Exelon Nuclear

Exelon Generation
4300 Winfield Road
Warrenville, IL 60555

www.exeloncorp.com

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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Dresden Nuclear Power Station, Units 2 and 3
Facility Operating License Nos. DPR-19 and DPR-25
NRC Docket Nos. 50-237 and 50-249

Subject: Additional Information Regarding Request for License Amendment for Pressure-Temperature Limits

Reference: Letter from P. R. Simpson, (Exelon Generation Company, LLC) to U. S. NRC, "Request for Changes Related to Technical Specifications Section 3.4.9, 'Reactor Coolant System Pressure and Temperature Limits,'" dated February 27, 2003

In the referenced letter, Exelon Generation Company (EGC), LLC, requested a change to Facility Operating License Nos. DPR-19 and DPR-25 and the Technical Specifications (TS) for Dresden Nuclear Power Station, Units 2 and 3, regarding reactor coolant system pressure and temperature limits.

In a communication from Mr. L. W. Rossbach on June 30, 2003, and a subsequent teleconference on August 14, 2003, the NRC requested additional information concerning this proposed change. The enclosures to this letter provide the requested information as follows.

1. Enclosure 1 contains a non-proprietary version of the information and an affidavit supporting withholding from public disclosure.
2. Enclosure 2 provides the requested information in a proprietary version furnished by General Electric (GE) Company.

The enclosed responses contain proprietary information. GE, as the owner of the proprietary information, has executed the enclosed affidavit, which identifies that the enclosed proprietary information has been handled and classified as proprietary, is customarily held in confidence, and has been withheld from public disclosure. The proprietary information has been provided to EGC in a GE transmittal that is referenced in the affidavit. The proprietary information has been faithfully reproduced in the enclosed responses such that the affidavit remains applicable. GE has requested that the enclosed proprietary information be withheld from public disclosure in accordance with 10 CFR 2.790, "Public inspections, exemptions, requests for withholding," and 10 CFR 9.17, "Agency records exempt from public disclosure."

AP01

Should you have any questions concerning this letter, please contact Mr. Allan R. Haeger at (630) 657-2807.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 11th day of September 2003.

Respectfully,

Patrick R. Simpson

Patrick R. Simpson
Manager, Licensing

Enclosure 1: Additional Information Regarding Request for License Amendment for Pressure-Temperature Limits (Non-Proprietary Version)

Enclosure 2: Additional Information Regarding Request for License Amendment for Pressure-Temperature Limits (Proprietary Version)

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – Dresden Nuclear Power Station
Office of Nuclear Facility Safety – Illinois Department of Nuclear Safety

Enclosure 1

Additional Information Regarding Request for License Amendment for Pressure-Temperature Limits (Non-Proprietary Version)

NRC RAI 1

The basis for the pressure-temperature (P-T) limit curves is explained in Attachment 4 to the February 27, 2003 letter from the licensee. The local stresses for determining the stress intensity factor, K_I for the Bottom Head Pressure Test curve was determined from a [[ ]] control rod drive (CRD) nozzle [[ ]] analysis [[ ]] in Attachment 4 of the licensee application).

a) Identify the computer codes that were used in the finite element stress analysis. Were the computer codes approved by the NRC? How were the codes benchmarked? Were the codes benchmarked to a code approved by the NRC?

b) Discuss briefly the assumptions and the inputs to the stress analysis.

GE Response

a) [[ ]] The codes, assumptions, and inputs are identified in the discussion below. Specific information regarding NRC approval is not available; the information available regarding benchmarking is provided below. It may be noted that the information in the [[____________]] report has been used since the early 1980's as the basis for all PT curves provided by General Electric Nuclear Energy (GENE). This stress analysis uses commonly accepted practices and their applications are consistent with the American Society of Mechanical Engineers (ASME) Code, Section III. In the [[______________]] report, finite element analyses were used rather than hand calculations to determine the appropriate stresses.

b) Codes, assumptions and inputs are described below:

Thermal Analysis

The thermal analysis uses the HAP program; this program is also used for the thermal stress analysis. Assumptions include modeling the length of the CRD housing to minimize end effects. Inputs include material properties, geometry of the component, heat transfer coefficients for the different flow conditions, fluids (i.e., air, water, and insulated) and regions, and the thermal transient definition. Engineering judgment was used to determine the limiting transients. Only the limiting thermal transients (i.e., rated power normal operation, including CRD isolation and single rod scram, loss of feedwater pumps, and safety valve blowdown) were evaluated. A system of node pairs was selected to determine thermal gradients based on previous experience with the regions where high thermal stresses are expected. The times into each transient when the thermal gradients peaked were considered for analysis in the stress analysis.

Stress Analysis

A finite element model is used to determine the primary and secondary stresses as well as the peak stress intensity ranges consistent with the methods of the ASME Code. An assumed axisymmetric geometry is used to model the actual three-dimensional configuration; all but the central CRD housing are non-axisymmetric. Experimental work was used to adjust the stresses for the central CRD housing model to simulate the stresses in the most highly stressed housing-to-shell junction at the outermost (hillside) geometry. The stresses are simulated by increasing the shell pressure on the vessel and using a factor of 3 to model the stress concentration of the penetration to match the experimental results.

Computer codes used for this evaluation include the following.

1060 & 1657 HAP – axisymmetric nonlinear heat analysis program. This is a finite element program used to determine nodal temperatures in a two-dimensional or axisymmetric body subjected to transient disturbances. The temperature results have been verified by comparing the results to sample problems solved both by hand and by using the CBI program TGRV.

992 – GASP. The program uses finite element methods to determine the stresses and displacements of plane or axisymmetric structures. Loadings may be thermal, mechanical, accelerational or a combination of these. Further description is provided in Wilson, E.L., "A Digital Computer Program for the Finite Element Analysis of Solids with Non-Linear Material Properties", Aerojet General Corporation, Sacramento, CA, Technical Memorandum No. 23, July 1965. Hand calculations were performed by GE to confirm that the stresses for the limiting normal and upset transient [[ ]] are reasonable. The hand calculations are discussed in the response to RAI 3. The hand calculations included the following.

$\sigma_{mth} = E\alpha\Delta T/2(1-\nu)$ where E = modulus of elasticity, α = coefficient of thermal expansion, ΔT = through wall temperature difference, ν = Poisson's ratio. Also σ_{mp} = PR/t, where P = pressure, R = radius of the vessel, and t = thickness.

1684 – DUNHAM'S. This code is similar to GASP, but is able to handle non-axisymmetric loads.

NRC RAI 2

To determine whether the [[ ]] CRD [[ ]] analysis was applicable to Dresden, the CRD and bottom head were analyzed in accordance with [[ ]] in Attachment 4 and the recirculation outlet nozzle was analyzed in accordance with [[ ]] in Attachment 4. It was determined that the recirculation nozzle in Dresden was more limiting than the [[ ]] analysis and the [[ ]]

a) Describe the analyses that were performed in [[ ]] Identify the computer codes that were used in the [[ ]] Were the computer codes approved by the NRC? How were the codes bench marked? Were the codes benchmarked to a code approved by the NRC?

b) [[ ]] How were Dresden specific geometries considered when performing these analyses? [[ ]]

GE Response

a) [[ ]]

The computer codes used in [[ ]] are the same as those discussed in Question 1. Reference 18 used calculations based upon WRC Bulletin 175, "PVRC Recommendations on Toughness Requirements for Ferritic Materials", dated August 1972.

b) The value for T-RT_{NDT} for the CRD nozzle was obtained from finite element analysis in Reference 16 and generated using K_{Ia} (see top of page 27 of Attachment 4) and the 1989 ASME Code, Section III or XI, Appendix G, Figure G-2214-1 M_m.

Basis for Use of CRD Nozzle T-RT_{NDT} of 161°F

A CRD nozzle bottom head pressure of 1593 psig is used to generate the K_I that is applied to the unadjusted bottom head (CRD) T-RT_{NDT} P-T curve. A K_I value of 154.3 ksi-in$^{1/2}$, generated using a bottom head pressure of 1593 psig, is used for the unadjusted curve at a steam dome pressure of 1563 psig. In addition, the T-RT_{NDT} is conservatively calculated using K_{Ia} rather than K_{Ic}.

The calculations for K_I and T-RT_{NDT} are shown below:

The CRD penetration stresses obtained from Reference 16 are consistent with a spherical shell with a penetration; that is, the stress determined using 3 times nominal pressure stress.

		(ksi)			(ksi)			(inches)
σ_{pm}	=	35.87	σ_{sm}	=	0.30	t	=	8
σ_{pb}	=	-0.30	σ_{sb}	=	1.50			
σ_{ys}	=	47.68						

The value of M_m from Figure G-2214-1 was based on a thickness of 8 inches; therefore $t^{1/2} = 2.83$, $\sigma/\sigma_{ys} = 0.78$ and $M_m = 2.83$.

K_{Im} and K_{Ib} are calculated from Paragraph G-2214.1:

$$\begin{aligned} K_{Im} &= M_m * \sigma_{pm} \\ &= 2.83 * 35.87 \\ &= 101.5 \text{ ksi-in}^{1/2} \end{aligned}$$

$$\begin{aligned} K_{Ib} &= (2/3)\, M_m * \sigma_{pb} \\ &= (2/3)\, 2.83 * (-0.30) \\ &= -0.60 \text{ ksi-in}^{1/2} \end{aligned}$$

The total K_I, including a safety factor of 1.5 on primary stress, is therefore:

$$\begin{aligned} K_I &= 1.5\,(K_{Im} + K_{Ib}) + M_m * (\sigma_{sm} + (2/3) * \sigma_{sb}) \\ &= 1.5\,(101.5 + -0.60) + 2.83 * (0.30 + (2/3)*1.50) \\ &= 154.3 \text{ ksi-in}^{1/2} \end{aligned}$$

Solving for $T\text{-}RT_{NDT}$ for a specific K_I using the curve in Figure G-2210-1:

$$\begin{aligned} T\text{-}RT_{NDT} &= \ln[(K_I - 26.78) / 1.223] / 0.0145 - 160 \\ &= \ln[(154.3 - 26.78) / 1.223] / 0.0145 - 160 \\ &= 161°\text{F} \end{aligned}$$

Using $K_I = 154$ ksi-in$^{1/2}$, $T\text{-}RT_{NDT}$ for the CRD nozzle is 161°F, based upon a bottom head pressure of 1593 psig. For the purpose of determining the limiting CRD discontinuity, the $T\text{-}RT_{NDT}$ of 161°F is used to conservatively represent a steam dome pressure of 1563 psig.

Recirculation Outlet Nozzle

For the evaluation for the recirculation outlet nozzle, the methods from WRC Bulletin 175, "PVRC Recommendations on Toughness Requirements for Ferritic Materials", dated August 1972 are used from [[ ]]

NRC RAI 3

In Reference 1, Section 4.3.2.1.2, "Core Not Critical Heatup/Cooldown - Non-Beltline Curve B (Using Bottom Head)," presents (on page 28) a comparison between the stresses, which result in the vessel bottom head from two transient conditions versus those generated for the CRD curve. Provide additional information regarding your analysis of the identified transient conditions, which demonstrates that the results summarized in Section 4.3.2.1.2 are directly comparable when all vessel and penetration geometry correction factors have been applied equivalently.

GE Response

The original assumption for the CRD (bottom head) Curve B (core not critical heat-up/cool-down) was that the [[

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As a result of the NRC question, the stress report was further reviewed and K_I values for the limiting normal and upset transients were determined. [[

]] Further finite-element evaluation would be required to confirm that the assumption is correct.

Therefore, the following statements in the DNPS PT reports cannot be confirmed at this time:

[[

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However, when using the limiting normal and upset thermal transient with plant specific geometry and a less conservative plant specific initial RT_{NDT}, the CRD Curve B in the report is bounding. See the calculation provided at the end of the response to Question 3.

Therefore, the statements in the DNPS PT Reports have been revised as discussed below.

The following paragraph should be removed from the report.

[[

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The following paragraph should be inserted in place of the removed paragraph.

"[[

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Figures 4-2a and 4-2b are replaced with a diagram of the appropriate transient, because the analysis to develop the P-T curves was revised to consider only normal and upset conditions and not the emergency and faulted conditions as originally defined.

[[

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Justification Of Generic Evaluation For The Plant Specific Application

The P-T curve is dependent on the calculated K_I value, and the K_I value is proportional to the stress and the crack depth as shown below:

$$K_I \propto \sigma (\pi a)^{1/2}$$

Where: $\sigma = PR/t$ and $a = t/4$

Therefore, $(PR/t)\ (\pi t/4)^{1/2} \propto R/t^{1/2}$

The stress is proportional to R/t and, for the P-T curves, crack depth, *a*, is t/4. Thus, K_I is proportional to $R/(t)^{1/2}$. So when $R/(t)^{1/2}$ is greater, K_I is greater, and $T\text{-}RT_{NDT}$ is greater, confirming that the generic case is bounding.

Therefore the DNPS specific geometries were considered when performing these analyses as shown in Equations (4-2) and (4-3) of Attachment 4 to the application (hereinafter referred to as "the report"), to evaluate $R/t^{1/2}$. Equation (4-2) uses the generic BWR/6 bottom head dimensions, while Equation (4-3) demonstrates the plant specific DNPS calculation. As stated in the report, because the generic result of Equation (4-2) is greater than the plant-specific DNPS result of Equation (4-3), the generic P-T curve for the bottom head (CRD) region is conservative when applied to either DNPS unit.

As explained in Section 4.3.2.1 of the report, P-T limit plots were developed only for the feedwater and bottom head (CRD) nozzles. [[

]] As shown in Tables 4-6 and 4-7, each discontinuity in the RPV that requires fracture toughness evaluation (those not requiring evaluation are described in detail in Appendix A) is bounded by one of the curves. [[

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NRC RAI 4

To determine whether the [[ ]] feedwater nozzle [[ ]] for the upper head and feedwater pressure test limits were applicable to Dresden, the feedwater nozzles were analyzed in accordance with [[ ]] in Attachment 4 and the steam outlet nozzle was analyzed in accordance with [[ ]] in Attachment 4. It was determined that the feedwater nozzle was more limiting.

a. Describe the analyses that were performed in [[ ]] Identify the computer codes that were used in the [[ ]] Were the computer codes approved by the NRC? How were the codes benchmarked? Were the codes benchmarked to a code approved by the NRC?

b. [[ ]] How were specific geometries considered when performing these analyses? [[ ]]

GE Response

a) [[ ]] The Codes, inputs and assumptions are identified and discussed in the response to Question 1. The codes used in [[ ]] are the same as those used in [[ ]] Specific information regarding approvals is not available; the information available regarding benchmarking is provided in the response to Question 1. It may be noted that the information in the [[ ]] reports have been used since the early 1980's as the basis for all P-T curves provided by GENE. These stress analyses use commonly accepted practices and their applications are consistent with the ASME Code. In these reports, finite element analyses were used as opposed to hand calculations to determine the appropriate stresses.

b) The value for T-RT_{NDT} for the FW nozzle was obtained from [[ ]] and generated using K_{Ia} (see bottom of page 34 of Attachment 4). [[ ]]

Basis for Use of FW Nozzle T-RT_{NDT} of 166°F

Based on the bounding FW nozzle dimensions noted in the calculation below, the K_I of 200 ksi-in$^{1/2}$ at a pressure of 1563 psig, used to generate the unadjusted upper vessel T-RT_{NDT} P-T curve, is conservative. Therefore, by adding a conservative adjustment to the already conservative T-RT_{NDT} curve, it is demonstrated that all possible discontinuities are bounded.

The following discussion demonstrates how the RT_{NDT} adjustment required for the T-RT_{NDT} curve is determined in order to assure that all components are bounded.

T-RT_{NDT} for the FW nozzle is 166°F, based on conservatively bounding dimensions as shown below, and conservatively uses T-RT_{NDT} calculated using K_{Ia} (see page 34) rather than K_{Ic}. The calculations for K_I and T-RT_{NDT} are shown below.

BWR/6 251-inch dimensions:

Vessel Radius, R	126.7 inches
Vessel Thickness, t	6.5 inches
Vessel Pressure, P	1563 psig

Pressure Stress : $\sigma = PR/t$ = 1563 psig * 126.7 inches / 6.5 inches = 30466 psi

The factor $F(a/r_n)$ from Figure A5-1 of WRC Bulletin 175 is 1.6 where:

a = Lesser of ¼ t_n or ¼ t_v = 1.63 inches
t_n = Thickness of nozzle = 7.13 inches
t_v = Thickness of vessel = 6.5 inches
r_n = Apparent radius of nozzle = $r_i + 0.29\, r_c$ = 7.16 inches
r_i = Actual inner radius of nozzle = 6 inches
r_c = Nozzle radius (nozzle corner radius) = 4 inches

Thus, $a/r_n = 1.63 / 7.16 = 0.23$, and $F(a/r_n)$ is 1.6.

Including the safety factor of 1.5, the stress intensity factor, K_I, is calculated:

$$K_I = 1.5 * \sigma (\pi a)^{1/2} * F(a/r_n)$$
$$K_I = 1.5 * 30.466 (\pi * 1.63)^{1/2} * 1.6 = 165 \text{ ksi-in}^{1/2}$$

The method to solve for T-RT_{NDT} for a specific K_I is based on the curve in Figure G-2210-1 in ASME Code Appendix G:

$$\begin{aligned} T\text{-}RT_{NDT} &= \ln[(K_I - 26.78) / 1.223] / 0.0145 - 160 \\ &= \ln[(165 - 26.78) / 1.223] / 0.0145 - 160 \\ &= 166°F \end{aligned}$$

Using $K_I = 200$ ksi-in$^{1/2}$ (page 34), T-RT_{NDT} for the FW nozzle is 181°F. However, for the purpose of determining the limiting upper vessel discontinuity, the conservative T-RT_{NDT} of 166°F is used because it is then more likely that adjustment will be needed to account for the discontinuity of another component as demonstrated below. (The demonstration does not use DNPS plant-specific initial RT_{NDT} values.)

Using T-RT_{NDT} = 166°F for the FW nozzle, and an initial RT_{NDT} for the FW nozzle of 40°F, the resulting hydrotest temperature is:

166°F + 40°F = 206°F

T-RT_{NDT} for the highest non-FW nozzle component of those listed in Table 4-6 on page 23 (the top head nozzle) is 170°F, and the initial RT_{NDT} for the top head nozzle is 40°F. Therefore, the resulting hydrotest temperature is:

170°F + 40°F = 210°F

The result of this discontinuity evaluation is that the upper vessel T-RT_{NDT} curve must be adjusted by 40°F for the FW nozzle plus an additional 4°F (210°F – 206°F) to be bounding for the most limiting component, which is the top head nozzle.

Performing the same evaluation, but using T-RT_{NDT} of 181°F for the FW nozzle, the comparison of hydrotest results follows:

181°F + 40°F = 221°F, representing the FW nozzle
170°F + 40°F = 210°F, representing the top head nozzle

The result is that the upper vessel T-RT_{NDT} curve is adjusted by only 40°F to be bounding for both the FW nozzle and the top head nozzle, because the FW nozzle is bounding.

Therefore, use of the lower T-RT_{NDT} value (166°F) results in a more conservative P-T curve for the upper vessel region, thereby assuring that the most limiting discontinuity is bounded.

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Justification Of Generic Evaluation For The Plant Specific Application

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In the DNPS, Unit 2 example, the initial RT_{NDT} of the FW nozzle is directly added to the upper vessel (FW) plot. As explained in Section 4.3.2.1 of the report, P-T limit plots were developed only for the feedwater and bottom head (CRD) nozzles. [[

]] As shown in Tables 4-6 and 4-7, each discontinuity in the RPV that requires fracture toughness evaluation (those not requiring evaluation are described in detail in Appendix A) is bounded by one of the curves. [[

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NRC RAI 5

For the core not critical heatup/cooldown limit curve, the feedwater nozzle was identified as the limiting discontinuity because its stress conditions are the most severe in the vessel and it experiences cold feedwater flow relative to the vessel. Stresses were taken from a [[ ]] Compare the geometry of the feedwater nozzle and vessel in the finite element analysis to that in Dresden and explain why the stress resulting from the [[ ]] is equivalent or bounding for the Dresden feedwater nozzle and vessel geometry.

GE Response

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The thermal stresses are proportional to the thickness in which a larger thickness produces a larger thermal stress. The equation for thermal stress is $E\alpha\Delta T/(2*(1-\nu))$* where ΔT is greater for a shell with a larger thickness. Therefore the thermal stress is bounding for the [[ ]] The thermal stress in the K_I solution has a safety factor of 1.0. Pressure stress = PR/t and the pressure stress is bounding for DNPS, however, K_I is proportional the stress and $t^{1/2}$, therefore K_I for the pressure stress is also bounding for the pressure condition. The pressure stress has a safety factor of 2.0 for the core-not-critical condition. Since K_I for the primary and secondary stress are bounding for the [[ ]] dimensions, the [[ ]] geometry is bounding.

* - E = modulus of elasticity, α = coefficient of thermal expansion, ΔT = through wall temperature difference, ν = poisons ratio.

General Electric Company

AFFIDAVIT

I, David J. Robare, state as follows:

(1) I am Technical Projects Manager, Technical Services, General Electric Company ("GE") and have been delegated the function of reviewing the information described in paragraph (2) 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 the GE letter dated September 9, 2003, "Dresden PT RAI Responses." The proprietary information is delineated by a double underline inside double square brackets. Figures and large equation objects are identified with double square brackets before and after the object. In each case, the superscript notation$^{\{3\}}$ refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner, GE relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.790(a)(4) for "trade secrets" (Exemption 4). The material for which exemption from disclosure is here sought also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

(4) Some examples of categories of information which fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by General Electric's competitors without license from General Electric constitutes a competitive economic advantage over other companies;

b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information which reveals aspects of past, present, or future General Electric customer-funded development plans and programs, resulting in potential products to General Electric;

d. 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 paragraphs (4)a., and (4)b, above.

(5) To address 10 CFR 2.790 (b) (4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GE, 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 GE, 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. Access to such documents within GE is limited on a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GE 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 methods and processes, which GE has developed and applied to pressure-temperature curves for the BWR over a number of years. The development of the BWR pressure-temperature curves was achieved at a significant cost, on the order of ¾ million dollars, to GE.

The development of the evaluation process along with the interpretation and application of the analytical results is derived from the extensive experience database that constitutes a major GE asset.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GE's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GE's comprehensive BWR safety and technology base, 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 NRC-approved methods.

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

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.

GE's competitive advantage will be lost if its competitors are able to use the results of the GE 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 GE 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 GE of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed on this 9TH day of SEPTEMBER 2003.

David J. Robare
General Electric Company