UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
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December 11, 2000

SDP/EA-00-263

Carolina Power & Light Company
ATTN: Mr. James Scarola
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SUBJECT: NRC SPECIAL INSPECTION REPORT 50-400/00-10 ; PRELIMINARY WHITE FINDING

Dear Mr. Scarola:

On September 30, 2000, the Nuclear Regulatory Commission (NRC) completed an inspection at your Shearon Harris reactor facility. Inspection report 50-400/00-03 contained the results of that inspection and it was transmitted to you on October 30, 2000. The report discussed an issue relating to a bearing failure of the C charging/safety injection pump (CSIP). On November 30, 2000, the significance determination for the C CSIP bearing failure was discussed with you and other members of your staff.

The C CSIP bearing failure issue appears to have low to moderate safety significance. As described in Section 1R13 of NRC Inspection Report 50-400/00-03, the C CSIP had a failed outboard thrust bearing which resulted in the pump being inoperable in excess of the Technical Specification limiting condition for operation action statement requirements. This issue was assessed using the Significance Determination Process as a potentially safety significant finding that was preliminarily determined to be White, i.e., an issue with some increased importance to safety, which may require additional NRC inspection. The finding has a low to moderate safety significance because the failed outboard thrust bearing would have caused the C CSIP to fail when outboard thrust conditions existed (at pump flow rates in the range of 200 to 500 gallons per minute) while the pump was intermittently in service from May 1999 to January 2000 as one of two redundant CSIPs. These conditions would have existed if the CSIP had been called upon to provide high pressure safety injection for once-through core cooling to mitigate the effects of a loss of secondary side heat removal, or in response to multiple loss-of-coolant accident break sizes or a steam generator tube rupture. The failed thrust bearing could have caused the C CSIP to fail prior to completing the high pressure safety injection function, leaving only one CSIP to complete that function. The enclosure contains the details of our evaluation.

Related to this finding are two apparent violations involving (1) your failure to comply with Technical Specification 3.5.2.a for C CSIP operability, and (2) your failure to initially classify the failed thrust bearing as a significant adverse condition, which resulted in not adequately identifying the cause as required by 10 CFR 50, Appendix B, Criterion XVI. These two apparent violations of NRC requirements are being considered for escalated enforcement action in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions - May 1, 2000" (Enforcement Policy), NUREG-1600. The current Enforcement Policy is included on the NRC's website at www.nrc.gov/OE.

Before the NRC makes a final decision on this matter, we are providing you an opportunity to request a Regulatory Conference where you would be able to provide your perspectives on the significance of the finding, the bases for your position, and whether you agree with the apparent violations. If you choose to request a Regulatory Conference, we encourage you to submit your evaluation and any differences with the NRC evaluation at least one week prior to the conference in an effort to make the conference more efficient and effective. If a conference is held, it will be open for public observation. The NRC will also issue a press release to announce the conference.

Please contact Mr. Brian Bonser at (404) 562-4560 within seven days of the date of this letter to notify the NRC of your intentions. If we have not heard from you within 10 days, we will continue with our significance determination and enforcement decision and you will be advised by separate correspondence of the results of our deliberations on this matter.

Since the NRC has not made a final determination in this matter, no Notice of Violation is being issued for these inspection findings at this time. In addition, please be advised that the number and characterization of apparent violations described in Inspection Report 50-400/00-03 may change as a result of further NRC review.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Public Available Records (PARS) components of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/NRC/ADAMS/index.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Victor M. McCree, Deputy Director
Division of Reactor Projects

Docket No.: 50-400
License No.: NPF-63

Enclosure: Significance Determination Process
Phase III Evaluation

cc w\encl: (See page 3)

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SIGNIFICANCE DETERMINATION PROCESS PHASE III EVALUATION

Phase III Evaluation

Problem: The C Charging/Safety Injection Pump's (CSIP's) outboard thrust bearing would not function in outboard thrust conditions. Outboard thrust conditions exist when a flowrate of 200 - 500 gallons per minute (gpm) is demanded from the pump.

> Assumption: These conditions would exist when the CSIP was used to perform once-thru-cooling core cooling in response to a loss of secondary side heat removal due to numerous initiating events and, when the CSIP was used to perform high pressure injection in response to small-break loss of coolant accidents (LOCAs) and steam generator tube ruptures (SGTRs). The licensee's Probabilistic Safety Analysis (PSA) evaluates the conventional medium-break LOCA as a "large" small-break LOCA.

Exposure Time: The C CSIP was in service as the A CSIP from May 15, 1999 - June 4, 1999 and from November 13, 1999 - December 18, 1999. Therefore, the total time the C CSIP acted as A was 55 days. The C CSIP was in service as the B CSIP from January 3, 2000 - January 7, 2000 or 4 days. Also, the C CSIP acting in a swing capacity (backup to A or B) from December 18, 1999 - January 3, 2000; January 7, 2000 - April 15, 2000 and; May 13, 2000 - August 1, 2000. This is 194 days.

Analysis: The three conditions of C acting as A, C acting as B, and C acting as swing were considered. The analysis included internal events and external events.

1. Internal Events (plus internal flooding).

   A. Condition 1 - CSIP C acting as A

      1. Cutsets from the licensee's full scope model were evaluated. These cutsets had basic event HPMP1ASAHR, CSIP 1A-SA FAILS TO RUN, set to one. The CSIP common cause failure basic events (CCFs) were not altered. The lack of lubrication did not exist on the other pumps. Therefore, the CCF was not increased to consider this performance deficiency as a CCF contributor. Since the CSIP would operate and provide normal makeup/seal injection, the cutsets were evaluated and pruned to remove any that contained reactor coolant pump seal LOCAs or anticipated transients without scram (ATWS). The assumption being that the CSIP would operate and maintain proper seal cooling eliminating the seal LOCA. Also, the CSIP would properly operate in the emergency borate mode following an ATWS. The model could not differentiate between the CSIP being used for normal RCS makeup /RCP seal injection or for Emergency Core Cooling System (ECCS) injection /once thru cooling. The dominant initiating event contributors were from 6.9 kilovolt (Kv) Bus B loss, B direct current (DC) Bus loss and steam generator tube rupture.

         The results by initiating event are:

Initiating Event	Core Damage Frequency (CDF) Contribution for 1 yr
Instrument Air Loss	1.87E-6
SGTR	9.97E-6
Loss of Offsite Power (LOSP)	6.90E-7
Service Water System(SWS) Loss	6.86E-7
Reactor (Rx) Trip	1.43E-6
Turbine Trip	2.24E-7
6.9 Kv B Bus Loss	2.28E-5
Small Break Loss of Coolant Accident (SBLOCA)	6.96E-7
Partial Main Feedwater (MFW) Loss	2.27E-7
Total MFW Loss	3.67E-6
B Bus DC Loss	1.28E-5
Total	5.51E-5

The exposure time must be considered and the CDF increase is reduced accordingly.

5.51E-5 * (55/365) = 8.3E-6

The baseline CDF must be subtracted from 8.3E-6 to ascertain the CDF change. The baseline CDF is 8.3E-6 times the normal basic event value for HPMP1ASAHR, CSIP 1A-SA FAILS TO RUN. That value is 4.32E-4. This makes the baseline CDF:

8.3E-6 * 4.32E-4 = 3.59E-9

The CDF change is 8.3E-6 - 3.59E-9 = 8.29E-6

2. The latest NRC Simplified Plant Analysis Risk (SPAR) model, Rev. 3, of Harris was also used to evaluate the risk significance of this performance deficiency. The CSIP performance deficiency was modeled as basic events HPI-MDP-FR-1A & HPI-MDP-FS-1A set to TRUE. A condition assessment was performed using 1.3E3 hours (55 days). The resulting cutsets were reviewed to remove any RCP LOCA sequences. This was determined to be basic event RCS-MDP-LK-SEALS. Therefore, the loss of component cooling water (LOCCW) and loss of emergency service water (LOESW) sequences were eliminated. The resulting CDF change was:

Event Tree Name	Sequence Name	Importance
Loss of Offsite Power (LOOP)	10	5.0E-6
LOOP	17	9.5E-7
Small Break Loss of Coolant Accident (SLOCA)	07	5.1E-7
SGTR	13	1.9E-7
TRANSIENT (TRANS)	08	6.9E-8
TRANS	20	3.9E-9
Medium Break Loss of Coolant Accident (MLOCA)	10	1.4E-9
Total		7E-6

3. Recovery Consideration: This is a multi-stage horizontally mounted centrifugal charging pump. Upon reaching the 200 - 500 gpm flow range, the pump bearing would fail. Such a failure would not be recoverable by operators and recovery credit will not be further considered in this analysis. The use of the swing pump was considered in the licensee's full scope model. However, it is only used when loss of charging is the initiating event. Placing the swing into service requires moving an electrical breaker from one division to the other. Also, valve manipulations are required. These manual actions significantly reduce the success of using this option prior to core damage. Also, at various times the swing pump option was not available due to maintenance activities. This was why the swing pump was acting as the A pump.

4. Summary: There is not a one-to-one correlation between the SPAR model results and the licensee's full scope model. However, they are within the same magnitude. Also, the SPAR model does not contain the dominant initiating events of Loss of DC B and Loss of 6.9 Kv that are included in the licensee's full scope model. If these initiating events were considered in the SPAR model the CDF change would be significantly larger than the licensee's full scope model. Therefore, the licensee's full

scope model results of 8.29E-6 will be considered the results of the internal events review for CSIP C acting as A.

B. Condition 2 - CSIP C acting as B

1. Based upon the limited number of cutsets that were eliminated from A above, a scoping analysis using the risk achievement worth (RAW) and the licensee's full scope model was used. RAW is the resulting increase in CDF given the equipment associated with the basic event always failed for one year. The highest RAW was for FAIL TO RUN of 1.6. The baseline CDF was 5.02E-5 from the licensee's current model used for Maintenance Rule implementation.

   1.6 * 5.02E-5 - 5.02E-5 = 3E-5 * 4/365 = 3E-7 change in CDF

2. Using the NRC's SPAR model

   1.029 * 5.55E-5 - 5.555E-5 = 1.6E-6 * 4/365 = 1.8E-8 change in CDF

3. Recovery Consideration: This is a multi-stage horizontally mounting centrifugal charging pump. Upon reaching the 200 - 500 gpm flow range, the pump bearing would fail. Consistent with 1.A.3 above, such a failure would not be recoverable by operators and recovery credit will not be further considered in this analysis.

4. Summary: CSIP C acting as B is a minor risk contributor with very limited affect upon the risk increase associated with CSIP C acting as A.

C. Condition 3 - CSIP C acting as Swing

1. Using the licensee's full scope model, the swing pump provided a very limited reduction in CDF. In the licensee's model it is only used when loss of charging is the initiating event. Placing the swing into service requires moving an electrical breaker from one division to the other. Also, valve manipulations are required. These manual actions significantly reduce the success of using this option prior to core damage. In the 1000+ cutsets provided with the CSIP A always failed, none included a swing CSIP basic event. This indicated that the swing CSIP was of little risk importance and had a RAW of 1.00. Therefore, the risk increase for failing to have swing capability is greatly out weighed by CSIP C acting as B and will be deleted from risk quantification.

2. The NRC's SPAR Rev. 3 model uses the swing pump as a high pressure injection (HPI) mitigation train for numerous event trees. A slightly conservative scoping analysis will be performed. The RAW for CSIP C as the swing (basic event HPI-MDP-FR-1C) is 1.025 with a baseline CDF of 5.55E-5. The CDF change is:

   {[5.55E-5 * 1.025] - 5.55E-5} * 194/365 = 7E-7

3. Summary: Clearly, CSIP C acting as A is of far greater risk significance and CSIP C acting as swing will be deleted from risk quantification.

D. Internal Events Summary. Due to some of the modeling differences between the licensee's full scope model and the NRC's SPAR, Rev. 3, the change in CDF is quantified as 8.29E-6 from the licensee's full scope model.

2. External Events

A. Given the results of the internal events review, only CSIP C acting as A will be quantified. The ramifications of CSIP C acting as B or as Swing would be a magnitude less in risk importance. Surrogates from the internal events review will be used to examine the external events contribution to the risk increase due to the performance deficiency.

B. Impacts from earthquakes, high winds, and tornadoes would be modeled similarly to the LOSP initiating event accident sequences. However, the frequency of such initiating events would be at least one order of magnitude smaller than LOSP, and would have an associated decrease in CDF contribution. These sequences were not quantified because of their low contribution to CDF.

C. For the most part, fire risk falls in this same category. However, the dominant cutset contribution is from loss of the 6.9 Kv B Bus. The licensee's Individual Plant Evaluation for Exteral Events (IPEEE) did perform detailed risk analysis of the 6.9 Kv Bus compartment and fire initiating event frequency causing loss of the bus will be examined.

1. Cabinet fires in the B Switchgear Room that were suppressed but due to their location caused a loss of 6.9 Kv B.

   The generic fire initiating event frequency is 7.3E-3 for a switchgear room. Of the 77 cabinets only 4 could cause a loss of the 6.9 Kv Bus B (reference IPEEE support document 2Y57.F/08A pages 17-3 & 4). Therefore, 4/77 * 7.3E-3 = 3.79E-4 fires/yr that would cause a loss of 6.9 Kv B (even though they were suppressed).

2. Cabinet fires originating in the B Switchgear Room that go unsuppressed and spreads to one of the four critical cabinets.

   This was quantified at 3.5E-4 (reference IPEEE page 4-79, table 4-5). However, a more realistic analysis is:

7.3E-3 * (1 - 26/84) * (.1) * (.1) = 5.11E-5 fires/yr that go unsuppressed and cause loss of 6.9 Kv B

7.3E-3 fires/yr represents the frequency of all cabinet fires in the B Switchgear Room

1 - 26/84 represents the probabillity (Pr) of cabinet fires that would not self-extinguish. The fire induced vulnerability evaluation (FIVE) data base contains 84 fires, 26 of which self-extinguished.

0.1 represents the Pr that the fire would not be manually suppressed.

0.1 represents the Pr that this unsuppressed fire would spread enough to actually cause failure of one of the 4 critical buses. This is the Severity Factor and is consistent with draft significance determination process (SDP) guidance in this area.

3. Welding/cutting fires that would be unsuppressed causing loss of 6.9 Kv bus B

   The initiating event frequency was derived at 1.3E-5 (reference IPEEE page 4-79, table 4-5).

4. The fire ignition frequency associated with transient combustibles was at least a magnitude less and will be dropped from quantification.

Therefore, the initiating event (IE) frequency for a fire originating in the B Switchgear Room causing a loss of B 6.9 Kv was 3.79E-4 + 5.11E-5 + 1.3E-5 = 4.4E-4.

D. Fires originating in the control room that would cause a loss of the critical B functions of secondary side cooling and charging/high pressure safety injection (HPSI) were examined. At least one fire discussed in Table 4-7, page 4-101 of the IPEEE met this description. Scenario 1E7, fire in the SSPB Output 1 sub-cabinet with early suppression would have caused loss of B auxiliary feedwater (AFW) & B CSIP along with causing a reactor trip. Therefore, the IE frequency of 7.43E-5 will be used as a surrogate for loss of the 6.9 Kv Bus from a fire in the control room.

E. Summing all the 6.9 Kv B Bus losses from fire gives:

   3.79E-4 + 5.11E-5 + 1.3E-5 + 7.43E-5 = 5.17E-4

F. Integrating this new initiating event frequency into the conditional core damage probaiblity (CCDP) for 6.9 Kv Bus B from the internal events review gives an increase in CDF due to the deficiency.

The CDF increase from 6.9 Kv Bus Loss = 2.28E-5

Dividing by internal events IE Frequency of 2.01E-3 gives the CCDP

2.28E-5/2.01E-3 = 1.13E-2

5.17E-4 [IE Frequency] * 1.13E-2 [CCDP] = 5.84E-6

Compensating for exposure time and the CDF baseline gives a change in CDF of

[5.84E-6 - 5.7E-9] * 55/365 = 8.79E-7

Consistent with previous discussions above, no recovery credit is given. Therefore, the CDF change is quantified at 8.79E-7 for external events.

G. There is not an independent NRC model to evaluate external risk. It is not possible to use the surrogate method since the SPAR model does not include the 6.9 Kv B Bus loss as an initiating event.

Collective Risk Summary: In this situation the internal and external risk contributions are additive. Therefore, 8.79E-7 (external) + 8.29E-6 (internal) = 9.2E-6 CDF change for CSIP C acting as A. A conservative risk contribution of CSIP C acting as B would be 3E-7(internal) + 3E-8 (external) = 3.3E-7. Adding these two risk contributions: 9.2E-6 + 3.3E-7 = 9.5E-6. The risk contribution of CSIP C acting as the swing does not increase the risk in the E-7 range. Therefore, the performance deficiency is characterized as WHITE.