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

Dominion

September 27, 2004

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

Serial No.:	04-538
NLOS/PRW	Rev. 1
Docket No.:	50-423
License No.:	NPF-49

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 3
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
REGARDING PROPOSED TECHNICAL SPECIFICATION CHANGES FOR IMPLEMENTATION OF ALTERNATE SOURCE TERM

In a letter dated May 27, 2004, Dominion Nuclear Connecticut, Inc. (DNC) requested an amendment in the form of changes to the Technical Specifications to Facility Operating License Number NPF-49 for Millstone Power Station Unit 3. The proposed changes were requested based on the radiological dose analysis margins obtained by using an alternate source term consistent with 10 CFR 50.67. In a facsimile dated August 20, 2004, the NRC requested additional information to facilitate the technical review being conducted by the staff to clarify certain items of the May 27, 2004 submittal. Attachment 1 of this letter is the response to the request for additional information.

In accordance with 10 CFR 50.91(b), a copy of this License Amendment Request is being provided to the State of Connecticut.

If you should have any questions regarding this submittal, please contact Mr. Paul R. Willoughby at (804) 273-3572.

Very truly yours,

Leslie N. Hartz
Vice President – Nuclear Engineering

Attachment

Commitments made in this letter: None.

cc: U. S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406-1415

Mr. V. Nerses
Senior Project Manager
U. S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Mail Stop 8C2
Rockville, MD 20852-2738

Mr. S. M. Schneider
NRC Senior Resident Inspector
Millstone Power Station

Director
Bureau of Air Management
Monitoring & Radiation Division
Department of Environmental Protection
79 Elm Street
Hartford, CT 06106-5127

COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Leslie N. Hartz, who is Vice President - Nuclear Engineering of Dominion Nuclear Connecticut, Inc. She has affirmed before me that she is duly authorized to execute and file the foregoing document in behalf of that company, and that the statements in the document are true to the best of her knowledge and belief.

Acknowledged before me this 27TH day of September, 2004.

My Commission Expires: May 31, 2006.

Vicki L. Hull
Notary Public

(SEAL)

ATTACHMENT 1

PROPOSED TECHNICAL SPECIFICATION CHANGES IMPLEMENTATION OF ALTERNATE SOURCE TERM

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 3

PROPOSED TECHNICAL SPECIFICATION CHANGES
IMPLEMENTATION OF ALTERNATE SOURCE TERM
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

In a letter dated May 27, 2004, Dominion Nuclear Connecticut, Inc. (DNC) requested an amendment in the form of changes to the Technical Specifications to Facility Operating License Number NPF-49 for Millstone Power Station Unit 3. The proposed changes were requested based on the radiological dose analysis margins obtained by using an alternate source term consistent with 10 CFR 50.67. In a facsimile dated August 20, 2004, the NRC requested additional information to facilitate the technical review being conducted by the staff to clarify certain items of the May 27, 2004 submittal.

Below is the response to the request for additional information:

NRC Question 1

In the license amendment proposal, the licensee states that the containment sump pH will be at least 7 (Table 3.1-4). Please discuss the assumptions and calculations used to determine that the sump pH will remain above 7 for 30 days following the LOCA. Please provide this information in sufficient detail for the staff to perform independent calculations to evaluate the licensee's conclusion. If the calculations were performed manually, describe the methodology and provide sample calculations. If a computer code was used, describe the code and provide the input values and how they were derived. Provide the results of the pH calculations at different time intervals and explain how the time intervals were selected.

DNC Response

This question has been subdivided into several different sub-questions. Each sub-question is stated and a response is provided.

Background

The basis for Technical Specification 3/4.5.5 states that trisodium phosphate (TSP) dodecahydrate is stored in porous wire mesh baskets on the floor or in the sump of the containment building to ensure that iodine, which may be dissolved in the recirculation reactor cooling water following a loss of coolant accident (LOCA), remains in solution. TSP also helps inhibit stress corrosion cracking (SCC) of austenitic stainless steel components in containment during the recirculation phase following an accident. TSP is employed as a passive form of pH control for post LOCA containment spray and core cooling water. Adjusting the pH of the recirculation solution to levels above 7.0 prevents a significant fraction of the dissolved iodine from converting to a volatile form.

MPS-3 was originally designed and licensed with sodium hydroxide (NaOH) as the buffer to neutralized the acidic boric acid post accident sump inventory. Due to the significant maintenance issues associated with the NaOH liquid, a plant modification was implemented in 1995 (Plant Design Change Record [PDCR] MP3-94-135). Calculation US(B)-350 was developed to determine the required volume of TSP required to replace the NaOH. This calculation was issued in direct support of the modification. The responses to question 1 are extracted from this calculation and the MPS-3 Final Safety Analysis Report. Question 1 and the responses follow:

NRC Question 1A: In the license amendment proposal, the licensee states that the containment sump pH will be at least 7 (Table 3.1-4). Please discuss the assumptions and calculations used to determine that the sump pH will remain above 7 for 30 days following the LOCA. Please provide this information in sufficient detail for the staff to perform independent calculations to evaluate the licensee's conclusions.

DNC Response 1A: The quantity of TSP (trisodium phosphate) required to achieve an ultimate pH of 7.1 has been determined and includes the TSP volume required to neutralize boric acid, hydrochloric acid (HCL) generated from degradation of electrical cable, and nitric acid (HNO_3) generated from the irradiation of nitrogen. (Note: The selection of the 7.1 pH provides margin relative to the required pH of 7.0.)

The following considerations were utilized in the calculation of the containment sump pH following a LOCA:

- The sump pH is calculated as a function of time.
- Significant sources of borated water are provided below:
  - Refueling Water Storage Tank (RWST) volume of 1,162,963 gallons [maximum usable volume at the reference temperature of 77° F]
  - Reactor Coolant System (RCS) volume of 61,929 gallons at the reference temperature of 77°F.
  - Safety Injection (SI) Accumulator liquid volume of 27,946 gallons at the reference temperature of 77° F.
- RWST, RCS & SI Accumulator Boron Concentration 2,900 ppm
- Volume of TSP 974 ft^3 of 54 lb / ft^3 (minimum density)
- pH is calculated at a temperature of 77° F
- HCl generated from the degradation of electrical cable insulation is considered and is applied as a function of time. The quantity of hypalon cable insulation inside the MPS-3 containment is approximately 82,060 pounds. A conservative 30 day cable dose of 2.00 X 10^8 Rads is considered for the generation of HCl.
- HNO_3 generated from the irradiation of nitrogen is considered and is applied as a function of time.
- 90% of the RCS and accumulators liquid portion are assumed to be released and reach the sump within 60 seconds from the initiation of the LOCA. The remaining 10% is assumed to reach the sump in the subsequent thirty days and is addressed when performing the long term (thirty day) calculation. The primary loop LOCA release flashing fraction is conservatively assumed to be 40%. Full condensation is assumed for the long-term calculation. These

assumptions are conservative since they will delay the water level from reaching the TSP in the short term and will minimize the pH in the long term.

- The pressurizer and surge line water volumes are assumed to reach the sump after the sump level reaches the top of the TSP.
- The TSP is conservatively assumed to dissolve incrementally at the rate which the TSP baskets are flooded. However, it is assumed that once dissolved, the TSP mixes instantaneously throughout all water on the floor. The TSP baskets are located as close as practical around the containment sump. The TSP is not assumed to slump (i.e. the TSP above the water level does not fall into the water).
- The containment mat elevation is (-) 24' – 6" and the minimum TSP level elevation is (-) 24' – 0". The TSP is stored to a height of 3' – 3" above the basket bottom.
- A sump beta plus gamma dose of 4 X 10^7 Rads total integrated dose for one year is assumed. This value corresponds to a plant with a higher power level than MPS 3.
- Water volume required to raise the water level inside containment by one inch is 8,157 gallons.
- Containment Spray and Safety Injection reach the floor approximately 4 minutes after accident initiation and accumulates at approximately 130.6 gallons / sec.

NRC Question 1B: If the calculations were performed manually, describe the methodology and provide sample calculations.

DNC Response 1B: The calculations were performed manually. Relative to the methodology question, sufficient methodology detail is provided above in the response to question 1A and in the sample calculation provided in Enclosure 1.

NRC Question 1C: If a computer code was used, describe the code and provide the input values and how they were determined.

DNC Response 1C: Not applicable. A computer code was not used.

NRC Question 1D: Provide the results of the pH calculation at different time intervals and explain how the time intervals were selected.

DNC Response 1D: Enclosure 2 contains the profile of the post DBA minimum containment sump pH for the time period of LOCA initiation to 30 days following the LOCA. Time intervals were selected based on containment sump fill rates, changes to containment sump fill rates, and the additions of acids and bases to the sump solution. More points were selected early in the transient to ensure that a smooth curve could be generated. Since the generation of acids due to the breakdown of cable insulation and nitrogen is a long term effect and is relatively linear based on time and exposure level, fewer points were generated for the later portion of the pH curve.

Additional Information

The only significant source of organics available to contribute to the generation of acid in the containment sump inventory is electrical cable insulation. No other significant organics are present in the MPS 3 containment relative to acid generation.

References:

1. FSAR Table 6.1-2, Parameters for Ultimate Sump pH Calculation
2. FSAR Figure 6.5-1, Post DBA Minimum Containment Sump pH

NRC Question 2

Did the meteorological measurement program meet the recommendations of Regulatory Guide (RG) 1.23, "Onsite Meteorological Programs," during the period from 1997 through 2001?

DNC Response

The meteorological data for Millstone for the period 1997 through 2001 were collected and processed in accordance with the standards described in RG 1.23 and ANSI/ANS-2.5-1984. Attachment C (page 57 of 66) of the X/Q calculation DBAX/Qs-04053R3, included in the May 27, 2004 letter, is a copy of the certification memo.

NRC Question 3

With regard to guidance in RG 1.194, "Atmospheric Relative Concentrations for Control Room Radiological Habitability Assessments at Nuclear Power Plants," and use of the ARCON96 computer code, the source-to-receptor distance is the shortest horizontal distance between the release point and intake. ARCON96 uses this distance and the elevations of the source and receptor to calculate the slant path. For releases within building complexes, the shortest horizontal distance between the release point and the intake could be through intervening buildings. In these cases, it is acceptable to take the length of the shortest path (e.g., "taut string length") around or over the intervening building as the source-to-receptor distance. However, staff notes that if the source and receptor are at different heights with respect to each other, calculating a "taut string length" may already factor in the vertical component of the distance. In this case, the same value should be input into ARCON96 for both the release and intake heights to avoid estimating erroneous additional slant path distance. Do the "taut string lengths" discussed in Calculation No. DBAX/Qs 04053R3 factor in the differences in elevations between the sources and receptor?

DNC Response

The technique applied to the "taut string length" in calculation DBAX/Qs-04053R3 does factor in the difference in elevation between the source and receptor. DNC opted to keep the source and receptor elevations as they were and calculate an "effective" horizontal distance based upon the shortest "taut string length." Input of the "effective" horizontal distance and actual elevations of the source and receptor into ARCON96, make the calculated slant path in the code match the shortest "taut string length" around or over intervening buildings. This technique is discussed in DBAX/Qs-04053R3 (page 7 of 66).

NRC Question 4

Page 7 of Calculation No. DBAX/Qs-04053R3 states that the Turbine Building vent stack flow rate must be maintained to at least 7.08 m^3/s in the winter. Is this the minimum flow rate during all times of the year and is it reasonable to expect that it can be maintained during the course of an accident (e.g., as addressed by technical specification) even if a single failure or loss of offsite power occurs?

DNC Response

The Turbine Building Vent stack flow of 7.08 m3/sec (15,000 cfm) is the minimum exit flow that is available during the year. The flow is for the winter mode of operation and is based on a loss of offsite power (LOOP) with only one Category 1 electrical train available.

The Auxiliary Building Ventilation System (ABVS), described in Section 9.4.3 of the Millstone 3 Final Safety Analysis Report (FSAR) exhausts out the Turbine Building Vent stack. The following systems and components of the ABVS are Safety Class 3: the building isolation dampers; the charging pump, component cooling water pump, and heat exchanger ventilation system; the MCC, rod control, and cable vault ventilation system; and the auxiliary building filtration units including fans, dampers, and segment drainage up to and including the isolation valves. In the event of a LOOP signal, the charging pump, reactor plant component cooling water pump, and heat exchanger supply and exhaust fans will continue to operate and exhaust through the Turbine Building Vent. There are two sets of charging pump, component cooling pump, and heat exchanger area supply (3HVR*FN14A&B) and exhaust (3HVR*FN13A&B) fans. The supply fans are each rated for 27,000 cfm and each exhaust fan for 30,000 cfm. The ventilation system in the charging pump, reactor plant component cooling water pump, and heat exchanger areas has two dependant system manual damper positions that allow operation in either the winter or summer mode. In the winter mode, which provides the minimum flow out the vent stack, manual dampers are positioned such that outside air is mixed with return air at a fixed rate to maintain a minimum area temperature. In the summer mode, the recirculation flow path is isolated. The exhaust path remains the same for both modes of operation. Damper positions in the winter mode alignment restrict the flow of outside ambient supply air to a minimum of 15,000 scfm during normal and accident alignments of the ABVS. An in-service test verified the minimum flow during the winter mode of operation.

NRC Question 5

Do *X*/Q estimates for all of the release/receptor pairs address the most limiting cases, including those potentially associated with single failure and loss of offsite power?

DNC Response

The X/Q's address the most limiting cases for each release/receptor pairs. The only receptor location is the Millstone Unit 3 Control Room ventilation intake. The Millstone Unit 3 Control Room has only one intake for both its normal and emergency ventilation. The release points for the Loss of Coolant Accident (LOCA) and Rod Ejection Accident (REA) are the Millstone site stack, the Turbine Building Vent stack, the containment edge, the Main Steam Valve Building (MSVB) roof vent, the Engineered Safety Features Building (ESF) roof vent, and the Refueling Water Storage Tank (RWST) vent. The release points for the Steam Generator Tube Rupture Accident (SGTRA), Locked Rotor Accident (LRA), and the secondary side release of the REA are the Steam Generator Atmospheric Dump (ADV) and Safety Valves. For the Main Steam Line Break accident (MSLB) the release point is the turbine building roof vent. A description of these release points is provided to explain their selection and applicability.

Millstone Site Stack
The Supplementary Leak Collection and Release System (SLCRS) collects leakage from the secondary containment during accident conditions and exhausts to the Millstone site stack through filters. SLCRS is a Safety Class 3 system and is described in section 6.2.3 of the FSAR. The flow rate out the site stack from SLCRS is based on a LOOP with only one category 1 electrical train available.

Turbine Building Vent Stack
The ABVS also collects leakage from the secondary containment during accident conditions. The ABVS, described in section 9.4.3 of the FSAR, exhausts to the Turbine Building Vent stack through filters and is Safety Class 3. The flow rate out the vent stack through ABVS is based on a LOOP with only one category 1 electrical train available. Auxiliary Building normal ventilation also exhausts out the vent stack. Various fans associated with this ventilation system receive nonnuclear safety related trip signals. For conservatism, Millstone assumes that these fans continue to operate even though they receive a trip signal and the accident assumes a LOOP. It is a conservative assumption because the releases associated with the continued operation of these fans are unfiltered. The discharge flow from these fans is based on one of the two isolation discharge dampers failing to close due to a loss of a train of Engineered Safety Features (ESF) equipment and leakage from the ducts. For the Control Room analysis, these fans are assumed to be tripped by manual action at 80 minutes post accident. Amendment No. 211, dated September 16, 2002 and November 25, 2002, addressed the revised FSAR licensing basis for post-accident operation of SLCRS

(TAC No. MB3700) and approved crediting this manual action for Millstone Unit 3. The turbine building vent stack is also the assumed location for releases from any fuel handling accident (FHA), as the X/Q from the vent stack is greater than any other release location resulting from a FHA.

Containment Edge

The containment edge X/Q was calculated for containment leakage that is not collected by either SLCRS or ABVS. It is also known as bypass leakage. There is no fan or other mechanical device associated with this release point. The distance used in the development of the X/Q is the shortest distance between the containment edge and the Millstone Unit 3 control room ventilation intake. The amount of leakage that is assumed to be released from the containment through this release path is the maximum leakage permitted by Technical Specifications.

Main Steam Valve Building (MSVB) and Engineered Safety Features Building (ESF) Roof Vents

The MSVB and ESF roof vents exhaust normal ventilation from these two buildings. The fans associated with these release points receive nonnuclear safety related trip signals. For conservatism, Millstone assumes that these fans continue to operate even though they receive a trip signal and the accident assumes a LOOP. It is a conservative assumption because the releases from the roof vents are unfiltered and at ground level. The discharge flow rates are based on one of the two isolation discharge dampers failing to close due to a loss of a train of ESF equipment and leakage from the ducts. For the Control Room receptor, these fans are tripped by manual action at 80 minutes post accident. Amendment No. 211, dated September 16, 2002 and November 25, 2002, addressed the revised FSAR licensing basis for post-accident operation of SLCRS (TAC No. MB3700) and approved crediting this manual action for Millstone Unit 3. The distance used in the development of the X/Q for each vent was the shortest distance between the vent and the Millstone Unit 3 control room ventilation intake.

Refueling Water Storage Tank (RWST) Vent

The RWST X/Q was calculated for leakage out the vent of the tank. There is no fan or other mechanical device associated with this release point. The distance used in the development of the X/Q is the shortest distance between the RWST and the Millstone Unit 3 control room ventilation intake. The amount of leakage that is released from the RWST is based on backleakage through tested isolation valves, the evolution of the iodines out of the RWST water into the RWST airspace and the "breathing rate" of the RWST. The breathing rate of the RWST was determined by making use of the ideal gas law and expected volumetric change. The latter was based on a conservative rise in air temperature within the RWST as a result of solar heating.

Steam Generator Atmospheric Dump (ADV) and Safety Valves

The ADV and safety valves are located in the same area; therefore the closest valve to the control room ventilation intake was used in the calculation of the X/Q. Releases from these points are coincident with loss of off site power that is concurrent with accident initiation. The condenser is unavailable for cooldown due to the LOP. The applicable single failure for the LRA is a stuck open ADV with operator action needed to close it. A single failure for the SGTRA involves a stuck open ADV on the affected steam generator, which is closed by operator action and then the ADV fails open. The SGTRA, LRA, and REA assume only one category 1 electrical train is available.

Turbine Building Roof Vent
For the Main Steam Line Break accident (MSLB) the release point assumed is the closest turbine-building roof vent to the control room intake. The release from the roof vent is coincident with loss of off-site power that is concurrent with accident initiation. The condenser is unavailable for cooldown due to the LOP. A single failure for the MSLB is the inability to isolate the break in the turbine building with the main steam isolation valves. The MSLB assumes only one category 1 electrical train is available.

NRC Question 6

In a column title for breathing rates in Table 1.3-5 of Attachment 1 to your letter, does it mistakenly include "*X*/Q" with the units of breathing rate?

DNC Response

Yes. "*X*/Q" should not appear in that column title.

ENCLOSURE 1

PROPOSED TECHNICAL SPECIFICATION CHANGES
IMPLEMENTATION OF ALTERNATE SOURCE TERM

CALCULATION: TSP QUANTITY REQUIRED TO ENSURE MINIMUM ULTIMATE SUMP PH OF 7.1

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 3

Calculation:TSP Quantity Required to Ensure Minimum Ultimate Sump pH of 7.1

Determine the maximum possible volume of boric acid reaching the sump.

Volume of Reactor Coolant System (RCS) excluding the Pressurizer and the Surge Line:

Specific Volume @ 583.5 °F, 2250 psia ≈ 0.02231 ft^3/lbm
Specific Volume @ 77 °F, atmospheric pressure ≈ 0.01607 ft^3/lbm

Therefore, the maximum RCS volume @ 77 °F is 78,328 gal x 0.01607 / 0.02231 = 56,420 gallons

Volume of Pressurizer and Surge Line:

Maximum Water Volume @ 77 °F is 45820 lbm X 0.01607 ft^3/lbm X 7.48 gal/ft^3 = 5,509 gallons

Pressurizer and surge line physical liquid volume = 45,820 lbm X 0.02698 ft^3/lbm ≈ 1,236ft^3 ≈ 9,248 gallons
Where the specific volume is based on saturated water conditions of the pressurizer at 2250 psia.

Therefore, the RCS volume is: 9,248 + 78,328 = 87,576 gallons at normal operating temp. and press..
Therefore, the RCS volume is: 5,509 + 56,420 = 61,929 gallons at 77°F.

Volume of the Accumulators (four):

Maximum Water Volume of one Accumulator @ 120 °F, 660 psia is 7,030 gallons (28,120 gallons for four)

Specific Volume @ 120 °F, 660 psia ≈ 0.01617 ft^3/lbm
Specific Volume @ 77 °F, atmospheric pressure ≈ 0.01607 ft^3/lbm

Therefore, the maximum volume of the four Accumulators @ 77 °F is 28,120 gal x 0.01607 / 0.01617 = 27,946 gallons

Volume of the Refueling Water Storage Tank (RWST)

The maximum RWST volume @ 40 °F is 1,207,000 gallons. The shutoff set point for the quench spray pumps is 2.33 ft above the tank bottom or 47,655 gallons.

The maximum RWST usable volume @ 40 °F is 1,207,000 gallons - 47,655 gallons = 1,159,345 gallons.

Specific Volume @ 40 °F, atmospheric pressure ≈ 0.01602 ft^3/lbm

Therefore, the maximum usable RWST volume is 1,159,345 gallons X 0.01607 / 0.01602 = 1,162,963 gallons at 77°F.

Maximum Water Volume Inside Containment

Maximum Volume =

RCS max volume + Accumulator max volume + RWST max volume
61,929 + 27,946 + 1,162,963 =

1,252,838 gallons = 4,742,508 liters

Determine the volume of TSP required to neutralize the boric acid and achieve a minimum ultimate sump pH of 7.1.

TSP crystals: trisodium phosphate dodecahydrate: $Na_3PO_4\ 12H_2O$ ¼ NaOH: molecular weight (mol) = 390.1

Boric Acid Concentration is 2900 ppm boron

Based on Stone and Webster Engineering Corporation Test Report: "Test Results for Titration of Boric Acid with Trisodium Phosphate", dated November 3, 1994, 1.1 $X10^{-2}$ (gm – mole / l) of TSP is needed for a pH of 7.1. To account for an uncertainty of 0.03 in the pH volume, the TSP amount extracted from the Stone and Webster report corresponds to a pH of 7.13.

Required TSP moles = 4,742,508 liters X 1.1 X 10^{-2} gm - mole / l = 52,167.6 gm - moles

Required TSP mass = 52,167.6 gm – mole X 0.3901 kg / gm = 20,351 kg (to neutralize the boric acid)
Required TSP mass= 20,351 kg X 2.2046 lbm / kg = 44,865 lbm (to neutralize the boric acid)
Required TSP volume = 44,865 lbm X 1/54 ft^3/lbm = 831 ft^3 (to neutralize the boric acid)

Determine the TSP volume required to neutralize 30 days of HCl generation due to cable insulation and hypalon (chlorosulfonated polyethylene) radiolysis.

The amount of HCl produced by the irradiation of electrical cable is estimated as 4.6 X 10^{-4} mole of HCl per lb of insulation per megaRad.

The quantity of electrical insulation inside containment is 82,060 lbm and the average 30 day cable dose is conservatively set equal to 2.00 X10^{8} Rads (note: this is actually the one year dose).

HCl produced in 30 days = 82,060 lbm X 200.00 megaRads X 4.6 X 10^{-4} gm – mole / lbm - megaRad
= 7,550.00 gm – moles of HCl

Since HCl is a strong acid and completely dissociates in solution, one mole of TSP is required to neutralized one mole of HCl.

Therefore, 7,550 gm-moles of TSP are need to neutralize the HCl.
TSP mass required: 7750 gm - mole X 0.3901 kg / gm-mole ≈ 2945.3 kg = 6493.3 lbm
TSP volume required: 6493.3 lbm X 1/54 ft^3 / lbm ≈ 121 ft^3

Determine the TSP volume required to neutralize 30 days of nitric acid (HNO_3) generated due to irradiation of water and air.

The amount of HNO_3 produced by sump irradiation is 7.3 X 10^{-6} mol HNO_3 / liter –megaRad X 4,742,508 liters ≈ 34.62 g-mole HNO_3 / megaRad X 40.00 megaRads ≈ 1.384.8 gm – mole HNO_3.

Since is HNO_3 a strong acid and completely dissociates in solution, one mole of TSP is required to neutralized one mole of HNO_3.

Therefore, 1,384.8 gm-moles of TSP are need to neutralize the HNO_3.
TSP mass required: 1,384.8 gm – moles X 0.3901 kg / gm-mole ≈ 540.21 kg = 1191 lbm
TSP volume required: 1191 lbm X 1/54 ft^3 / lbm ≈ 22 ft^3

<u>Total TSP Quantity Required to Ensure Minimum Ultimate Sump pH of 7.1</u>

The total TSP required for an ultimate (30 day) sump pH of 7.1 is: 831 + 121 + 22 = 974 ft^3 (≈ 52,596 lbm based upon a 54 lbm / ft^3 TSP density).

Serial No.: 04-538
Docket No.: 50-423

ENCLOSURE 2

PROPOSED TECHNICAL SPECIFICATION CHANGES
IMPLEMENTATION OF ALTERNATE SOURCE TERM

POST DBA MINIMUM CONTAINMENT SUMP Ph

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 3

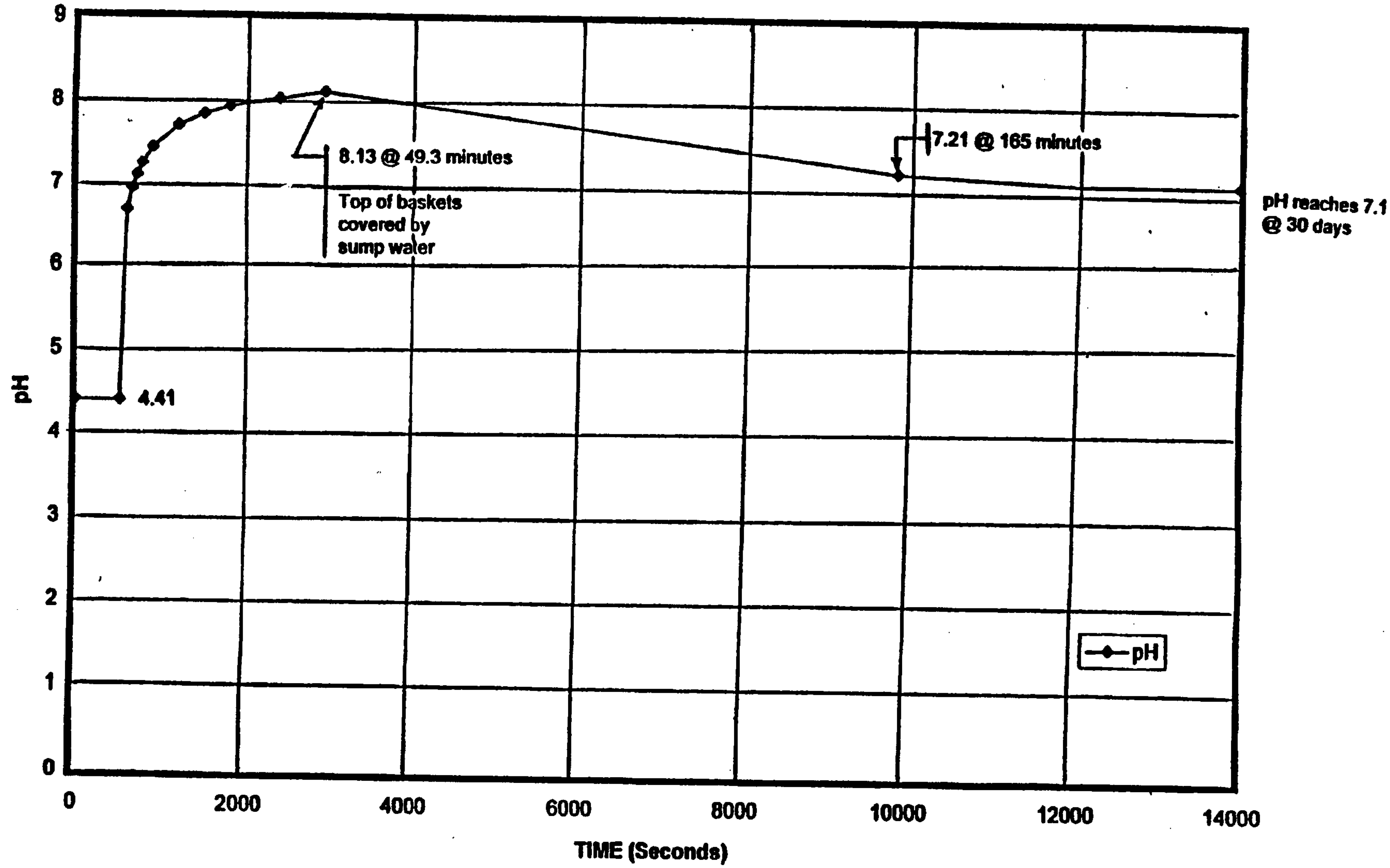

FIGURE 1
POST DBA MINIMUM CONTAINMENT SUMP pH

MAY 1997