June 26, 2002

Mr. John L. Skolds, President
Exelon Nuclear
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Dear Mr. Skolds:

As discussed during a telephone conversation on June 21, 2002, between Mr. W. Stoffels, Maintenance Manager, and Mr. J. Gavula, Senior Reactor Inspector, this letter transmits a set of questions that pertain to your staff's evaluation of past operability for the High Pressure Coolant Injection System at Dresden Unit 3. The operability evaluation was provided to NRC inspectors in January 2002, in response to an Unresolved Item documented in NRC Inspection Report 50-237/01-21; 50-249/01-21.

The operability evaluation was necessary to determine if the High Pressure Coolant Injection System would have been able to perform its safety function between July 5, 2001, when a pipe support was apparently damaged during an automatic initiation of the system, and September 30, 2001, when a significant amount of air was vented from the system's discharge piping and when the damaged pipe support was repaired. During that time period, the system was in a degraded condition and would have experienced additional significant hydraulic transient loads whenever it was automatically initiated.

The above noted questions are an enclosure to this letter and were previously provided to your staff on May 8, 2002. These questions need to be addressed to determine if the High Pressure Coolant Injection System was operable in its degraded condition during the above time period. This determination will establish the significance of the findings and violations identified in the referenced inspection report. It is our understanding that your staff will be prepared to discuss these issues with us in late July. Please contact Mr. Gavula at 630-829-9755 to arrange a meeting for this discussion.

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Sincerely,

/RA/

John M. Jacobson, Chief
Mechanical Engineering Branch
Division of Reactor Safety

Docket Nos. 50-237; 50-249
License Nos. DPR-19; DPR-25

Enclosure: As stated

cc w/encl: Site Vice President - Dresden Nuclear Power Station
Dresden Nuclear Power Station Plant Manager
Regulatory Assurance Manager - Dresden
Chief Operating Officer
Senior Vice President - Nuclear Services
Senior Vice President - Mid-West Regional Operating Group
Vice President - Mid-West Operations Support
Vice President - Licensing and Regulatory Affairs
Director Licensing - Mid-West Regional Operating Group
Manager Licensing - Dresden and Quad Cities
Senior Counsel, Nuclear, Mid-West Regional Operating Group
Document Control Desk - Licensing
M. Aguilar, Assistant Attorney General
Illinois Department of Nuclear Safety
State Liaison Officer
Chairman, Illinois Commerce Commission

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Director Licensing - Mid-West Regional Operating Group
Manager Licensing - Dresden and Quad Cities
Senior Counsel, Nuclear, Mid-West Regional Operating Group
Document Control Desk - Licensing
M. Aguilar, Assistant Attorney General
Illinois Department of Nuclear Safety
State Liaison Officer
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Dresden HPCI Hydraulic Transient
May 8, 2002

Comments/questions regarding operability evaluation performed by the licensee.

1) Current operability evaluation does not combine seismic load with transient load. Without evaluating the system for this combination, the SDP screening question cannot be answered. Specifically, "Does the finding involve loss of any safety function, identified by the licensee through an IPEEE, that contributes to external event initiated core damage accident sequences?"

> The SER for the Dresden IPEEE says that the preferred success path for RCS inventory control is HPCI. Since HPCI will automatically initiate during a seismic event due to low water level in the reactor, <u>and</u> the system would have experienced a hydraulic transient upon initiation, these loads need to be combined to determine if the safety function would have been lost.

2) The hydraulic transient loads developed for the operability evaluation attempted to duplicate the pressure response of the HPCI system based on data from the July 5, 2001 scram. What assurance is there that these transient loads are bounding based on the following:

> A) the data from the July 5th scram reflects operator intervention to prevent HPCI injection. Would loads have been higher without this intervention?
>
> B) the data from the July 5th scram shows very large flow rates during the transient. Could these high flow rates have shifted the air between the two different volumes, such that the system response following the July 5th scram would be different than the response recorded?
>
> C) the transient loads were calculated based on two air volumes of 16 scf and 10 scf; however, the calculated amount of air vented from the system was 21 scf and 6 scf respectively. While the total quantity of air was close (26 scf vs 27 scf) the distribution varied. How will this variation in the distribution of air quantities affect the transient loads?
>
> D) since the intermediate high point in the system was not vented, it would appear to result in approximately 31 scf of air in the system. Since only 26 scf of air was modeled, how sensitive is the system response to the amount of air?
>
> E) the location of the air near the intermediate high point will vary depending on what has occurred in the system. Upon initial fill and vent, (assuming only the vent valves near the pump and injection valve are opened) the volume of air will be asymmetrically located from the high point forward toward the injection valve. After a surveillance is performed and the system has been pressurized to 1200 psi, the air will be asymmetrically located from the high point back toward the pump. Although the quantity of air remains the same, the volume of the intermediate slug of water trapped between the two air volumes will change. Have these two configurations been considered in the analysis to ensure bounding loads have been analyzed?

3) Regarding Calculation, DRE01-0076, “Analysis of HPCI Injection Piping Dynamic Loads,”

A) Section 2.1 HPCI Pump Modeling...”It was noted in comparison to the July 5th flow data that an 8 second pump start ramp most closely modeled the acceleration of flow observed.” Please provide the bases for this statement. In looking at the July 5th flow data, the flow went from 0 to 6000 gpm in approximately 2.4 seconds.

B) Section 3.1, “...HPCI turbine speed profile is linear, following auto start...The turbine speed behavior assumption is consistent with the Dresden system behavior.” Based on affinity laws, pump flow is directly proportional to the speed; however, the flow data (and therefore the speed) from the July 5th event does not reflect a linear profile. Please provide the bases for this assumption.

C) Section 3.2, According to transmittal “F” the CST minimum indicated level is 10.5 ft. According to the venting calculation, the elevation in the CST is 517' + 1.5' + level. This would give the minimum elevation as (517 + 1.5 + 10.5) 529ft. The elevation difference between the CST and centerline of the uppermost HPCI discharge pipe is (529 - 525.5) = 3.5ft = 1.52psi....plus atmospheric of 14.7 yields 16.22 psia not 17.7psia given here. Please provide a basis for the apparent difference.

D) Section 4.3 “The HPCI system has 16 cu-ft of air and 6 cu-ft of air trapped in the system, based on approximate venting calculations.” Based on the initial venting calculations presented to the NRC there was 21 cu-ft and 6 cu-ft of trapped air. Furthermore, in Section 6.1, it stated that 10 cu-ft of air was present in the second volume. Explain the discrepancies.

E) Section 6.3, why was only 1.25 cu-ft of air used to evaluate the surveillance case?

F) The frequency content of the relap analysis shows the highest loads in the 4 hz range. However, by comparing the TADS data to the Relap results, it appears that there is a different frequency content. What assurance is there that the relap time histories will lead to bounding piping loads due to the difference in frequency content?

G) The initial Relap time histories were filtered to remove some high frequency analytical artifacts. It was noted that some load was lost by this process and a 2 percent factor was applied to account for this. Provide the bases for this factor.

4) Regarding Calculation, DRE01-0074, “Dresden Unit 3 HPCI Historical Operability Analysis Due to Failed Support M-1187D-80"

A) Page 9...”e) Support 3-2342-4 was analyzed as a no-action support in Reference 5, and is therefore excluded from the analysis for consistency.” Although it was previously shown that this support had no effect on the seismic analysis, a comparable evaluation has not been performed with respect to the current transient loads. Since this support exists, the loads on nearby supports may be affected by this support and the system needs to be evaluated with the support in place.

B) Page 9..."f) The gaps between the lugs and the clamp on support M-1187D-86 are such that four lugs will be engaged in each direction." The gaps vary as follows: <1/16, 3/32, 3/16, 3/16 and <1/16, 1/32, 1/8, 3/16. Based on this variation, the load will not be equally distributed between the lugs as evaluated in Attachment B. Evaluate the support with only two active lugs or show that operability stresses would not be exceeded at the point when sufficient displacement has allowed all four lugs to participate in distributing the load.

C) The calculated piping displacements with support M1187D-80 "failed" are in excess of 2 inches along the axis of the piping near support M1187D-83. According to isometric drawing M-1187C-4 sheet 3, the nearby penetration clearance appears to be 1.00 inch in this direction. If this is correct, what affect will this have on the analysis results?

D) Based on pipe stress analysis with support -80 removed the following pipe supports do not meet operability limits even after refinements are made to the evaluations:

M-1187D-81...IC = 1.03	(limiting component is strut, can't refine IC without material data from mfr.)
M-1187D-82...IC = 2.12	(limiting component is rod)
M-1187D-83...IC = 1.06	(limiting component is embed plate already refined)
M-222............ IC = 1.3	(limiting component is rod, already refined)

However, only M-1187D-82 was removed to evaluate the system. The basis for this approach was given as, "While some component of other supports may exceed the operability allowable, only the -82 support is removed since it has the highest interaction and is expected to fail first. Once this support fails, it may affect the response of the piping to the transient as it continues through the HPCI piping." This approach is inconsistent with the previously approved operability criteria for Dresden, in that, if supports do not meet operability limits, iterative analyses of the piping should remove supports that are not capable of withstanding the loads. The Part 9900 guidance on operability forwarded by Generic Letter 91-18, indicates that NRC approval is needed for the use of operability criteria or evaluation methods which do not meet ASME Appendix F or have not been previously approved.

E) For support M1187-D88, the tension stress for the rod was evaluated using A53 pipe yield stress. i) need to determine allowable stress for bolting material not pipe material. ii) why aren't Level D limits used for Grinnell Figure 640N from published DRS/LCD like clamp? iii) the calculation used normal allowable as 0.6 S_y = 0.6 (35,000) = 21,000; however, if A36 is used the Code uses 0.75 S' (not 0.6 S_y) = 0.75 (21,000) = 9,000. Please provide bases for the approach used in the calculation.

5) Regarding Calculation, DRE01-0072, "HPCI Pipe Support Historical Operability Analysis for Transient Loads"

A) Refined analysis for M-1187D-83,

Page 123... the lateral displacements calculated at this support vary between 1.23" and 1.06" depending on which supports have failed (see DRE01-0074 pp C5 & C8). Since the support is not carrying any load, friction will not keep the pipe centered on the cross beam, therefore, the load can not be assumed to be equally divided between the trapeze rods.

B) Refined analysis for M-1187D-86
Page 127... the lateral displacement calculated in for this support in DRE01-0074 (page C8) is 2.568 inches. The resulting out of plane loading should be considered since this support is at 99.8 percent of operability allowables.

6) According to the event description for LER 89-029, “Elevated HPCI discharge Piping Temperature Due to Reactor Feedwater System Back Leakage,” in October 1989, the HPCI discharge temperature had increased to approximately 275 degrees F between MOVs 2-2301-08 and 2-2301-09, and to approximately 246 degrees F at the HPCI pump. Based on these temperatures much larger portions of the piping system were apparently filled with steam. Using insights into the magnitudes of the loads obtained during the current analytical efforts, should the following statements be reviewed for completeness and accuracy of information? Specifically, the LER states:

in Section D, “Safety Analysis of Event”...although the Reactor Feedwater back leakage condition is believed to have resulted in minor degradation of the discharge piping supports, this condition in itself did not render the HPCI systems functionally inoperable.

in Section E.9, “The Commonwealth Edison Company Nuclear Engineering Department confirmed the operability of the Unit 2 and 3 HPCI systems in the as-found condition identified in October and November of 1989. The operability evaluation considered the elevated temperature conditions existing in the HPCI piping. It also considered the effect of several damaged and unloaded supports identified during subsequent piping walkdowns.