

10 CFR 50.90
10 CFR 50.67

November 2, 2005
2130-05-20217

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Oyster Creek Generating Station
Facility Operating License No. DPR-16
NRC Docket No. 50-219

Subject: Response To Request For Additional Information – License Amendment
Request No. 315, “Application of Alternative Source Term” (TAC No. MC6519)

This letter provides additional information in response to NRC draft request for additional information received via NRC email, dated August 26, 2005, regarding Oyster Creek License Amendment Request No. 315, submitted to NRC for review on March 28, 2005. The additional information is provided in Enclosure 1.

The enclosed response contains proprietary information as defined in 10 CFR 2.390(a)(4). Accordingly, it is requested that Enclosure 1 be withheld from public disclosure. An affidavit certifying the basis for this application for withholding as required by 10 CFR 2.390(b)(1) is also enclosed with this letter (Enclosure 3). Enclosure 2 provides a non-proprietary version of Enclosure 1.

No new regulatory commitments are established by this submittal. If any additional information is needed, please contact David J. Distel at (610) 765-5517.

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

Respectfully,

gaf 11/2/05
Executed On



Pamela B. Cowan
Director - Licensing & Regulatory Affairs
AmerGen Energy Company, LLC

Enclosures: 1) Response to Request for Additional Information (Proprietary Version)
2) Response to Request for Additional Information (Non-Proprietary Version)
3) Polestar Applied Technology, Inc., Affidavit Certifying Request For Withholding From Public Disclosure

AP01

U.S. Nuclear Regulatory Commission

November 2, 2005

Page 2

cc: S. J. Collins, USNRC Administrator, Region I
P. S. Tam, USNRC Senior Project Manager, Oyster Creek
R. J. Summers, USNRC Senior Resident Inspector, Oyster Creek
File No. 03079

ENCLOSURE 2

OYSTER CREEK

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

LICENSE AMENDMENT REQUEST No. 315

APPLICATION OF ALTERNATIVE SOURCE TERM

NON - PROPRIETARY VERSION

1. **NRC Question**

The determination of the suppression pool pH at 30 days after a loss-of-coolant accident (LOCA) is described in Attachment 3, Page 12, of the application. This description states that the standby liquid control system (SLC) is credited as a means to buffer the suppression pool water and will prevent the pH from falling to a value less than 7 during the 30-day dose calculation period. In addition, the description states that suppression pool pH is a function of the time-dependent radiation level in the drywell and the time-dependent radiation level in the suppression pool, among other parameters. Please provide the time-dependent calculations to support the assertion that the pH will not decrease to a value less than 7 from the time of the LOCA to 30 days after the LOCA. These calculations should also address the change in pH at the time of the sodium pentaborate injection and the effects of acid formation (i.e., HCl production from the decomposition of cable insulation and HNO₃ production from the irradiation of water and air).

Response

Calculation PSAT 05201H.05 is enclosed for review (Attachment1). The calculation was performed using the (proprietary) Polestar QA software STARpH 1.04 code.

As indicated in Table 3 of the calculation, the pH will not decrease to a value less than 7 from the time of the LOCA up to 30 days after the LOCA. The pH remains greater than or equal to 8.0 until $t = 30$ days, at which time it drops to 7.9.

Table 3 (page 14 of 20 in the enclosed calculation) indicates the change in pH at the time of the sodium pentaborate injection (assumed at $t = 5$ hours). The effects of acid formation (i.e., HCl production from the decomposition of cable insulation and HNO₃ production from the irradiation of water and air) are described on pages 8 and 9 of the enclosed calculation.

ENCLOSURE 2

ATTACHMENT 1

POLESTAR APPLIED TECHNOLOGY INC.

CALCULATION No. PSAT 05201H.05, REVISION 3

“Suppression Pool pH for OCNGS Control Room Habitability”

NON - PROPRIETARY

CALCULATION TITLE PAGE

CALCULATION NUMBER: PSAT 05201H.05

CALCULATION TITLE:

"Suppression Pool pH for OCNGS Control Room Habitability"

<u>ORIGINATOR</u>		<u>CHECKER</u>		<u>IND REVIEWER</u>	
<u>Print/Sign</u>	<u>Date</u>	<u>Print/Sign</u>	<u>Date</u>	<u>Print/Sign</u>	<u>Date</u>

REVISION: 0

1

2

3

4

REASON FOR REVISION:

Nonconformance Rpt

0 - Initial Issue

N/A

1 – Revise to address HCl from chloride-bearing cable insulation, to credit the buffering effect of SLCS, to include basis for neglecting pool temperature effect on pH, and to include plant specific fission product group inventories

N/A

2– Revise Justification for Assumption 5, Assumption 6, and second paragraph of Results section to better reflect the desired timing of SLCS injection and the form and effect of cesium. Reference [9a] added.

N/A

3- Compliance with 10CFR2.390, May, 2005; proprietary designation removed from all pages except first page and those actually containing proprietary information
Proprietary information on each proprietary page designated in [[brackets]]

N/A

Table of Contents

<u>Section</u>	<u>Page</u>
Purpose	2
Methodology	2
Assumptions	3
Design Input	6
References	6
Calculation	8
Results	14
Conclusion	15
Exhibit 1 Radiolysis of Water Input and Output	16
Exhibit 2 Radiolysis of Cable, Cable Category 1, Input and Output	17
Exhibit 3 Radiolysis of Cable, Cable Category 2, Input and Output	18
Exhibit 4 Radiolysis of Cable, Cable Category 3, Input and Output	19
Exhibit 5 Add Acid Input and Output	20
Attachment 1 Estimate of Drywell Electrical Cable Insulation (2 pages)	

Purpose

The purpose of this calculation is to determine the pH of the suppression pool of the Oyster Creek Nuclear Generating Station (OCNGS) as a function of time following a severe accident in support of control room habitability studies. This calculation is being performed using Polestar QA software STARpH 1.04 code [1] in accordance with the reference [1a] and [1b] procedures and the reference [1c] Amergen request.

Methodology

- Apply the Radiolysis of Water model from the STARpH 1.04 code [1] to calculate the [HNO₃] concentration in the water pool vs. time.
- Aggregate the 9 different cable types provided in the design input into three cable sizes which encompass the 9 different types.
- Calculate conversion factors for each of the three aggregated cable sizes.
- Calculate cable jacket mass for each of the three aggregated cable sizes.

- Apply the Radiolysis of Cable model of STARpH 1.04 to calculate the [HCl] concentration in the water pool vs. time for each of the aggregated cable sizes.
- Manually calculate the [H⁺] concentration added to the pool vs. time from the Radiolysis of Water model result and from the sum of the Radiolysis of Cable model results for the three aggregated cable sizes.
- Determine the sodium pentaborate buffer concentration added to the pool from the standby liquid control system (SLCS), the buffer dissociation constant, and the buffer starting pH.
- Calculate the pH of the water pool considering the concentration of sodium pentaborate in the pool and [H⁺] additions as a function of time using the Add Acid model of STARpH 1.04.

Assumptions

Assumption 1: Fission product inventory is 1.1 times the inventory given in item 1.3 of reference [2].

Justification: The fission product inventory in reference [2] is conservative for the purposes of aerosol removal but is increased by a factor of 1.1 for conservatism with respect to the radiolytic production of nitric and hydrochloric acids.

Assumption 2: The fraction of aerosol source term in water pool is 0.90.

Justification: Previous Polestar QA calculations indicate that the fraction of the aerosol source term in an unsprayed drywell that settles in the sump pool is close to 90% (see for example reference [3] which calculates this fraction as 0.87 for the Perry Drywell). Given that the spray will tend to wash any aerosol which deposits on elevated surfaces into the sump, the actual fraction of aerosol in the water pool is expected to be essentially 100%. Thus use of 90% is conservative since it will overestimate the radiation level in the drywell vapor space and thus overestimate the [HCl] from radiolysis of chloride-bearing cable insulation.

Assumption 3: Proprietary information deleted

Justification:

Assumption 4: The pH effect of the increased pool temperature from the accident is very small in a strongly buffered system such as Oyster Creek and can be neglected.

Justification: Proprietary information deleted

Proprietary information deleted

Assumption 5: The SLCS is actuated and the sodium pentaborate is injected into the pool within several hours of accident initiation.

Justification: A core damage event large enough to release the substantial quantities of fission products in the time frame considered for the alternate source term in reference [11] will be very evident to the operators (e.g., core outlet temperature, radiation level in the drywell, pressure and temperature in the drywell, hydrogen level in the drywell) within minutes of the initiating event. Thus it is reasonable to assume for purposes of this calculation that the Oyster Creek EOPs and SAMGs provide for SLCS actuation within ~1 hour of accident initiation.

If SLCS injection is into the pool (i.e., into the reactor vessel with the vessel communicating with the pool as in a recirculation line break), significant mixing will occur quickly, on the order of 1 hour based on two trains of drywell spray of 3000 gpm each and a pool volume of ~650,000 gallons per reference [2].

If the reactor vessel is not immediately communicating with the pool, an additional few hours is assumed to transpire before the operators flood the vessel

up to the break to assure communication with the pool or inject sodium pentaborate to the pool via an alternate pathway.

Assumption 6: The unbuffered pH of the pool should remain above 7 for at least several hours.

Justification: Proprietary information deleted

Design Input

1. Reactor power = 1969 MWt
2. Suppression pool volume = 82,000 ft³ (min), 92,000 ft³ (max)
3. RCS inventory = 7,600 ft³
4. Containment water volume is the sum of the suppression pool volume and the RCS inventory
5. Pool Initial pH = 6.23
6. Drywell is sprayed
7. The wetwell was last painted in 1983/1984
8. The drywell is unpainted
9. Fission product inventories - see Item 1.3, reference [2]
10. Electrical cable insulation is given in Attachment 1.
11. Drywell volume = 180,000 ft³
12. The total torus volume (gas + liquid) is 210,000 ft³.

Items 1 to 4, 6 to 9, 11, and 12 are from reference [2]. Item 5 is from reference [12]. Item 10 is from reference [13].

References

1. PSAT C107.02, STARpH, A code for Evaluating Containment Water Pool pH During Accidents, Code Description and Validation and Verification Report, Revision 4, February, 2000.
- 1a. PSAT 05201U.01, Project QA Plan for Application of the Revised DBA Source Term to the Amergen Oyster Creek Generating Station, August, 2000.

- 1b. PSAT 05201U.02, Implementing Procedure for Design Control for Application of the Revised DBA Source Term to the Amergen Oyster Creek Generating Station, Sept., 2000.
- 1c. Amergen email to Polestar, A. Baig to J. Metcalf, March 16, 2001.
2. PSAT 05201U.03, Dose Calculation Data Base for Application of the Revised DBA Source Term to the Oyster Creek Nuclear Generating Station, Revision 3, September, 2000.
3. PSAT 04202H.12, "Calculation of Fraction of Containment Aerosol Deposited in Water," April, 1996.
4. PSAT 05201H.01, "Thermal-Hydraulic Assessment for OCNGS Control Room Habitability," Rev. 0, March, 1997.
5. Proprietary information deleted
6. Handbook of Physics and Chemistry, CRC Press, 1993, page 8-42.
7. Proprietary information deleted
8. E. Beahm et al, "Iodine Evolution and pH Control," NUREG/CR-5950, November, 1992.
9. Proprietary information deleted
- 9a.
- 10.
11. "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," Regulatory Guide 1.183, July, 2000.
12. PSAT 05201H.10, "Justification for Use of OCNGS Initial Suppression Pool pH Value," September, 2000.
13. Amergen email, A. Baig to J. Metcalf, January 11, 2001.
14. Proprietary information deleted
15. .

16. Amergen fax, A. Baig to F. Hennion, August 21, 2000, containing Section C., Standby Liquid Control System, pages 3.2-3 to 3.2-4, and Figures 3.2-1 and 3.2-2.

Calculation

Calculation of [OH⁻] and [HNO₃] in Water Pool vs. Time

The BWR version of the Radiolysis of Water model in the STARpH 1.04 code (Ref. 1) calculates the hydroxyl ion concentration, [OH⁻], from fission product cesium, and nitric acid concentration, [HNO₃], in the containment water pool generated by radiolysis. Proprietary information deleted

Inputs to the Radiolysis of Water model are based on the Design Inputs, Items 1 to 5 and Item 9, and Assumptions 1 and 2. The core inventories by radionuclide group are:

<u>Group Title</u>	<u>Elements in Group</u>	<u>Core Inventory (Kg)</u>
I	I, Br	22.44
Cs	Cs, Rb	301.4
Te	Te, Sb, Se	47.74
Sr	Sr	87.34
Ba	Ba	134.2
Ru	Ru, Rh, Mo, Tc, Pd	732.6
Ce	Ce	1133
La	La, Zr, Nd, Eu, Nb, Pm, Pr, Sm, Y	1056

Containment water pool volume = water volume of wetwell + RCS volume

$$= 89,600 \text{ ft}^3 \times 2.83\text{E}1 \text{ L/ft}^3$$

$$= 2.536\text{E}6 \text{ L}$$

The core inventory of fission products in the table above is entered in column F of the Radiolysis of Water model spread sheet and a burnup value of 33,000 MWd/t is used in cell K2 so that the fission product inventory is not modified when calculating values for HI and CsOH.

The output of the calculation with the Radiolysis of Water model in the form of net [OH⁻] and [HNO₃] as a function of time is provided in the first and last columns of the output portion of Exhibit 1.

Calculation of [HCl] in Water Pool vs. Time

The concentration of HCl in the water pool as a result of radiolysis of electrical cable insulation is calculated using the Radiolysis of Cable model of the STARpH 1.04 code. Inputs to the Radiolysis of Cable model are based on the Design Inputs, Items 1 to 4 and Items 10 to 12, and Assumption 2.

The containment free volume is just the total containment volume (Design Input, Items 11 and 12) minus the maximum suppression pool volume (Item 2). The maximum pool volume is used to minimize the free volume which in turn maximizes the radiation level in containment.

$$\begin{aligned} \text{Containment free volume} &= \text{total torus volume} + \text{drywell volume} - \text{max. pool volume} \\ &= 210,000 \text{ ft}^3 + 180,000 \text{ ft}^3 - 92,000 \text{ ft}^3 \\ &= 298,000 \text{ ft}^3 \times (12 \text{ in/ft})^3 \times (2.54 \text{ cm/in})^3 \\ &= 8.44\text{E}9 \text{ cm}^3 \end{aligned}$$

To account for gamma radiation leakage from the containment, the STARpH 1.04 BWR Mark 1 default value of 0.068 for one minus fraction of gamma leakage is used [1].

The cable insulation characteristics are listed in Attachment 1 which was provided by Amergen [13]. There are 9 different cable types listed, 6 of which contain chloride-bearing insulation (the shaded rows). These 6 chloride-bearing cable types have been aggregated into 3 cable sizes to simplify the Radiolysis of Cable calculation. These 3 cable sizes and relevant characteristics are given in Table 1.

Table 1 Oyster Creek Containment Aggregated Cable Characteristics

Cable Category	Jacket Thickness (in)	Jacket Thickness (cm)	Jacket O D (in)	Jacket OD (cm)	Length (ft)	Jacket ID (in)	Jacket ID (cm)	Attachment 1 Conductors Included (length ft)
1	0.08	0.203	1.16	2.946	4635	1.0	2.54	M/C Instr (4635)
2	0.045	0.114	0.335	0.851	17654	0.245	0.622	M/C Instr (9015) Coax (5883) M/C Instr (2756)
3	0.035	0.089	0.263	0.668	11782	0.193	0.49	T/C (9653) T/C (2129)

The characteristics of the 3 jackets in Category 2 are the same except for the Coax which is actually 0.043 in. thickness. Thus the approximation of 0.045 in. overestimates the amount of jacket and is conservative. The characteristics of the 2 jackets in Category 3 are identical. The chloride-bearing material in all cases is assumed in Attachment 1 to be PVC. Thus the PVC Version 1.04 of the Radiolysis of Cable model is used. The effect of conduit is neglected here (the two chloride-bearing cables on page 2 of Attachment 1 are in conduit) since this effect impacts only a small amount of cable, and neglecting this effect is conservative (overestimates HCl generated by 5 to 10 %).

The conversion factors, R_γ and R_β , found in cells H2 and I2 [1], must be calculated for each cable category in Table 1.

Proprietary information deleted

The output of the calculations with the Radiolysis of Cable model in the form of [HCl] as a function of time is provided as Exhibits 2, 3, and 4 for Cable Categories 1, 2, and 3, respectively. The total [HCl] is just the sum of that from Exhibits 2, 3, and 4.

Calculation of [H⁺] Added to the Pool

The net hydrogen ion concentration added to the pool is the sum of the Net [OH⁻] and [HCl] shown as a function of time in Exhibit 1 and Exhibits 2, 3, and 4, respectively. These data are combined in Table 2 below to give Net [H⁺] Added. The parenthetical values for Net [H⁺] Added mean that the values indicated are actually [OH⁻] since the amount of hydroxide in the Net [OH⁻] column exceeds the [HCl]. The Net [OH⁻] is taken from the first column of Exhibit 1, and is the [OH⁻] concentration in mol/L which results from the [OH⁻] from CsOH less the [H⁺] from initial pH, HI, and HNO₃. Also shown in Table 2 is the hydrogen ion concentration, [H⁺] Added, due to [HNO₃] and [HCl] only (i.e., neglecting the [OH⁻] from CsOH).

Calculation of Sodium Pentaborate Buffer Added to Pool

The inputs to the Add Acid model of the STARpH 1.04 code are the concentration in mol/L of the buffer, the dissociation constant of the buffer, and the starting pH. [[The dissociation constant of the borate buffer is 5.8E-10 [1]. The borate buffer is in the form of sodium pentaborate [16] and the starting pH of a solution of this material is given as 8.6 in reference [1].]] The concentration of B is calculated below.

Table 2 Calculation of [H⁺] Added to Pool

<u>Time</u>	<u>[HNO₃]</u>	<u>Net [OH⁻]</u>	<u>[HCl]</u>	<u>[H⁺] Added</u>	<u>Net [H⁺] Added</u>
1h	7.33E-6	1.69E-4	6.90E-6	1.42E-5	(1.62E-4)
2h	9.90E-6	1.67E-4	1.30E-5	2.29E-5	(1.54E-4)
5h	1.51E-5	1.62E-4	2.76E-5	4.27E-5	(1.34E-4)
12h	2.35E-5	1.53E-4	5.23E-5	7.58E-5	(1.01E-4)
1d	3.48E-5	1.42E-4	8.35E-5	1.18E-4	(5.85E-5)
3d	6.69E-5	1.10E-4	1.70E-4	2.37E-4	6.00E-5
10d	1.28E-4	4.87E-5	2.99E-4	4.27E-4	2.50E-4
20d	1.70E-4	7.00E-6	3.48E-4	5.18E-4	3.41E-4
30d	1.98E-4	(2.1E-5)	3.62E-4	5.60E-4	3.83E-4

Based on Figure 3.2-1 of reference [16], the minimum sodium pentaborate mass in the Standby Liquid Control System (SLCS) tank is for the condition of 15 wt% sodium pentaborate with 1172 gallons of solution. From Figure 3.2.2, the minimum temperature of 15 wt% solution is 70 F. The density of water at 70 F is 62.3 lbm/ft³. A density of 62.1 lbm/ft³, corresponding to 90 F, will be used for conservatism. Thus 1172 gallons is

$$(1172 \text{ gal})(0.1337 \text{ ft}^3/\text{gal})(62.1) = 9731 \text{ lbm water}$$

Thus there is

$$(0.15)(9731) = 1460 \text{ lbm}$$

of sodium pentaborate. The ppm equivalent may be determined as follows.

The molecular weight of sodium pentaborate ($\text{Na}_2\text{O} \cdot 5\text{B}_2\text{O}_3 \cdot 10\text{H}_2\text{O}$), assuming 35% B¹⁰ per reference [16] (i.e., 10.65 g B/mol), is 589 g/mol. Thus there is

$$(10.65 \text{ g B/mol B})(10 \text{ mol B/mol})(1/589 \text{ mol/g})(1460 \text{ lbm}) = 264 \text{ lbm B.}$$

With pool volume of 89,600 ft³ (suppression pool plus RCS volume), and water density of 61.54 lbm/ft³ at a pool temperature of 116 F from Assumption 4, the boron concentration is

$$(264)(1/89600)(1/61.77)(1\text{E}6) = 47.7 \text{ ppm.}$$

This in turn is equivalent to

$$(264 \text{ lbm})(454 \text{ g/lbm})(1/10.65 \text{ mol B/g}) = 11,254 \text{ mol B}$$

$$(11254 \text{ mol B})(1/89600 \text{ ft}^3)(1/28.32 \text{ ft}^3/\text{L}) = 4.44\text{E-}3 \text{ mol B/L}$$

Calculation of pH

The Add Acid model of STARpH 1.04 is used to determine pH vs time for the above system using the [H⁺] Added values from Table 2 and 4.44E-3 mol B/L. Proprietary information deleted
The results of the Add Acid calculation are provided in Exhibit 5.

Results

Proprietary information deleted

For time points 1 hr and 2 hr, pH is indicated simply as >8.0 on the basis of Assumption 6. From 5 hours on, the effect of cesium is neglected and pH is obtained by applying the Table 2, [H⁺] Added column to Exhibit 5. The results are shown in Table 3.

Table 3 pH Results vs. Time

<u>Time</u>	<u>pH</u>
1h	>8.0
2h	>8.0
5h	8.6
12h	8.5
1d	8.5

3d	8.4
10d	8.2
20d	8.0
30d	7.9

Conclusion

The pH of the containment water pool for the Oyster Creek radiological DBA LOCA is above 8 for most of the duration of the accident, decreasing to 7.9 at 30 days.

Exhibit 1 Radiolysis of Water Input and Output

Exhibit 2 Radiolysis of Cable, Cable Category 1, Input and Output

Exhibit 3 Radiolysis of Cable, Cable Category 2, Input and Output

Exhibit 4 Radiolysis of Cable, Cable Category 3, Input and Output

Exhibit 5 Add Acid Input and Output

ATTACHMENT 1

ESTIMATE OF DRYWELL ELECTRICAL CABLE INSULATION

TRAY SUMMARY

Total cable length (feet)= 39,145

Conductor	Total length (ft) L	% of total	Typical size	NO. Cond.	Cond. Dia/inch (ID)	Insulation thickness Inch	Wire/cable Dia/inch (Calculated OD)	Insulation Vol/Cuft	No. of cables	Cable Dia/inch (Calculated ID)	Jacket thickness inch	Typical* OD (Inch)	Jacket volume/cuft	TOTAL Volume/cuft	Remarks
1/C Power	3608	9.21	# 8AWG	1	0.146	0.06	0.266	0.973	1	0.27	0	0.27	0.000		Vulkene insulation* **
							0			0					
M/C Instr.	4,635	11.84	29/C #16	29	0.058	0.025	0.108	6.087	1	1	0.08	1.16	8.740	14.828	PVC Ins/jacket*
	9015	23.03	3/C #16sh	3	0.058	0.025	0.108	1.225	1	0.245	0.045	0.335	2.568	3.792	PVC Ins/jacket*
							0			0					
M/C Contr	6351	16.22	7C #12	7	0.092	0.03	0.152	3.551	1	0.51	0.06	0.63	4.741		Vulk Ins/geop jacket
							0			0					
Coax	5883	15.02	RG 59B/U	1	0.166	0.08	0.326	2.527	1	0.246	0.043	0.332	1.596	4.123	PVC Ins/jacket*
							0			0					
T/C	9653	24.66	2/C #16 sh	2	0.058	0.015	0.088	0.461	1	0.193	0.035	0.263	1.681	2.143	PVC Ins/jacket*
	99.98														
													TOTAL	24.885	CU FT

ATTACHMENT 1

ESTIMATE OF DRYWELL ELECTRICAL CABLE INSULATION

CONDUIT SUMMARY

Total cable length (feet): 8764

Conductor	Total length (ft)	% of total	Typical size	NO. Cond.	Cond. Dia/inch (ID)	Insulation thickness inch	Wire/cable Dia/inch (Calculated OD)	Insulation Vol/Cuft	No. of cables	Cable Dia/inch (Calculated ID)	Jacket thickness inch	Typical* OD (Inch)	Jacket volume/cuft	TOTAL Volume/cuft	Remarks
M/C Instr	2756	31.44	3/C #16sh	3	0.058	0.025	0.108	0.374	1	0.245	0.045	0.335	0.785	1.159	PVC ins/jacket**
							0			0					
M/C Contr	3879	44.26	7C #12	7	0.092	0.03	0.152	2.169	1	0.51	0.06	0.63	2.895		Vulk ins/geop jacket
							0			0					
1/C Instr	2129	24.3	2/C #16sh	2	0.058	0.015	0.088	0.102	1	0.193	0.035	0.263	0.371	0.473	PVC ins/jacket**
													TOTAL	1.632	CU FT

NOTES:

- * where jacketed, OD includes jacket thickness
 - ** jacket material not known, assumed PVC for conservatism.
 - *** Vulkene is a thermoplastic chemically cross-linked polyethylene
Geoprene is GE trade name for Neoprene
- 1/C instr and control quantities negligible compared to M/C instr and control.
Therefore, M/C instr and control quantities indicated above include 1/C instr and control quantities.

Notes for Insulation quantity Calculations:

Refer to ETTS 34896 for the estimate of cable lengths and jacket and insulation thickness information
The formula for calculating volume (cu ft) of a pipe shaped object is $\text{Pi} \times n \times L / 576 \times ((\text{OD}-\text{ID}) \times (\text{OD}+\text{ID}))$
Where Pi is 180 degrees in radians
n is number of conductors in the cable
L is cable length in feet
OD is outside diameter of cable with jacket or conductor&insulation in inch
ID is the inside diameter of the cable with jacket or conductor diameter in inch
Conductor diameters are for stranded copper conductors from Okonite Catalog

ENCLOSURE 3

**POLESTAR APPLIED TECHNOLOGY, INC.
AFFIDAVIT CERTIFYING REQUEST FOR
WITHHOLDING FROM PUBLIC DISCLOSURE**

Polestar Applied Technology, Inc.

AFFIDAVIT

I, David E.W. Leaver, being duly sworn, depose and state as follows:

- (1) I am a Principal and an Officer of Polestar Applied Technology, Inc. ("Polestar") and am responsible for the function of reviewing the information described in paragraphs (2) and (8) which is sought to be withheld, and have been authorized to apply for its withholding.
- (2) The information sought to be withheld is contained in portions of Polestar-prepared report PSAT 05201H.05 (see paragraph (8)). This report has been prepared for Exelon in support of an Exelon submittal to NRC on alternate source term (AST). The Polestar report addresses post-accident sump pH at the Oyster Creek Nuclear Generating Station.
- (3) In making this application for withholding of proprietary information of which it is the owner, Polestar relies upon the exemption from disclosure set forth in the NRC regulations 10 CFR 9.17(a)(4), 2.390(a)(4), and 2.390(b)(1) for "trade secrets and commercial or financial information obtained from a person and privileged or confidential" (Exemption 2.390(a)(4)). The material for which exemption from disclosure is here sought is all "confidential commercial information".
- (4) Some examples of categories of information which fit into the definition of proprietary information are:
 - a. Information that discloses a process or method, including supporting data and analyses, where prevention of its use by Polestar's competitors without license from Polestar constitutes a competitive economic advantage over other companies.
 - b. Information which, if used by a competitor, would significantly reduce his expenditure of resources or improve his competitive position in the analysis, design, assurance of quality, or licensing of a similar product;
 - c. Information which reveals cost or price information, production capacities, budget levels, or commercial strategies of Polestar, its customers, or its suppliers;
 - d. Information which reveals aspects of past, present, or future Polestar customer-funded development plans and programs, of potential commercial value to Polestar;
 - e. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in both paragraphs (4)a and (4)b, above.

- (5) The information sought to be withheld was submitted to Exelon (and, we trust, to NRC) in confidence. The information is of a sort customarily held in confidence by Polestar,

and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by Polestar, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

- (6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge. Distribution of such documents within Polestar is limited to those with a need to know.
- (7) The approval of external release of such a document typically requires review by the project manager, and the Polestar Principal closest to the work, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside Polestar are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.
- (8) The information identified in paragraph (2), above, is classified as proprietary because it contains detailed information on and results from trade secret methodologies developed by Polestar and applied under the Polestar 10 CFR 50, Appendix B Quality Assurance Program. The trade secret information is identified in **[[double bold brackets]]** in the calculation. Specifically:

Pages 3, 4, 5, and 6 – dealing with Assumptions 3, 4, 5, and 6 related to (1) Polestar's knowledge of possible forms of acids and temperature phenomena in containment and how to address these effects in a pH calculation, and (2) Polestar's knowledge of cesium chemistry and alternative chemical forms (i.e., other than CsOH).

Page 7 – a list of key references that were used in Polestar's pH models

Page 8 – a reference to an assumption that was proprietary

Pages 9, 10, 11, 12, and 13 – details of the calculation of conversion factors used in the determination of the amount of acid generated by the cables

Page 13 – information on the calculation of the sodium pentaborate boron buffer

Page 14 – details on the calculation of the effect of the boron buffer

Pages 16 – 20 – the inputs and outputs of the Polestar pH calculational models

The trade secrets used in this Oyster Creek Nuclear Generating Station work are several of a number of Polestar developed methods, models, and codes. Development of these methods, models, and codes was achieved at a significant cost to Polestar, well over \$100,000, which is a significant fraction of internal research and development resources available to a company the size of Polestar.

The development of the methods, models and codes, along with the interpretation and application of the results, is derived from the extensive experience database that constitutes a major Polestar asset.

- (9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to Polestar's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of Polestar's comprehensive technology base on application of the AST to operating plants and advanced light water reactors, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with methods which have been developed and are being maintained in accordance with 10 CFR 50, Appendix B requirements.

The research, development, engineering, analytical and review costs comprise a substantial investment of time and money by Polestar.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

Polestar's competitive advantage will be lost if its competitors are able to use the results of the Polestar experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to Polestar would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive Polestar of the opportunity to exercise its competitive advantage to seek an adequate return on its relatively large investment in developing these very valuable analytical tools.

STATE OF CALIFORNIA)
)
COUNTY OF SANTA CLARA) ss:

David E.W. Leaver, is being duly sworn, deposes and says:

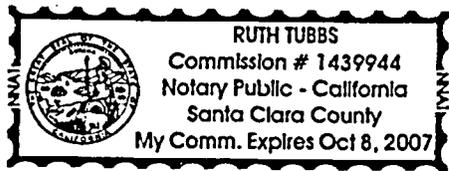
That he has read the foregoing affidavit and the matters stated therein are true and correct to the best of his knowledge, information, and belief.

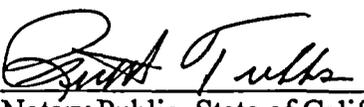
Executed at Los Altos, California, this 18th day of October 2005.



David E.W. Leaver
Polestar Applied Technology, Inc.

Subscribed and sworn before me this 18th day of October 2005.





Notary Public, State of California