Commonwealth Edison Company
Dresden Generating Station
6500 North Dresden Road
Morris, IL 60450
Tel 815-942-2920

ComEd

March 26, 1997

JMHLTR: 97-0039

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

Subject: Dresden Nuclear Power Station Units 2 and 3
Additional Information Regarding Application for Amendment to Facility Operating Licenses DPR-19 and DPR-25, Appendix A, Technical Specifications, **Section 3/4.7.K, "Suppression Chamber," and Section 3/4.8.C, "Ultimate Heat Sink."** Docket Nos. 50-237 and 50-249

References:

a) J. Stephen Perry Letter to U.S. NRC, dated February 17, 1997; Dresden Nuclear Power Station Units 2 and 3, Application for Amendment to Facility Operating Licenses DPR-19 and DPR-25, Appendix A, Technical Specifications, Section 3/4.7.K, "Suppression Chamber," and Section 3/4.8.C, "Ultimate Heat Sink."

b) J. Stephen Perry Letter to U.S. NRC, dated February 27, 1997, Dresden Nuclear Power Station Units 2 and 3, Additional Information Regarding Application for Amendment to Facility Operating Licenses DPR-19 and DPR-25, Appendix A, Technical Specification.

c) J. F. Stang Letter to Irene Johnson, dated March 13, 1997, Request for Additional Information (TAC Nos. M97983 and M97984).

d) J. F. Stang Letter to Irene Johnson, dated March 21, 1997, Request for Additional Information (TAC Nos. M97983 and M97984).

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Pursuant to 10 CFR 50.90, ComEd has requested your approval of changes to Facility Operating Licenses DPR-19 and DPR-25 through the above reference (a). The purpose of this letter is to respond to a request for additional information based on reference (d) and a March 13, 1997 meeting between ComEd and your Staff in Washington D.C. In response to your request, ComEd is providing 1) status of supporting calculations, 2) Response to the Requests for Additional Information in accordance with the above Reference (c) and (d), and 3) revised values for containment overpressure versus time to address issues identified during discussions with the NRC Staff.

Within 180 days, ComEd will complete a containment analysis which includes a 2-sigma uncertainty factor on the ANS 5.1-1979 3.4 year Decay Heat Curve in accordance with Table 3.2 of G.E. Design Specification 23A6938. Reanalysis of the Environmental Qualification of Electrical Equipment, Low Pressure ECCS Pump Net Positive Suction Head Calculation, and Torus Attached Piping will also be completed in this time frame. The following assumptions will also be incorporated into the analysis with the 2-sigma uncertainly: 1) vessel modeling to include realistic modeling of the enthalpy content of the reactor fluid, and 2) use of the actual ECCS pump efficiency when converting pump horsepower to heat in the suppression pool.

Status of Supporting Calculations

Torus Attached Piping-References (a) and (b) provided an assessment that the piping systems and supports were within UFSAR allowable stress limits for a postulated torus long term post-LOCA heat up to 180 degrees F, and referenced ongoing calculations to verify this data. The assessment was based upon the belief that sufficient margin existed to preclude the need for detailed hangar evaluations. It has subsequently been discovered that portions of the expected margin have been previously utilized and the new detailed stress evaluations will be required to verify the acceptability of the higher suppression pool temperature. ComEd will complete all supporting calculations demonstrating all piping systems and supports will remain within UFSAR allowable limits prior to implementation of this License Amendment on Unit 2. For Unit 3, calculations will demonstrate that all piping systems and supports will be within UFSAR allowable limits prior to startup from the currently scheduled refueling outage, D3R14, scheduled to begin March 29, 1997.

Environmental Qualification-The environment has changed due to the postulated higher suppression pool temperature of 176 degrees F. The increased temperature parameter affects the Reactor Building Corner Rooms, Torus Area and the Reactor Building General Areas. ComEd has concluded that Dresden Station remains in compliance with 10 CFR 50. 49. Our conclusion is based on equipment testing which bounds the environmental conditions caused by the DBA-LOCA.

Electrical Loading-The impact of the higher than rated pump flow on the brake horsepower requirements for the Core Spray and LPCI motors has been reviewed. The conclusion in the UFSAR Section 8 that the loading on the emergency diesel generator is within its capacity has not changed.

Requests for Additional Information

Answers to the requests for additional information as provided to ComEd in references (c) and (d) are provided in attachment 1 to this letter. All questions are answered with the exception of question 1 to reference (d) which, through discussion with the NRC Staff, was deleted from the request.

Containment Overpressure

In order to provide adequate net positive suction head for the low pressure ECCS pumps, ComEd proposes to credit the available containment pressure as outline below:

Time Period (seconds)	Containment Overpressure (psig)
0-240	9.5
240-480	2.9
480-6000	1.9
6000-accident termination	2.5

The containment overpressure provides an NPSH margin of approximately 3.0 psig at time of PCT (~170 seconds). Under worst case accident conditions (i.e. LPCI loop select logic failure), the Core spray and Low Pressure Coolant Injection Pumps cavitate from 260-600 seconds. Graphs of the available containment pressure and credited containment pressure are provided in attachment 2 to this letter.

The information provided herein has been reviewed by the onsite review groups in accordance with Company procedures and policies.

ComEd is notifying the State of Illinois of this application for amendment by transmitting a copy of this letter and its attachments to the designated state official.

To the best of my knowledge and belief, the statements contained in this document are true and correct. In some respects these statements are not based on my personal knowledge, but on information furnished by ComEd employees, contractor employees, and/or consultants. Such information has been reviewed in accordance with company practice, and I believe it to be reliable.

If there are any questions regarding this issue, please contact Frank Spangenberg of my staff at (815) 942-2920, extension 3800.

Sincerely,

J. M. Heffley
Station Manager
Dresden Station

Signed before me on this 26 day,
March, 1997,
by Sherry L. Butterfield
Notary Public

OFFICIAL SEAL
SHERRY L BUTTERFIELD
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES:05/23/00

Attachments: 1) Responses to References (d) and (e) Requests for Additional Information.
2) Graphs of Available and Credited Containment Overpressure.

cc: A. Bill Beach, Regional Administrator - RIII
Senior Resident Inspector -Dresden
J. F. Stang, Dresden Project Manager, NRR
Office of Nuclear Facility Safety - IDNS

Attachment 1
Responses to References (d) and (e)
Requests for Additional Information

J.F. Stang Letter to Irene Johnson, dated March 13, 1997, Request for Additional Information (TAC Nos. M97983 and M97984).

QUESTION 2

Specify how the length of time at full power operation before shutdown was estimated, and confirm that this value is 1.26 years, as specified in reference 32, "Letter from S. Mintz to J. Nash, Review of NRC Information Notice 96-39, February 7, 1997," of your February 17, 1997 license amendment request. Why was a value 1.26 years chosen for the time at full power, versus 3.4 years. Comment on the differences between using 1.26 years versus 3.4 years.

RESPONSE TO QUESTION 2

An irradiation time of 1.26 years was used to generate the GE generic decay heat used in the Dresden analysis. This irradiation time was meant to be representative of a realistic midcycle irradiation period for BWR plants. It was not intended to be a bounding end of cycle time for any specific plant. Therefore, the length of time at full power before shutdown for Dresden was not used as an input to the generic decay heat calculation. It was considered acceptable to use a generic decay heat based on a realistic irradiation time of 1.26 years due to the small sensitivity of the decay energy to this parameter for the time periods of concern.

The reason that the generic decay heat based on 1.26 years was used for the Dresden containment analysis as opposed to the generic decay heat based on 3.4 years (Reference 1) is that the Reference 1 decay heat was not yet in use for domestic BWR containment analysis at the time the Dresden containment analyses were initiated in 1992. The decision was made to continue using the ANS 5.1 decay heat based on 1.26 years in the current (1996) Dresden analysis to maintain a consistent decay heat basis. This decision was justified based on the small sensitivity to the irradiation time and on the fact that the limited number of decay heat data points actually input to the GE SHEX code resulted in a decay heat addition which is conservative relative to the ANS 5.1 decay heat curve based on ANS 5.1 with either 1.26 or 3.4 year irradiation time (see Figure 1). The conservatism in the input decay heat is demonstrated by the data in Table 1 which shows that the integrated core decay heat energy up to the time of the peak suppression pool temperature, based on the decay heat inputs actually used in the Dresden SHEX analysis, is higher than the integrated energy corresponding to the decay heat table for either irradiation time. This is due to the way the decay power is input to the code as explained below.

The computer codes used to perform containment analyses do not internally calculate the decay power. Instead, the user inputs a number of points from one of the decay power tables detailed previously in this document. These user-input tables are approximations of the decay power curve, however, as the computer codes only accept a limited number of curve points from the curve.

Table 1: COMPARISON OF INTEGRATED DECAY HEAT FOR CONTAINMENT ANALYSIS

Table	Exposure GWD/ST	Irradiation Time (Year)	Integrated Decay Heat Energy Up to Time of Peak Suppression Pool Temperature (20,000 sec) (Full Power Seconds)
GENE	10	1.26	231.6
GENE	25.7	3.4	233.8
Input to SHEX Analysis for Dresden (see Fig. 1)	10	1.26	235.8

In order to calculate decay power at each time step in the analysis, the code performs linear interpolations between the decay heat data points input to the code. The decay power curve is concave upward, therefore, the linear interpolation adds conservatism to the calculations because the interpolated decay power values are always higher than the actual values on the curve.

To confirm the conservatism in the SHEX calculation, a SHEX calculation was performed for CASE 2A1 of Reference 2 using decay heat inputs based on ANS 5.1 with a 3.4 year irradiation time but with inputs which more closely match the ANS 5.1 decay heat curve. The results are summarized in Table 2. Table 2 shows that the peak suppression pool temperature obtained with the ANS 5.1-3.4 year irradiation curve is approximately 1°F lower than obtained with the ANS 5.1-1.26 year irradiation curve.

Note that the higher temperature with the use of the lower irradiation decay heat curve is attributed to the conservative application of the lower irradiation decay heat curve in generating the SHEX inputs and is not attributed to the lower irradiation time period assumed for the decay heat calculation. It is recognized that an increase in exposure will produce a slight increase in the energy released during the accident.

TABLE 2-SUMMARY OF DRESDEN SHEX ANALYSIS

CASE	2a1	2a1
DECAY HEAT	ANS 5.1-1.26 YEAR IRRADIATION TIME*	ANS 5.1-3.4 YEAR IRRADIATION TIME*
Peak Long-Term Suppression Pool Temperature (°F)	172.1	171.5

*Decay heat values are specified at different times as input to the SHEX code for the two decay heat curves. Inputs for the 3.4 year irradiation time decay heat curve were chosen such that they more closely match the ANS 5.1 decay heat curve (See Figure 1).

QUESTION 3

Page 47 of your February 17, 1997 submittal states that ANS 5.1-1979 decay heat was used "without adders." The staff has typically required an uncertainty of two standard deviations (2-sigma) when using the ANS 5.1-1979 model. Justify that your use of the ANS 5.1 model for decay heat is conservative by showing that at least two standard deviations of confidence in the decay heat is provided. Ratio versus time of the decay calculated with ANS 5.1 relative to May-Witt, ANS 5.1 with a 1-sigma uncertainty added relative to May-Witt, and ANS 5.1 with a 2-sigma uncertainty added relative to May-Witt, would be particularly helpful.

RESPONSE TO QUESTION 3

The use of ANS 5.1 decay heat without the 2 sigma adder can be justified based on a comparison of the effect of the 2 sigma adder relative to the effects of the conservatisms in the containment analysis on the peak suppression pool temperature.

EFFECT OF 2 SIGMA ADDER ON PEAK SUPPRESSION POOL TEMPERATURE

Reference 2 included a Case (S6) which used ANS 5.1+ 10 % decay heat. The results of Case S6 are compared to Case 4A1 of Reference 3 to determine the relative effect of the 10 % adder on decay heat since the only difference between these two cases is the decay heat change. All other key parameters such as heat exchanger performance are the same for the two cases. The peak suppression pool temperature for Case 4A1 is 174.4°F. The peak suppression pool temperature for Case S6 is 179.1°F. Therefore the impact of using a 10 % adder is less than 5°F. A 10 % adder is consistent with the 2 sigma uncertainty reported in Reference 4. However, a more rigorous calculation of uncertainties was used in determining the 1 sigma values reported in Reference 1. Reference 1 shows 1 sigma uncertainty values of 4 % after 10 seconds. Therefore, the actual effect of a 2 sigma adder is closer to 4°F on the peak suppression pool temperature.

CONSERVATISM IN THE CONTAINMENT ANALYSIS

There are several conservatisms in the containment analysis which are used to maximize the suppression pool temperature. These are discussed below and summarized in Table 3.

Modeling Assumptions

1. The reactor is assumed to be operating at 102 % of rated thermal power. This includes a 2 % conservatism in the initial power. The effect on peak suppression pool temperature is estimated at approximately 1°F.

2. Feedwater flow into the vessel is assumed to continue until all the feedwater which will increase the peak suppression pool temperature is injected into the vessel. In addition, a conservative calculation of the energy in the feedwater heaters and piping metal is added to the RPV/containment system. This assumption is conservative because for the limiting DBA-LOCA analysis, it is assumed that off-site power is unavailable. therefore, the FW pumps would be tripped early in the event. In addition, no credit is taken for heat transfer from feedwater heaters and feedwater metal pipe to the ambient atmosphere. The results of sensitivity studies in Reference 5 show that the effect on peak suppression pool temperature of adding the hot feedwater in the analysis is 2°F. Since it is difficult to determine without rigorous calculations exactly how much feedwater is actually injected during the LOCA the conservatism in the use of hot feedwater is not quantified.

3. The initial vessel liquid inventory includes all the water in the vessel plus the water in attached piping up to the isolation valves (i.e. recirculation loops & ECCS piping). All this water mass is treated in the SHEX computer code as a single vessel node at saturated conditions. In fact about 80 % of this water is subcooled water. The assumption of saturated conditions therefore results in an artificial increase in the energy content of the vessel inventory. It is estimated that the effect of modeling all the vessel and piping water as saturated liquid is about 2°F in peak suppression pool temperature. There may be additional conservatism in the assumption that all the liquid and associated energy in the attached piping is transferred to the suppression pool. Since this is difficult to quantify, the conservatism in the modeling of the attached piping liquid was not given.

4. It is assumed in the analysis that the torus is perfectly insulated. According to Reference 6, the heat transfer coefficient for free air convection ranges from 1 to 5 BTU/hr-ft2-°F (and neglecting radiative heat transfer), a heat transfer rate of approximately 600-1200 BTU/sec near the time of the peak suppression pool temperature is estimated. This heat transfer rate is approximately 3-6 % of the core decay heat near the time of the peak suppression pool temperature. If accounted for, it is estimated that use of heat transfer from the torus wall to the reactor building would result in a 2°F decrease in peak suppression pool temperature.

Heat transfer to metal structures inside the suppression pool (i.e. SRV piping) are also conservatively neglected.

5. All ECCS and LPCI/Containment Cooling System pumps have 100 % of their rated horsepower converted to pump heat which is added to the RPV liquid or suppression pool water. Since the typical pump efficiency is on the order of 85 %, this leaves a conservatism of about 15 % in the pump heat added to the RPV and suppression pool. For a total pump heat of 1500 hp (1 LPCI/Containment Cooling pump and 1 CS pump), 15 % pump heat corresponds to approximately 1 % of the total heat added to the pool at the time of the peak suppression pool temperature. This translates to approximately a 0.5°F change in the peak suppression pool temperature.

6. Decay heat value are input manually to the code with an input table and not calculated at each time step by the code. Interpolation between points results in an increase in the total energy release as discussed in response to Question 2 above. This conservatism, based on the results shown in Table 2 of Question 2 above is at least 0.5°F.

7. Heat exchanger performance is calculated based on design fouling factors and tube plugging. The analysis assumes heat exchanger performance with 6 % plugging and design fouling factors based on conditions at the end of the 40 year plant life. It is accepted that there will be fouling of the heat exchanger and potential for tube plugging during the plant lifetime. However, it is expected that actual fouling and plugging during the plant life will be significantly less than the design values assumed for the analysis. Presently, the maximum number of plugged tubes on any Containment Cooling heat exchangers is 3.3 % on both Dresden Unit 2 and Unit 3.

Assumptions Based on Plant Conditions at Technical Specification Limits

8. The analysis assumes that the service water is at the maximum value of 95°F. A review of the hottest condenser inlet temperature over the last three years indicates a maximum of 91°F. The lower water temperature decreases the post LOCA suppression pool temperature by 2°F for every 4°F decrease in service water temperature. Therefore, the effect of the maximum service water temperature assumption is approximately 2°F.

9. The initial suppression pool volume is at the minimum Technical Specification limit. If it is assumed that the water volume is at its nominal value, the increase in water volume is 1.5 %. It is estimated that this water volume increase would reduce the peak suppression pool temperature by 1°F.

Table 3 provides a summary of the incremental worth of each conservatism where quantified and a comparison of the total quantified worth to the effect of the 2 sigma adder. Based on the discussion provided, it is concluded that the suppression pool temperature worth of the conservatism in the containment analysis is sufficient to justify the use of ANS 5.1 nominal decay heat without a 2 sigma adder. Figure 2 compares the ratio of ANS 5.1 decay heat with 1 and 2 sigma adders with May-Witt as requested in the question.

TABLE 3-RELATIVE WORTH OF CONSERVATISM IN CONTAINMENT ANALYSIS WITH RESPECT TO PEAK SUPPRESSION POOL TEMPERATURE

Conservatism in Containment Analysis	Effect on Peak Suppression Pool Temperature (°F)
Modeling Assumptions	
Initial Reactor Power 102 % of Rated Thermal	1.0°F
Feedwater Modeling	Not Quantified
Vessel Modeling	2.0°F
Insulated Torus	2.0°F
Use of 100 % of Pump heat	0.5°F
Decay Heat Inputs to SHEX Code	0.5°F
Heat Exchanger Performance based on Design Fouling and Plugging	Not Quantified
Margins Related to Plant at T/S Limits	
Suppression Pool Volume	1.0°F
Service Water Temperature	2.0°F
Total Worth of Quantified Conservatisms in Analysis	9.0°F
Effect of 2 Sigma Adder on ANS 5.1 Decay Heat	<5.0°F

References

1. GE Design Specification 23A6938, "Decay Heat Requirements," June 1992. This is a proprietary document and is not included in this submittal

2. GE-NE-T2300740-2, "Dresden Nuclear Power Station Units 2 and 3 Containment Analyses of the DBA-LOCA Based on Long-Term LPCI/Containment Cooling System Configuration of One LPCI/Containment Cooling System Pump and 2 CCSW Pumps," December 1996. This was previously transmitted as reference 20 to reference (a).

3. Letter, S. Mintz to J. Nash, "Dresden Containment Analyses for Limiting DBA-LOCA," November 18, 1996. This was previously transmitted as reference 5 to reference (a).

4. General Electric Co., "The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident," NEDO-23785-1-A, Volume III, October 1984. This is a proprietary document and is not included in this submittal.

5. GENE-637-042-1193, "Dresden Nuclear Power Station Units 2 and 3 Containment Analyses of the DBA-LOCA to Update the Design Basis for the LPCI/Containment Cooling System, February 1994. This was previously transmitted as reference 11 to reference (a).

6. "Principles of Heat Transfer", Frank Kreith, International Textbook Co., 1958.

7. Letter Ashok Thadani (NRC) to Gary L. Sozzi (GENE), "Use of SHEX Computer Program and ANSI/ANS 5.1-1979 Decay Heat Source Term for Containment Long-Term Pressure and Temperature Analysis," dated July 13, 1993. This document is enclosed.

<u>John F. Stang Letter to Irene Johnson dated March 21, 1997, Request for Additional Information (TAC Nos. M97983 and M97984).</u>

QUESTION 1

Has the occurrence of a stuck open relief valve (SORV) discharging to the suppression pool been considered from a minimum pressure perspective? It may be possible that a relief valve could fail to shut and heat up the suppression pool, but not immediately heat the containment. If the emergency core cooling system (ECCS) pumps would start under such an occurrence, this may be the limiting case, from a minimum pressure perspective, for net positive suction head (NPSH).

RESPONSE TO QUESTION 1

The SORV event for Dresden Station represents a slow depressurization of the Reactor Pressure Vessel over time. This event was analyzed for Dresden as part of the Mark I containment analysis program, to investigate the potential for S/RV discharge at elevated pool temperatures with respect to condensation stability (local pool temperature) limits. This analysis evaluated two SORV cases, both at power, but one case postulating spurious isolation. The results of these analyses showed peak suppression pool temperatures in the range of 131°F for the first case, without isolation and a single loop of pool cooling available, and 129°F for the isolation case, with two cooling loops postulated. Both cases assumed feedwater remained available throughout the event, to maximize vessel pressure and increase suppression pool heat load. ECCS operation was limited to the operation of LPCI in pool cooling mode. Although it was not calculated, the containment pressurization for this event would be limited to the thermal effects of gradual heating of the suppression pool airspace.

For an SORV event without feedwater, initiation of Core Spray and LPCI pumps would occur on a reactor vessel low low water level signal and injection would occur at much higher vessel pressures than experienced in the DBA LOCA scenarios analyzed as part of this amendment. This condition would require less net positive suction (NPSH) head due to lower low pressure ECCS flowrates. The DBA LOCA case with assumed failure of the LPCI loop selection logic yields maximum required injection flow rates opposed by minimum vessel pressures as well as the highest integrated ECCS flow of any case, which places the highest NPSH demands on the ECCS pumps. The long term LOCA analyses, while developing modest amounts of overpressure, produce the highest suppression pool temperatures, causing NPSH available to be minimized, and requiring operator action to limit the ECCS flows to maintain adequate margin with respect to NPSH requirements.

QUESTION 2

In your February 17, 1997 submittal, one of the conservatisms listed in your containment pressure and suppression pool temperature analysis is:

> "Feedwater flow into the vessel is assumed to continue until all the feedwater which will increase the peak suppression pool temperature is injected into the vessel. In addition, a conservative calculation of the energy in the feedwater piping is added to the RPV/containment system."

Please include details on the degree of conservatism, versus best estimate, in the above assumption. For example, addition of energy in the feedwater piping seems to be best estimate. How is conservatism incorporated into this modeling?

Generally, discuss more fully the modeling of the feedwater addition. In particular, discuss how the individual hotwells were modeled and how their enthalpies were combined, and whether any pumps that would provide a constant flow into the vessel were assumed to be running. Again, demonstrate how the assumption is conservative versus best-estimate.

RESPONSE TO QUESTION 2

This response is a repeat of item 2 to question 3 of J.F. Stang Letter to Irene Johnson, dated March 13, 1997, request for Additional Information (TAC Nos. M97983 and M97984).

Feedwater flow into the vessel is assumed to continue until all the feedwater which will increase the peak suppression pool temperature is injected into the vessel. In addition, a conservative calculation of the energy in the feedwater heaters and piping metal is added to the RPV/containment system. This assumption is conservative because for the limiting DBA-LOCA analysis, it is assumed that off-site power is unavailable. therefore, the FW pumps would be tripped early in the event. In addition, no credit is taken for heat transfer from feedwater heaters and feedwater metal pipe to the ambient atmosphere. The results of sensitivity studies in Reference 5 show that the effect on peak suppression pool temperature of adding the hot feedwater in the analysis is 2°F. Since it is difficult to determine without rigorous calculations exactly how much feedwater is actually injected during the LOCA the conservatism in the use of hot feedwater is not quantified.

QUESTION 3

For long-term containment response analysis case 2a1, a higher low-pressure coolant injection (LPCI) heat exchanger value (77.5 MBtu/hr) than the design value (71.0

MBtu/hr) was used. 71.0 MBtu/hr was also used to determine the peak suppression pool temperature.

Why was a higher heat removal rate assumed for the NPSH analysis (case 2a1)? How would the lower value of 71.0 MBtu/hr affect the NPSH available, relative to 77.5 MBtu/hr? Justify the use of the higher heat removal rate for the LPCI heat exchanger associated with the NPSH analysis.

RESPONSE TO QUESTION 3

The 77.5 MBtu/hr is the LPCI Heat exchanger rate for a LPCI flow of 5000 gpm and CCSW flow of 7000 gpm. This heat exchanger rate minimizes the available containment pressure post-LOCA. With the case 2a1 containment parameters, the operator may provide maximum cooling to the LPCI heat exchangers by maximizing CCSW flow of 7000 gpm. To determine the maximum suppression pool temperature, a LPCI heat exchanger rate of 71.0 MBtu/hr (LPCI flow of 5000 gpm/CCSW flow of 5000 gpm)was used (case 5) to maximize the suppression pool temperature.

In summary, the proper LPCI heat exchanger rate was used to maximize and/or minimize the containment parameters to assure conservatism in the analysis.

QUESTION 4

Per discussion between the staff and ComEd, it seems likely that the containment sprays would be turned on and remain on under the loss-of-coolant accident (LOCA) conditions analyzed for NPSH purposes.

Is it possible that the termination criteria for the sprays could be more closely tied to the overpressure requested for the time the sprays would be on, such that higher pressures would be present in containment and, therefore, more margin in NPSH available would exist?

RESPONSE TO QUESTION 4

This response will be submitted by March 31, 1997.

Figure 1 - Comparison of Decay Power Curves

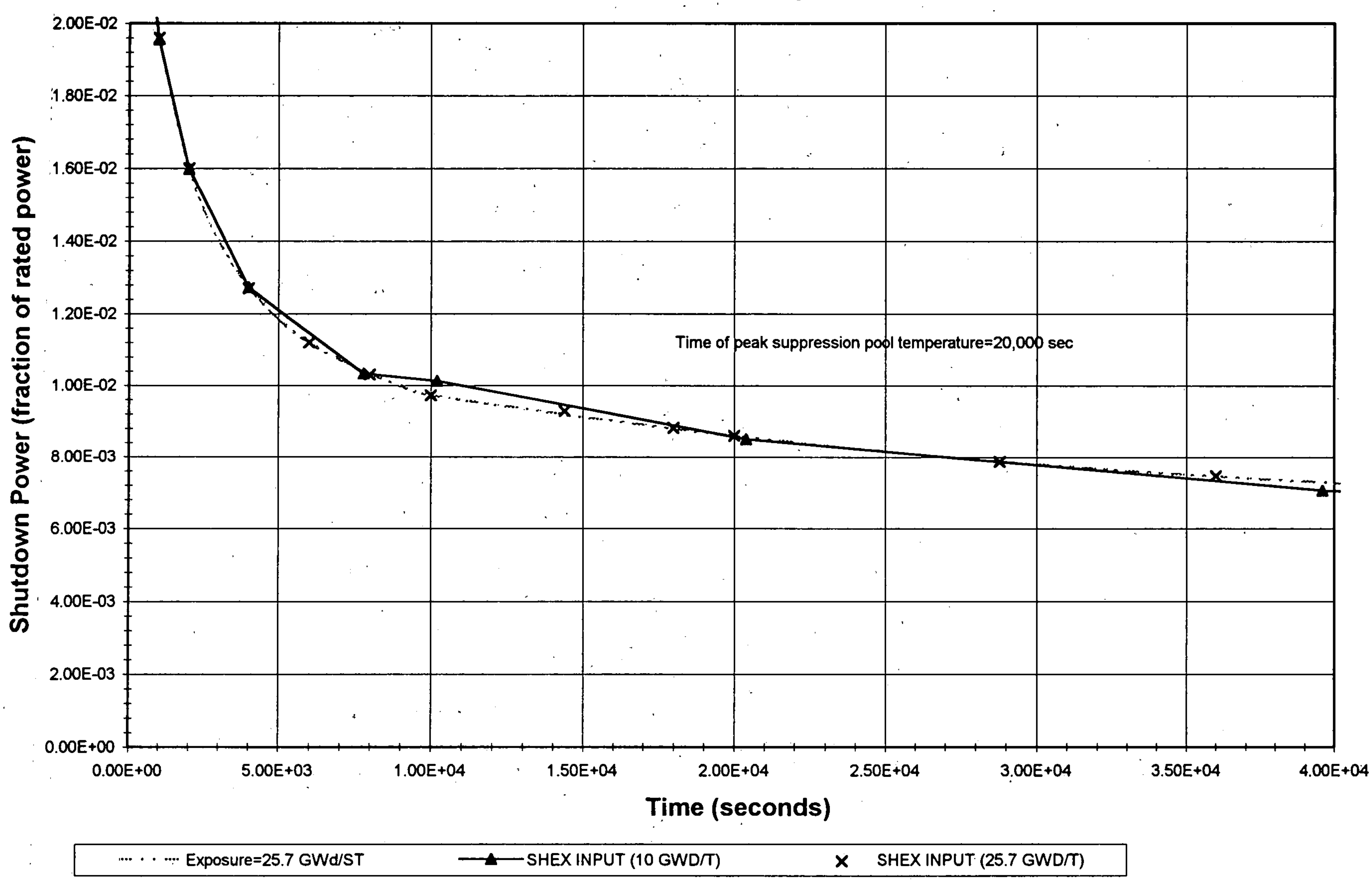
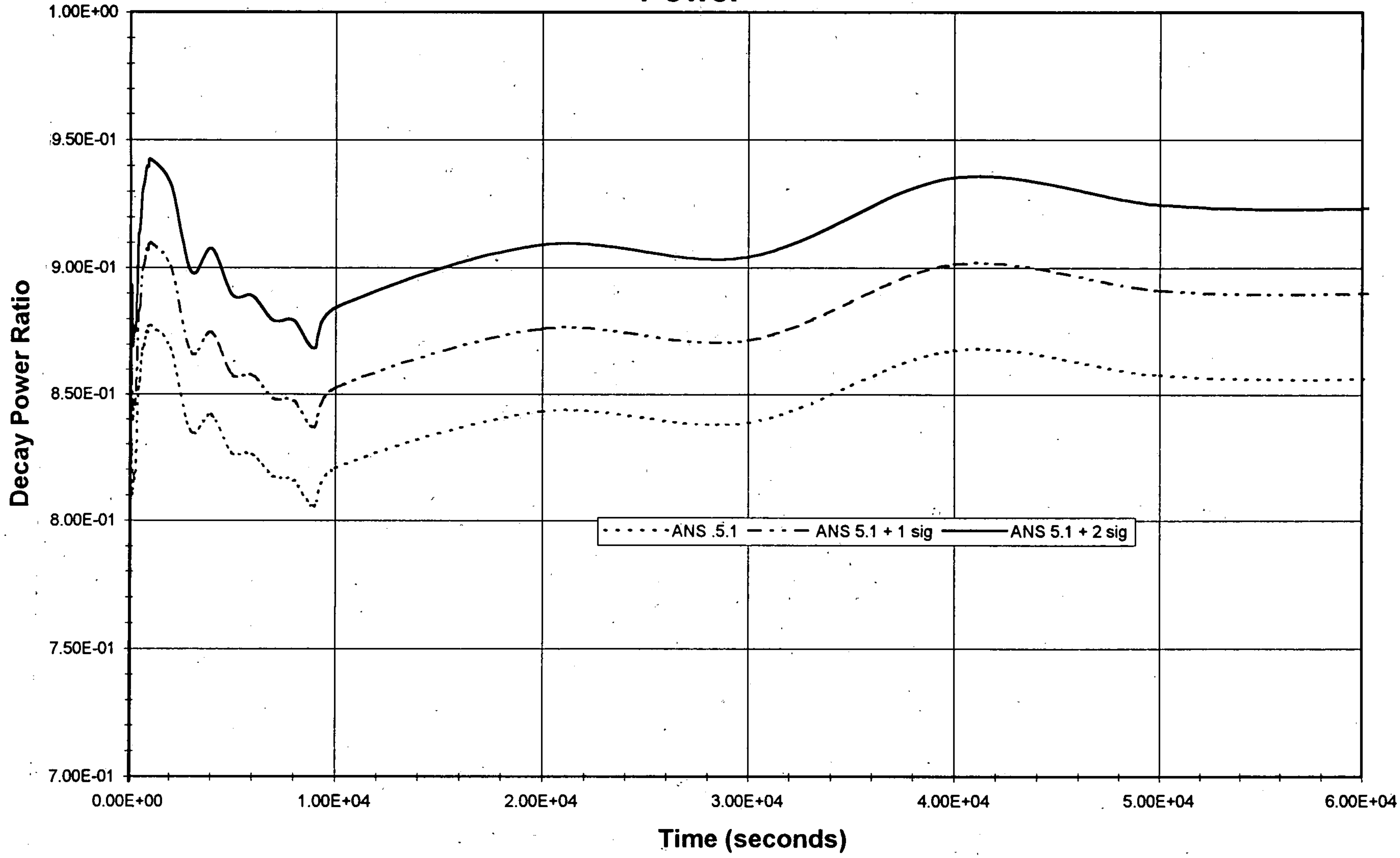


Figure 2 - Ratio of ANS 5.1 Decay Power Curves to May-Witt Decay Power



Reference 7

Letter Ashok Thadani (NRC) to Gary L. Sozzi (GENE), "Use of SHEX Computer Program and ANSI/ANS 5.1-1979 Decay Heat Source Term for Containment Long-Term Pressure and Temperature Analysis," dated July 13, 1993.