Project, PO Box 60  
Unionville, N.Y. 10988 <radiation.org> 1996-present

Professor Emeritus of Radiology, Department of Radiology,  
University of Pittsburgh School of Medicine, 1983-present.  
Adjunct Professor of History and Philosophy of Science, Department of  
History and Philosophy of Science, Indiana University,  
Bloomington, Indiana 1979-1984.  
Professor of Radiology and Consultant, Imaging Division, Department of  
Radiology, University of Pittsburgh, School of Medicine 1974-1983.  
Professor of Radiology and Director, Laboratory of Radiological  
Physics and Engineering, Department of Radiology, University of  
Pittsburgh, School of Medicine, 1967-1974.  
Professor of Radiological Physics, Department of Radiation Health,  
University of Pittsburgh Graduate School of Public Health, 1967-1974.  
Visiting Professor, Institute for Theoretical Physics, Stanford  
University, Palo Alto, California, 1966-1967.  
Advisory Physicist and Assistant to the Vice-President for Research  
and Development of the Westinghouse Research Laboratories, and  
Scientific Director of the Apollo Lunar Scientific Station Program,  
Westinghouse Research Laboratories, Pittsburgh, Pennsylvania, 1960-1967.  
Fellow Scientist, Electronics and Nuclear Physics Department  
Westinghouse Research Laboratories, 1958-1960.  
Visiting Professor, Institute Henri Poincare, Sorbonne, Paris,  
France, 1957-1958.  
Research Scientist, Electronics and Nuclear Physics Department,  
Westinghouse Research Laboratories, 1952-1957.  
Research Fellow, Cornell University, 1949-1951.  
Instructor, Physics Department, George Washington University,  
Washington, D.C. 1946-1947.  
Research Engineer, Electricity and Magnetism Department, U. S. Naval  
Ordnance Laboratory, White Oak, Maryland, 1946-1952.  
Science Writer, Science Service News Service, Washington, D.C. 1946.  
Military Service, U. S. Navy, (Radar and Electronics), 1945-1946.  
Teaching Assistant, Physics Department, Cornell University, 1943-1944.

### **PROFESSIONAL SOCIETIES**

American Physical Society (Fellow)  
Radiological Society of North America (Ret.)  
American Association of Physicists in Medicine (Ret.)  
American Association for the Advancement of Science  
American Astronomical Society  
New York Academy of Sciences  
Federation of American Scientists

Philosophy of Science Association

### **PATENTS**

Thirteen patents in the areas of Image Intensifiers for Nuclear Medicine and Astronomy; Television Camera Tubes for Space Astronomy, Night Vision and Radiology; Nuclear Particle Detectors ; Nuclear Reactors for Space Missions; Photo- Multipliers and Computerized Radiography for dose-reduction in diagnostic examinations.

### **BOOKS**

"Low-Level Radiation", Ballantine Books, New York, 1972

"Secret Fallout: Low Level Radiation from Hiroshima to Three-Mile Island", McGraw-Hill Book Co. 1981.

"Before the Big Bang: The Origins of the Universe", Four Walls Eight Windows, New York, 1997.

### **SCIENTIFIC PAPERS AND ARTICLES**

For a list see the RPHP website <[radiation.org](http://radiation.org)>

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

In the matter of : Docket No. 50-423  
Dominion Nuclear Connecticut, Inc. :  
Millstone Nuclear Power Station Unit 3 :  
(License Amendment Request :  
Stretch Power Uprate) : March 17, 2008

NOTICE OF APPEARANCE

In accordance with the provisions of 10 C.F.R. §2.314(b), Nancy Burton herewith serves Notice of Appearance that she appears in this proceedings as its duly authorized and designated representative of Connecticut Coalition Against Millstone and on her own behalf and provides the following requisite information:

Nancy Burton  
147 Cross Highway  
Redding Ridge CT 06876  
Tel./Fax 203-938-3952  
Email: [NancyBurtonCT@aol.com](mailto:NancyBurtonCT@aol.com)



Nancy Burton  
147 Cross Highway  
Redding Ridge CT 06876  
[NancyBurtonCT@aol.com](mailto:NancyBurtonCT@aol.com)

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

In the matter of : Docket No. 50-423  
Dominion Nuclear Connecticut, Inc. :  
Millstone Nuclear Power Station Unit 3 :  
(License Amendment Request :  
Stretch Power Uprate) : March 17, 2008

CERTIFICATE OF SERVICE

I certify that copies of the Connecticut Coalition Against Millstone/Nancy Burton Petition to Intervene and Request for Hearing; Declaration of Ernest J. Sternglass, Ph.D. and accompanying *Curriculum Vitae*; Declaration of Arnold Gundersen and accompanying *Curriculum Vitae*; Declaration of Cynthia M. Besade; Declaration of Nancy Burton and Notice of Appearance were transmitted on March 17, 2008 by email and by U.S. Mail, First Class, postage pre-paid to the individuals and offices as indicated below:

Office of the Secretary  
Attn: Rulemaking and Adjudications Staff  
U.S. Nuclear Regulatory Commission  
Mail Stop: O-16G4  
Washington DC 20555-0001  
[HearingDocket@nrc.gov](mailto:HearingDocket@nrc.gov)  
[Secy@nrc.gov](mailto:Secy@nrc.gov)  
(Original + 2 copies)

Office of the General Counsel  
U.S. Nuclear Regulatory Commission  
Washington DC 20555  
[OGCMailCenter@nrc.gov](mailto:OGCMailCenter@nrc.gov)

Office of Commission Appellate  
Adjudication  
U.S. Nuclear Regulatory Commission  
Mail Stop: O-16G4  
Washington DC 20555-0001  
[OCCAMAIL@nrc.gov](mailto:OCCAMAIL@nrc.gov)

Lillian Cuoco, Esq.  
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Millstone Nuclear Power Station  
Rope Ferry Road  
Waterford CT 06385  
[Lillian.Cuoco@dom.com](mailto:Lillian.Cuoco@dom.com)

[Signed in Original]   
Nancy Burton  
147 Cross Highway  
Redding Ridge CT 06876  
[NancyBurtonCT@aol.com](mailto:NancyBurtonCT@aol.com)