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ComEd

October 14, 1996

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

Subject: Zion Station Units 1 and 2
Response to Request for Additional Information
Operating Licenses DPR-39 and DPR-48
NRC Docket Nos. 50-295 and 50-304

Reference: 1) Letter from R. P. Tuetken, Commonwealth Edison, to U.S. Nuclear Regulatory Commission, dated July 26, 1996, - Application for Amendment to Facility Operating Licenses DPR-39 and DPR-48.

2) Letter from C. Y. Shiraki, U. S. Nuclear Regulatory Commission, to I. Johnson, Commonwealth Edison, dated September 26, 1996. Request for Additional Information

This letter provides Commonwealth Edison's (ComEd's) response to an NRC Request for Additional Information regarding a proposed amendment to the Zion Station Units 1 and 2 Facility Operating Licenses.

ComEd previously submitted, in Reference (1), a request to amend the Zion Station Technical Specifications. The proposed amendment would remove the requirements governing reactor coolant system pressure and temperature limits for heatup, cooldown, low temperature operation, and hydrostatic testing from the Technical Specifications. Such requirements would be governed by a ComEd controlled Pressure Temperature Limits Report (PTLR). The NRC subsequently issued a request for additional information (Ref. 2) concerning the proposed amendment. ComEd's response to the specific items in the NRC request is provided in the attachment to this letter.

A001/1

Please direct any questions you may have concerning this submittal to this office.

Respectfully,

J. H. Mueller
Site Vice President
Zion Station

Attachment

cc: NRC Regional Administrator - RIII
Zion Station Project Manager - NRR
Senior Resident Inspector - Zion Station
Office of Nuclear Facility Safety - IDNS
IDNS Resident Inspector
Zion NLA
Reg. Assurance File
DCD Licensing

ATTACHMENT

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION

References are identified on the last page of this attachment.

ITEM 1. Concerning the pressure-temperature limits curves in the current Zion Station Technical Specifications:

a. What was the value of the Adjusted Reference Temperature (ART) which was used to generate the cooldown curves.

RESPONSE: Based on WCAP-11247, August 1986, (Reference 1) the 1/4T ART used to generate the cooldown curves was 195°F. This was based on the most limiting of the Zion Unit 1 and 2 materials at the time, WF-70, with 0.32 Cu, 0.56 Ni, and an initial RT_{NDT} of 0°F. The 195°F 1/4T ART was based on the most limiting Zion Unit 1 fluence at 15 EFPY. The curves were later limited to 14 EFPY maximum due to Appendix G upper shelf energy restriction at 5.0E+18 n/cm^2, which was subsequently resolved by B&WOG equivalent margins analysis.

b. Will the cooldown curves be applied to define the acceptable region of operation for the upcoming Zion Unit 2 shutdown?

RESPONSE: No. ComEd has committed (Reference 11) to use the curves submitted by Reference 5. At the lower end where the concern with protection against nonductile failure is greatest, the Reference 5 curves are more limiting than both the curves in the Current Zion Technical specifications, and the curves submitted in the July 1996 PTLR submittal (Reference 2).

ITEM 2. Concerning the pressure-temperature limits curves submitted in LAR 92-03, which were based on a reassessment of the limiting Zion Station ART:

a. Confirm that the ART value used to calculate the cooldown curve which was proposed for 14 EFPY was 206 °F and whether this value was greater than the ART value requested in #1.a above.

RESPONSE: Based on WCAP-13406, July 1992 (Reference 3), the 1/4T ART value used to calculate the cooldown curves was 206°F. This was based on the most limiting of the Zion Unit 1 and 2 materials at the time, WF-70, with a Reg. Guide 1.99 Rev. 2 Position 2 calculated chemistry factor of 174. The initial RT_{NDT} of +18°F was based on interim B&WOG RVWG information. The 206°F, 1/4T ART value was based on most limiting Zion Unit 1 fluence at 14 EFPY. The 206°F, 1/4T ART value used in LAR 92-03 was higher than the value used in the current Technical Specifications.

b. Has this cooldown curve been used in Zion Station Operational Procedures at any time since September 1, 1992, to define a more conservative (more limiting than the TS curve) area of acceptable operation during cooldown?

RESPONSE: Yes. Zion Station has utilized the cooldown curves submitted in LAR 92-03, (Reference 5) since 1992. Zion has committed (Reference 11) to maintain this restriction via administrative controls.

c. Address the same issue from #2.b for the Heatup Rate and Criticality Limit Curves.

RESPONSE: Yes. Zion Station has also utilized the heatup rate and criticality limit curves submitted in LAR 92-03, (Reference 5) since 1992. Zion has committed (Reference 11) to maintain this restriction via administrative controls.

ITEM 3. Based upon the methodology used to develop the July 1996 Zion Submittal to institute a PTLR:

a. Indicate what the limiting ART would be for the current condition (14 EFPY) of the Zion Unit 2 vessel with regard to the cooldown curves and whether this condition is bounded by the cooldown curves addressed in #2.a and #2.b above.

RESPONSE: Based on WCAP-14664, June 1996 (Reference 4), the cooldown curves developed for the 1996 Zion submittal (Reference 5) were calculated using the 25.63 EFPY fluence for Zion Unit 2. This fluence is a result of back-calculating the location of the steady-state curve needed to support the existing 407 psig Cold Overpressure Mitigation System (COMS) setpoint in accordance with WCAP-14040 Revision 1. The 1/4T ART at this fluence is 233°F, with SA-1769 as the most limiting Zion material with 0.26 Cu, 0.61 Ni, and an initial RT_{NDT} of +10°F. While the 14 EFPY 1/4T ART would be 208°F using these inputs, the cooldown curves developed for the 1996 Zion submittal, when translated to 14 EFPY, are less limiting than the CTS curves. This is primarily the result of incorporating the random instrument uncertainty, which is required by the WCAP-14040, Revision 1, PTLR methodology, directly into the COMS setpoint.

ITEM 4. LCO 3.3.2.G is applicable in MODE 4 when the temperature of any RCS cold leg is less than or equal to 250°F, MODE 5 and MODE 6 with the reactor vessel head on. UFSAR Section 5.2.2.1.5 provides a calculation of the enable temperature which suggests that it should be 320°F. In addition, in 1992, Zion submitted LAR 92-03 requesting to change LTOP enable temperature from 250°F to 320°F based on new data.

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a. What is Zion's current practice with regard to LTOP enable temperature and, specifically, the enable temperature that will be used for the upcoming shutdown?

b. What is the technical basis for this practice?

RESPONSE: Zion's current COMS T_{Enable} is 320°F, based on a calculation performed in accordance with Branch Technical Position RSB 5-2, using material inputs of LAR 92-03. Zion's 1996 submittal (Reference 2) demonstrates that the current COMS T_{Enable} is conservative up to 25.63 EFPY for Zion Unit 2, based on the methodology of Code Case N-514 and the latest material property and fluence inputs. Zion committed in Reference 11 to use this enable temperature in the upcoming outage.

ITEM 5. LCO 3.3.2.G.2 allows a safety injection pump to be operable during LTOP operation.

a. In the mass addition portion of the LTOP analysis, does Zion account for injection from a safety injection pump?

b. What is Zion's current operating practice with regard to the operability of safety injection pumps during LTOP operation?

c. What is the technical basis for this practice?

RESPONSE: The injection from a safety injection pump is not accounted for in the mass addition portion of the LTOP analysis. ComEd has committed (Reference 11) to maintain administrative controls prohibiting operation of a Safety Injection pump when LTOP is required to be operable. ComEd will submit a supplement to LAR 96-02 (Reference 2) to include this restriction in Technical Specifications.

ITEM 6. LCO 3.3.2.G.3 states, "When starting a reactor coolant pump, when no reactor coolant pumps are running, the temperature in the secondary side of the steam generator in the loop in which the reactor coolant pump is to be started shall be less than 50°F higher than the RCS temperature."

a. How many loops of heat addition does Zion account for in the heat addition portion of the LTOP analysis,?

b. In the case of one reactor coolant pump running, how does Zion control the heat addition to the RCS?

c. What is Zion's current practice with regard to starting reactor coolant pumps while in LTOP operation?

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d. What is the technical basis for this practice?

RESPONSE: Heat addition is assumed from all four steam generators. Operational constraints and procedures prohibit the simultaneous start of more than one Reactor Coolant Pump (RCP). ComEd has committed (Reference 11) to maintain administrative controls prohibiting the starting of any RCP if the SG secondary side is ≥50°F higher than the RCS in any loop, while in LTOP operation. ComEd will submit a supplement to LAR 96-02 (Reference 2) to include this restriction in the Technical Specifications.

ITEM 7. The pressure difference between the pressure instrument controlling LTOP and the limiting location in the vessel is a function of the number of reactor coolant pumps and residual heat removal pumps running.

a. How is this pressure difference accounted for in the LTOP PORV setpoint?

b. How does Zion control the number of pumps running to ensure that the LTOP PORV setpoint is conservative?

RESPONSE: Current operating procedures limit the number of operating reactor coolant pumps and residual heat removal pumps, based on the temperature of the RCS. These limitations account for the pressure difference between the pressure instrument controlling LTOP and the limiting location in the vessel, and are based on the pressure/temperature curves submitted in LAR 92-03.

ITEM 8. In reference to Attachment F, Attachment 2 (WCAP-14666 REV. 0, Radiation Analysis and Neutron Dosimetry Evaluation):

On page 3-2 it is stated,

For Zion Unit 1, the extrapolations of pressure vessel exposure into the future were based on the assumption that the best estimate exposure levels characteristic of the average of low leakage fuel cycles employed during Cycles 13 through 15 would remain applicable throughout plant life.

However, in Tables 3.1-1 through 3.1-10, information on the cycle fluences is only given through Cycle 14 for Zion Unit 1. The appendix to this attachment indicates that applicable information is available from report NDIT 95-064-R0.

a. Provide the cycle specific data related to Tables 3.1-1 through 3.1-10 for Zion Unit 1, Cycle 15.

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RESPONSE: The best estimate Cycle 15 flux (E > 1.0 MeV) applicable to the Zion Unit 1 data tables 3.1-1 through 3.1-10 are provided as follows (data source - Ref. 12):

Table	Flux (E > 1.0 MeV) [n/cm2-sec]
3.1-1	5.71e+09
3.1-2	9.05e+09
3.1-3	9.31e+09
3.1-4	1.08e+10
3.1-5	1.93e+10
3.1-6	3.76e+10
3.1-7	4.28e+09
3.1-8	6.79e+09
3.1-9	6.98e+09
3.1-10	8.10e+09

It should be noted that Cycle 15 is the current Zion Unit 1 fuel cycle and does not end until April 1997.

b. Explain any systematic variations in average cycle wall fluxes within the subset of cycles in which low leakage core designs were used by addressing the manner in which fuel management and core design concepts are being employed for Zion Station.

RESPONSE: The fuel management strategy employed at Zion Station incorporates the use of highly burned fuel on the core periphery to reduce leakage from the core and, hence, the neutron flux reaching the reactor vessel inner wall. Depending on the specific burnup of fuel available at the onset of each fuel cycle, small variations in core leakage that are randomly distributed may occur from cycle to cycle. There is no systematic variation in the fuel management strategy that would tend to increase or decrease the core leakage over the long term. Therefore, since the variations in leakage tend to be small and randomly distributed, the use of an average over the subset of low leakage cycles is appropriate for projection of future operation.

c: Describe the manner in which concerns regarding the azimuthal wall flux shape are addressed in the Zion Station core design program.

RESPONSE: The low leakage loading patterns employed at the Zion Station tend to cluster high burnup fuel assemblies along the core minor axis (45°). This azimuth also corresponds to the location of maximum neutron exposure at the pressure vessel inner

surface. The net result is a flattening of the azimuthal flux distribution at the pressure vessel with a correspondingly larger flux reduction in the locations of maximum pressure vessel exposure.

d: If systematic variations exist, explain why these should not be accounted for in assessing the vessel and/or capsule fluences at select effective full power years (EFPYs).

RESPONSE: As noted in the response to b: above, no systematic variations exist in the fuel management strategy.

ITEM 9 In reference to Attachment F, Attachment 1 (Framatone Technologies Report 32-1257382-00):

EPRI report NP-373 is referenced in Tables 5 and 6 as the source document for the initial RT_{ndt} (IRT_{ndt}) value of +10 degrees F for SA-1769 (heat number 71229) weld material. A Babcock and Wilcox generic value of -5 degrees F had been reported previously for this material in ComEd's July 1992 response to Generic Letter 92-01, Revision 1.

a. Provide all of the test data (Charpy test resu... and drop weight data) which have been generated for the determination of IRT_{NDT} for the SA-1769 weld material and for welds fabricated from weld wire heat number 71249.

b. Demonstrate, based on the data provided above, why the data from the EPRI NP-373 report has now been deemed valid for determining the IRT_{NDT} value of this material.

RESPONSE: The reference to heat number 71229 in Item 9 is an apparent typographical error since the correct heat number is 71249. Weld Wire 71249 is the filler metal in Babcock & Wilcox Linde 80 welds SA-1101, SA-1229, and SA-1769 (see Ref. 6 pages from the NRC Reactor Vessel Integrity Database, attached). Since they are fabricated from the same weld wire, SA-1101 is a surrogate material for SA-1769. Actual IRT_{NDT} data in accordance with ASME Section III NB-2331 is not available for SA-1769 since the Zion 2 reactor vessel was fabricated before this requirement was added to the Code.

The Babcock & Wilcox Linde 80 IRT_{NDT} generic value of -5°F reported previously for SA-1769 in ComEd's July 1992 response to Generic Letter 92-01 Revision 1 was based on data presented in BAW-1803 Revision 1 (Ref. 7). However, recent investigations into sister plant data revealed that a measured IRT_{NDT} value of +10°F for SA-1769 surrogate weld SA-1101 was being utilized by other plants (see Ref. 6 pages attached).

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The +10°F IRT_{NDT} value for SA-1101 is based on measured data from EPRI NP-373 (Ref. 8). BAW-1815 (Ref. 9) establishes that the data contained in Ref. 8 for the outside surface and 1/4T locations is for SA-1101. Summarizing the data in NP-373, dropweight data

resulted in a dropweight NDT of -60°F, and the Charpy T50 was +70°F. ASME Section III NB-2331 requires that IRT_{NDT} be the higher of NDT or T50-60°F, resulting in an IRT_{NDT} of +10°F.

The +10°F IRT_{NDT} value for SA-1769 surrogate material SA-1101 has been accepted by the NRC (Florida Power & Light Turkey Point Units 3 and 4 SERs dated April 26, 1984, and January 10, 1989).

There is one other clearly traceable source of IRT_{NDT} data for SA-1101 which is considerably less limiting than the +10°F value reported in NP-373. BAW-1803 Revision 1 reports an IRT_{NDT} value of -50°F for a nozzle belt dropout weld made with SA-1101 (Ref. 7).

Based on the above, in order to be consistent with respect to sister plant data applications for weld metals fabricated with weld wire 71249, ComEd decided to utilize an IRT_{NDT} of +10°F for SA-1769.

ComEd plans to utilize the Linde 80 generic IRT_{NDT} value of -27°F described in BAW-2245 (Ref. 10) following approval of the Master Curve approach to reference fracture toughness by ASTM E8, and subsequent resolution of NRC comments.

ITEM 10 Commonwealth Edison's submittal dated July 26, 1996, states that the changes being requested are consistent with the guidance of Generic Letter (GL) 96-03. Attachment 1 to GL 96-03 provided a table which noted minimum requirements to be included in the PTLR, one of which (item 6) was the identification of "minimum temperatures *on* [emphasis added] the P/T curves such as minimum boltup temperature and hydrostatic test temperature". It is not clear that such an identification has been made on Figures 1 through 5 of Attachment F, Attachment 3 to your submittal.

a. Explain or correct this apparent deviation from the guidance of the GL and submit corrected copies of these figures, if necessary.

RESPONSE: The minimum boltup temperature is explicitly addressed in WCAP-14664, page 13 and will be indicated on the P/T curves via a supplement to Reference 2. The hydrostatic test temperature is indicated on Figures 1 - 4 of WCAP-14664 as " Leak Test Limit."

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ITEM 11 In reference to the discussion in Attachment F, Attachment 1, Appendix A (Credibility of Surveillance Data) ComEd indicated that surveillance data from the Point Beach Unit 2 reactor capsules were applicable to Zion Station. This conclusion was drawn for Zion WF-154 welds (weld heat number 406L44).

a. Demonstrate that the irradiation environments in the Point Beach Unit 2 and Zion Unit 2 vessels are similar with respect to the following conditions: damage rate, irradiation temperature, neutron spectral balance, and gamma flux/gamma heating. To address the irradiation temperature, provide data on a cycle-by-cycle basis for each unit's cold leg temperatures. Either provide data which explicitly quantifies and assesses the impact of differences in the aforementioned irradiation conditions or provide data which shows irradiation environment similarity due to a consistent shift in material properties for a surveillance material common to both vessels' surveillance programs.

RESPONSE: Both of the Zion Units and Point Beach Unit 2 were accepted by the NRC Staff as participants in the B&W Owners Group Master Integrated Reactor Vessel Material Surveillance Program (MIRVP) in an SER dated June 11, 1991. The Staff found "that the surveillance program of BAW-1543, Revision 3 should be capable of monitoring the effect of neutron irradiation and the thermal environment on the fracture toughness of ferritic reactor vessel beltline materials in the plants that are participating in the material surveillance program." Further, as part of the Attachment F, Attachment 1, and Appendix A evaluation of data credibility, all Regulatory Guide 1.99, Revision 2 credibility criteria were determined to be met, including Criterion 5, which addresses a comparison of identical correlation monitor material behavior in the different reactor environments.

Both of the Zion Units and Point Beach Unit 2 are Westinghouse reactors employing a reactor internals design using a fully circumferential thermal shield. The surveillance capsules holding the materials test specimens are mounted on the outer radius of the thermal shield in the downcomer region between the pressure vessel wall and the thermal shield. The geometries of the respective reactors in the vicinity of the surveillance capsules tends to result in radiation environments at the capsule positions that are similar both quantitatively and qualitatively. In all units, the capsules are designed to minimize the impact of gamma ray heating and, thus, maintain the irradiation temperature of the test specimens close to the temperature of the coolant in the downcomer region. Likewise, the temperature of the pressure vessel wall at the clad/base metal interface is also maintained very close to the downcomer coolant temperature, thus, providing compatibility between the test specimen irradiation temperatures and that of the pressure vessel wall.

To date, four surveillance capsules have been withdrawn from the 40° azimuthal location at Zion Unit 1 and three capsules have been withdrawn from the same location in Zion Unit 2. In the case of Point Beach Unit 2 two capsules have been withdrawn from the 13°

azimuthal location and one each from the 23° and 33° positions. Comparisons of the neutron dosimetry evaluations performed for these 11 surveillance capsules, as given below, provide an indication of the similarity in the irradiation environments at each of these locations.

Damage Rate

The following tabulation provides the neutron flux (E > 1.0 MeV) and iron atom displacement rate (dpa/sec) experienced by each of the surveillance capsules withdrawn from Zion Units 1 and 2 and Point Beach Unit 2 (data source - Ref. 12). The damage rates represent an average over the total irradiation period experienced by the respective capsules.

Capsule	Flux (E > 1.0 MeV) [n/cm2-sec]	Displacement Rate [dpa/sec]	Irradiation Time [efpy]
Zion 1 - T	8.06e+10	1.32e-10	1.22
Zion 1 - U	9.05e+10	1.49e-10	3.57
Zion 1 - X	7.71e+10	1.28e-10	5.16
Zion 1 - Y	5.78e+10	9.59e-11	8.58
Zion 2 - U	6.49e+10	1.06e-10	1.32
Zion 2 - T	6.90e+10	1.16e-10	3.57
Zion 2 - Y	5.04e+10	8.48e-11	9.20
PB 2 - V	1.44e+11	2.60e-10	1.52
PB 2 - T	8.21e+10	1.43e-10	3.45
PB 2 - R	1.39e+11	2.55e-10	5.20
PB 2 - S	6.81e+10	1.20e-10	14.8

An examination of this tabulation shows that in terms of neutron flux (E > 1.0 MeV) the range of damage rate extends from 5.04e+10 to 1.44e+11 and in terms of iron atom displacement rates the corresponding range extends from 8.48e-11 to 2.60e-10. The total range of damage rates for these capsules falls within approximately a factor of three. Furthermore, there is no systematic difference between the Zion and Point Beach data sets.

Spectral Balance

An indication of the differences in the energy distribution of neutrons at the surveillance capsule locations can be obtained via a comparison of the ratio of [dpa/sec]/[flux (E > 1.0 MeV)] at the respective capsule locations. A comparison of this type for the Zion and Point Beach surveillance capsules is provided as follows (data source - Ref. 12).

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Capsule	[dpa/Flux]	Irradiation Time [efpy]
Zion 1 - T	1.64e-21	1.22
Zion 1 - U	1.65e-21	3.57
Zion 1 - X	1.66e-21	5.16
Zion 1 - Y	1.66e-21	8.58
Zion 2 - U	1.63e-21	1.32
Zion 2 - T	1.68e-21	3.57
Zion 2 - Y	1.68e-21	9.20
PB 2 - V	1.81e-21	1.52
PB 2 - T	1.74e-21	3.45
PB 2 - R	1.83e-21	5.20
PB 2 - S	1.76e-21	14.8

An examination of this data table shows that the spectral indices as expressed by the ratio of iron displacement rate to neutron flux (E > 1.0 MeV) varies by less than approximately 12% over the entire range of capsules included in the data set. Thus, from a spectrum balance viewpoint the Zion and Point Beach irradiation conditions are very compatible.

Gamma Heating

Gamma heating effects the irradiation environment of the Zion and Point Beach reactor vessels in a similar fashion. At the surveillance capsule and reactor vessel locations the gamma ray heating is due primarily to secondary gamma rays induced by inelastic scattering and neutron capture in local materials. Since the secondary gamma ray production is a function of the neutron energy spectrum which, as described above, is very similar for these reactors, it follows that the gamma ray heating for these reactors is also very similar.

Furthermore, in the design of the Westinghouse surveillance capsules, the impact of internal heat generation is small and the specimen temperatures are maintained very close to the downcomer water temperature. This is verified by melt wire measurements obtained from each capsule.

Irradiation Temperature

The vessel inlet temperatures for the Zion Units was specified as 529°F for all fuel cycles and for Point Beach Unit 2 was 542°F, again for all fuel cycles. There has been no systematic variation in vessel inlet temperatures over the lifetime of Zion Units 1 and 2 and Point Beach Unit 2.

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Regulatory Guide 1.99 Revision 2 states that plant-specific surveillance data will be deemed credible as judged by the following criterion, among others:

> "The irradiation temperature of the Charpy specimens in the capsule must equal the vessel wall temperature at the cladding/base metal interface within ±25°F."

The PTS rule of 10 CFR 50.61 contains very similar wording. Since the irradiation temperature of the Charpy specimens from Point Beach Unit 2 is within ±25°F of the vessel wall temperature at the cladding/base metal interface of the Zion Units, and the other credibility criteria are met, the Point Beach Unit 2 data is credible and, according to 10 CFR 50.61, "must be integrated into the RT_{NDT} estimate." Both Regulatory Guide 1.99 Revision 2 and 10 CFR 50.61 are silent with respect to the application of any additional margin when the irradiation temperatures are within the ±25°F range, thus implying that the ±25°F range itself is accounted for in the margins and in the spectrum of irradiation temperatures contained in the underlying data base used as the basis for the correlations of Regulatory Guide 1.99 Revision 2 and 10 CFR 50.61.

A plant-specific indication of the effect of differences between the Zion Units and Point Beach Unit 2 irradiation temperature is the behavior of identical material irradiated in all three reactors. All seven surveillance capsules from Zion Units 1 and 2 and the four Point Beach Unit 2 capsules contain identical correlation monitor material from Heavy Section Steel Technology (HSST) plate 02. When the irradiation shift of this data is plotted relative to fluence as shown on the attached HSST Plate 02 curves (with surveilance data sheet) (source - Ref. 13), there is no evidence of a temperature effect in the behavior of the material.

ComEd concludes that the 13°F irradiation temperature difference between the Zion Units and Point Beach Unit 2 is insignificant, based on actual plant-specific power reactor data on identical material. Therefore, the application of additional margin is unwarranted. Additionally, neither 10 CFR 50.61 nor Reg. Guide 1.99, Rev. 2 require such an adjustment if the irradiation temperature of the Charpy specimens is within ±25°F of the vessel wall temperature at the cladding/base metal interface.

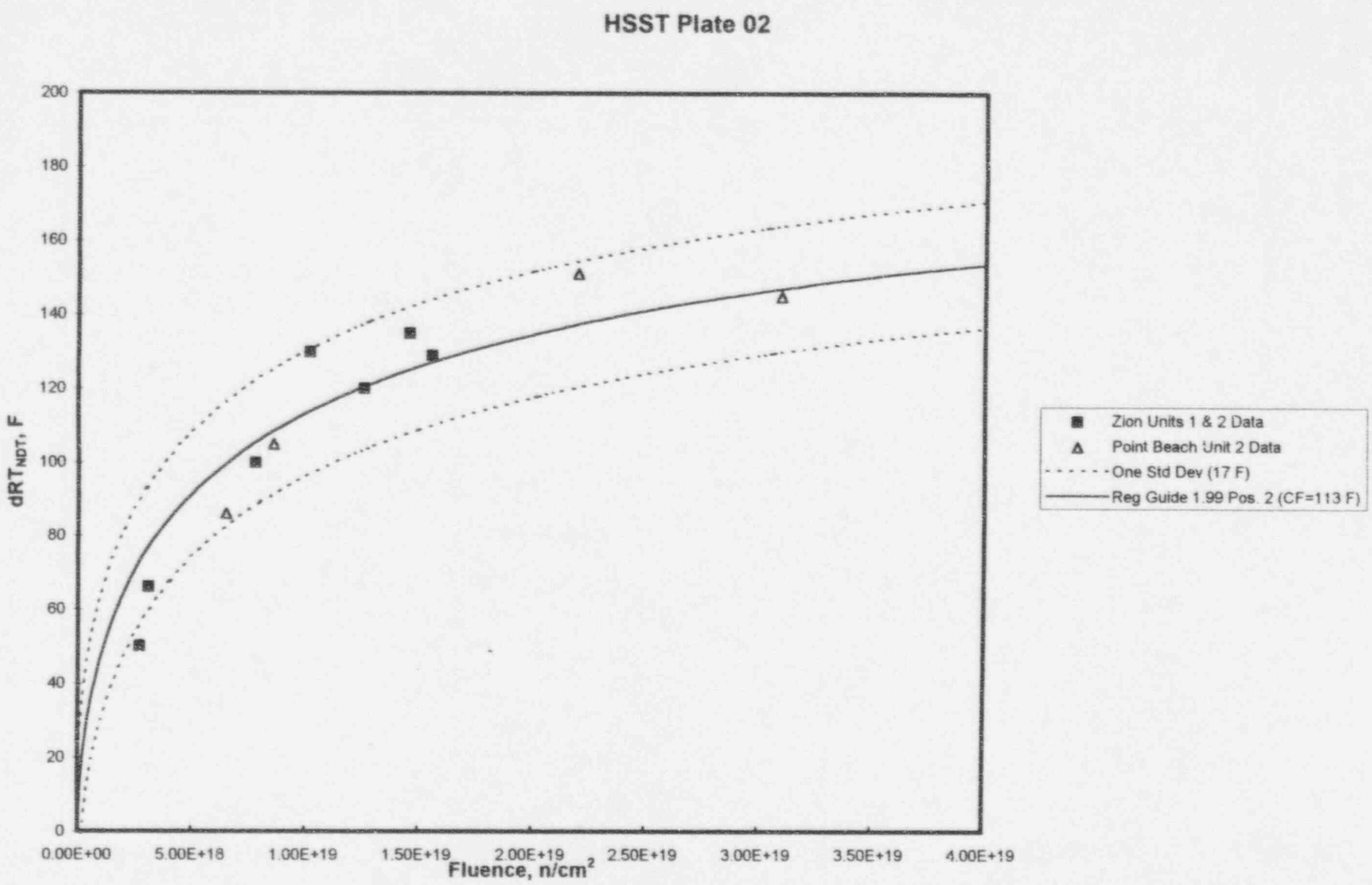
It should be noted that weld metal SA-1769 of Zion Unit 2 remains the limiting material of the two Zion vessels even if a margin of 1°F per °F is applied to the calculated chemistry factor for weld metal WF-154, since the 32 EFPY 1/4T ART for the limiting Zion Unit 1 weld metal would rise to only 232°F. for this reason, there would be no impact on the submitted pressure-temperature limits and LTOP setpoints.

NRC Best-Estimate Data for Weld Heat No. 71249

Weld Metal Property Information from NRC RVID Database

Plant Name	Beltline I.D.	Material Type	Flux Type	Flux Lot	IRTNDT	Method IRTNDT	CF	Method CF	Pct. Cu	Pct. Ni
Crystal River 3										
	Upper Shell Circ. Weld SA-1769 (ID)	Linde 80, SAW	Linde 80		-5	B&W Generic	181.6	Table	0.26	0.61
Dresden 2										
	Lower Int./Lower Shell Circ. Weld	Sub Arc Weld	Linde 80	8504	-5	Plant Spec	167.3	Table	0.21	0.62
Ginna										
	Nzzl/Int. Shell Circ. Weld SA-1101	Linde 80, SAW	Linde 80	8445	10	Plant Spec	180	Table	0.26	0.6
Oconee 1										
	Int./Lwr Shell Circ. Weld SA-1229	Linde 80, SAW	Linde 80	8492	-5	B&W Generic	181.6	Override	0.26	0.61
Point Beach 1										
	Int./Lwr Shell Circ. Weld SA-1101	Linde 80, SAW	Linde 80	8445	10	Plant Spec	180	Table	0.26	0.6
Turkey Point 3										
	Int./Lwr Shell Circ. Weld SA-1101	Linde 80, SAW	Linde 80	8445	10	Plant Spec	180	Table	0.26	0.6
	Surveillance Weld	Linde 80, SAW	Linde 80	8445					0.26	0.6
Turkey Point 4										
	Int./Lwr Shell Circ. Weld SA-1101	Linde 80, SAW	Linde 80	8445	10	Plant Spec	180	Override	0.26	0.6
	Surveillance Weld	Linde 80, SAW	Linde 80	8457					0.26	0.6

Plant Name	Beltline I.D.	Material Type	Flux Type	Flux Lot	IRTNDT	Method IRTNDT	CF	Method CF	Pct. Cu	Pct. Ni
Zion 2										
	Int./Lower Shell Circ. Weld SA-1769	Linde 80, SAW	Linde 80	8738	-5	B&W Generic	182	Override	0.26	0.61


HSST Plate 02
200
180
160
140
120
100
80
60
40
20
0
dRT_NDT, F
0.00E+00
5.00E+18
1.00E+19
1.50E+19
2.00E+19
2.50E+19
3.00E+19
3.50E+19
4.00E+19
Fluence, n/cm2
Zion Units 1 & 2 Data
Point Beach Unit 2 Data
One Std Dev (17 F)
Reg Guide 1.99 Pos. 2 (CF=113 F)

HSST Plate 02 Surveillance Data

Capsule	Fluence	T30 Shift
Z1-T	3.10E+18	66
Z1-U	1.02E+19	130
Z1-X	1.26E+19	120
Z1-Y	1.56E+19	129
Z2-U	2.70E+18	50
Z2-T	7.79E+18	100
Z2-Y	1.46E+19	135
PB2-V	6.50E+18	86
PB2-T	8.61E+18	105
PB2-R	2.20E+19	151
PB2-S	3.10E+19	145

ATTACHMENT

References

1) WCAP-11247, "Heatup and Cooldown Limit Curves for the Commonwealth Edison Company Zion Units 1 and 2 Reactor Vessel," August 1986.

2) R. P. Tuetken to NRC letter, submitting License Amendment Request 96-02 and Pressure Temperature Limit Report (PTLR), dated July 26, 1996

3) WCAP-13406, "Heatup and Cooldown Limit Curves for Normal Operation for Zion Units 1 & 2," July 1992.

4) WCAP-14664, "Zion Units 1 and 2 Heatup and Cooldown Limit Curves for Normal Operation," June 1996.

5) Letter from S. F. Stimac, Commonwealth Edison, to T. E. Murley, dated September 1, 1992, submitting License Amendment Request 92-03

6) EPRI CM-106390 Software "Reactor Vessel Materials Database RPVDATA Version 1.3," January, 1996

7) BAW-1803 Rev. 1, "Correlations for Predicting the Effects of Neutron Radiation on Linde 80 Submerged-Arc Welds," May 1991.

8) EPRI NP-373, "An Investigation of Mechanical Properties and Chemistry Within a Thick MnMoNi Submerged Arc Weldment," February 1977.

9) BAW-1815, "Availability of Weid Metal Data for Turkey Point Units 3 and 4," December 1983.

10) BAW-2245 Rev. 1, "Initial RTNDT of Linde 80 Welds Based on Fracture Toughness in the Transition Range," October 1995.

11) Letter from J. H. Mueller, ComEd, to NRC , dated September 18, 1996, regarding commitments to maintain administrative controls for pressure/temperature limits.

12) Letter SE-REA-96-190, from S. L. Anderson, Westinghouse, to T. Spry, ComEd, dated October 4, 1996, regarding responses to RAI on PTLR submittal

13) Letter ESC-96-540 from M. DeVan, Framatome, to T. Spry, ComEd, dated October 4, 1996, regarding correlation monitor material (HSST Plate 02) surveillance data comparison