UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET SW SUITE 23T85
ATLANTA, GEORGIA 30303-8931

January 30, 2004

EA-04-017

Carolina Power and Light Company
ATTN: Mr. C. J. Gannon
Vice President
Brunswick Steam Electric Plant
P. O. Box 10429
Southport, NC 28461-0429

SUBJECT: NRC INSPECTION REPORT NO. 05000324/2003006; PRELIMINARY WHITE FINDING; BRUNSWICK STEAM ELECTRIC PLANT

Dear Mr. Gannon:

This letter and the enclosed supporting documentation discusses a finding that appears to have low-to-moderate safety significance. As described in Section 1R17 of NRC Inspection Report 05000324/2003006, issued on January 16, 2004, a finding was identified which concerned a deficiency involving the design review of a modification implemented on the Unit 2 reactor feed pump speed control system. Specifically, the design review did not recognize that the system's power supplies would fail to provide power during supply voltage transients, such as would occur during a reactor scram. Upon recognizing this problem, while planning permanent corrective actions, you implemented compensatory measures such as protecting redundant makeup water sources and limiting activities with potential to cause a reactor/turbine trip. Also, operators were trained and procedures were revised to address timely recovery of the feedwater pump control system in the event of a power supply trip. You subsequently implemented a modification to supply the reactor feed pump control system with an uninterruptible power source.

This finding was assessed based on the best available information, including influential assumptions, using the applicable Significance Determination Process (SDP) and was preliminarily determined to be a White finding (i.e., a finding with some increased importance to safety, which may require additional NRC inspection). The finding has a low-to-moderate safety significance primarily due to the assumption that all reactor scrams following installation of the modification would have resulted in the loss of reactor feed pumps, and that the condition existed for about eight months. The finding does not represent a current safety concern because you subsequently installed an uninterruptible power source, which corrected the vulnerability of the power supplies to a supply voltage transient.

Inspection Report 05000324/2003006 indicated that this finding affected both the Initiating Events and Mitigating Systems Cornerstones of the NRC Reactor Oversight Process. After reviewing the functions that were degraded by this finding, we have decided to identify it only under the Mitigating Systems Cornerstone for tracking in the NRC Action Matrix.

Before we make a final decision on this matter, we are providing you an opportunity (1) to present to the NRC your perspectives on the facts and assumptions, used by the NRC to arrive at the finding and its significance, at a Regulatory Conference or (2) submit your position on the finding to the NRC in writing. If you request a Regulatory Conference, it should be held within 30 days of the receipt of this letter and we encourage you to submit supporting documentation at least one week prior to the conference in an effort to make the conference more efficient and effective. If a Regulatory Conference is held, it will be open for public observation. The NRC will also issue a press release to announce the conference. If you decide to submit only a written response, such submittal should be sent to the NRC within 30 days of the receipt of this letter.

Please contact Paul Fredrickson at (404) 562-4530 within 10 business days of the date of your receipt 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 decision and you will be advised by separate correspondence of the results of our deliberations on this matter.

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 Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA by L. Wert for/

Victor M. McCree, Director
Division of Reactor Projects

Docket Nos.: 50-324
License Nos.: DPR-62

Enclosure: SDP Phase III Summary

cc w/encl: (See page 3)

cc w/encl:
W. C. Noll, Director
Site Operations
Brunswick Steam Electric Plant
Carolina Power & Light
Electronic Mail Distribution

David H. Hinds
Plant Manager
Brunswick Steam Electric Plant
Carolina Power & Light Company
Electronic Mail Distribution

James W. Holt, Manager
Performance Evaluation and
Regulatory Affairs PEB 7
Carolina Power & Light Company
Electronic Mail Distribution

Edward T. O'Neil, Manager
Support Services
Carolina Power & Light Company
Brunswick Steam Electric Plant
Electronic Mail Distribution

Lenny Beller, Supervisor
Licensing/Regulatory Programs
Carolina Power and Light Company
Electronic Mail Distribution

William D. Johnson
Vice President & Corporate Secretary
Carolina Power and Light Company
Electronic Mail Distribution

John H. O'Neill, Jr.
Shaw, Pittman, Potts & Trowbridge
2300 N. Street, NW
Washington, DC 20037-1128

Beverly Hall, Acting Director
Division of Radiation Protection
N. C. Department of Environment
and Natural Resources
Electronic Mail Distribution

Peggy Force
Assistant Attorney General
State of North Carolina
Electronic Mail Distribution

Chairman of the North Carolina
Utilities Commission
c/o Sam Watson, Staff Attorney
Electronic Mail Distribution

Robert P. Gruber
Executive Director
Public Staff NCUC
4326 Mail Service Center
Raleigh, NC 27699-4326

Public Service Commission
State of South Carolina
P. O. Box 11649
Columbia, SC 29211

Donald E. Warren
Brunswick County Board of
Commissioners
P. O. Box 249
Bolivia, NC 28422

Warren Lee
Emergency Management Director
New Hanover County Department of
Emergency Management
P. O. Box 1525
Wilmington, NC 28402-1525

Distribution w/encl: (See page 4)

Distribution w/encl:
B. Mozafari, NRR
C. Evans, RII EICS
OE, MAIL
OE, WEB
RIDSRIDSNRRDIPMLIPB
PUBLIC

OFFICE	DRP/RII		DRP/RII		DRP/RII		EICS/RII		DRS/RII					
SIGNATURE	PEF		LXW1		EMD		CFE		RHB					
NAME	PFredrickson		LWert		EDiPaolo		CEvans		RBernhard					
DATE	01/27/04		01/27/04		01/27/04		01/27/04		01/27/04					
E-MAIL COPY?	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
PUBLIC DOCUMENT	YES	NO												

OFFICIAL RECORD COPY DOCUMENT NAME: C:\ORPCheckout\FileNET\ML040300141.wpd

SDP Phase III Summary

SRA Analysis Number: BRU0301
Analysis Type:SDP Phase III
Inspection Report #: 05000324/2003006.
Plant Name: Brunswick
Unit Number: 2
Enforcement Action # (if applicable):

I. Background - During the Spring 2003 Unit 2 outage, the licensee implemented a modification to the reactor feed pump speed control system. This modification, EC 46822, replaced the existing mechanical-hydraulic speed control system with a digital speed control system (Woodward TMR 5009). During follow-up of issues raised during the November 4 Unit 2 reactor trip, the licensee determined that a trip of both reactor feed pumps would occur during a Unit 2 turbine trip. The licensee discovered that the digital speed control system power supplies (two for each reactor feed pump) were designed to sense a fault condition within one cycle of abnormal supply voltages. The power supplies would fault, and thus cease to supply output power, if incoming voltage was sensed greater than 132 volts (AC) or less than 88 volts (AC). Simultaneous faults in the power supplies would result in the reactor feed pump tripping.

The speed control system power supplies ultimately receive power from the 2C and 2D Buses. These buses are provided with an automatically initiated, automatically executed, quick, dead bus transfer. The scheme is capable of quickly transferring each bus section and its loads from the normal source (unit auxiliary transformer) to the preferred source (startup auxiliary transformer) in the event of a loss of the normal power source or unit trip. This transfer results in the buses being disconnected from both voltage sources for a period of between one and five cycles, per the Updated Final Safety Analysis Report. As a result, the reactor feed pump speed control system power supplies would fault, and the reactor feed pumps would trip following unit trips and during certain voltage transients on the 2C and 2D Buses. The licensee's evaluation of the modification did not to recognize this vulnerability.

Performance Deficiency -The licensee's design review of the Unit 2 reactor feed pump speed control system modification (EC 46822) did not recognize that the system's power supplies would fault and fail to provide power during supply voltage transients. Voltage transients of sufficient magnitude to fault the power supplies, resulting in tripping of the reactor feed pumps, were determined to occur following automatic transfer of emergency buses 2C and 2D from the Unit Auxiliary Transformer to the Startup Auxiliary Transformer following a reactor/turbine trip.

Exposure Time - The condition existed from Unit 2 startup on 4/6/03 until 12/7/03 when it was eliminated with a plant modification that altered the power sources for the pump controls. This is 245 days.

Date of Occurrence - During the outage prior to the 4/6/03 startup.

II. Safety Impact: The deficiency results in the main feedwater system being unavailable for primary system makeup for all transients that result in a trip. Feedwater/condensate is usually credited about 70% of the time in the SPAR model.

III. Risk Analysis/Considerations

Assumptions

1. Any transient causing the generator to trip will also lead to a loss of main feedwater.

2. For events where the feedwater trips, but HPCI initiates, MSIV isolation on low water level will not necessarily occur, and recovery of feedwater is possible, with a failure rate of .1. If HPCI fails, feedwater is not recoverable.

PRA Model used for basis of the risk analysis: Revision 3i SPAR.

IV. Calculations

SPAR was run for the case where the main feed pumps fail to run. The change in frequency on an annualized basis was 2.3E-5/year. A review of the cutsets determined that a large percentage off the total risk contribution is dependent on the value of one basic event:

HCI-MOV-CC-IVFRO HPCI INJECTION VALVE FAILS TO REOPEN prob. 2.0E-001

The TRANS 55 sequences containing this basic event constitute almost half of the change in risk from the base case. NUREG/CR-5500, Volume 4, "Reliability Study:HPCI System 1987 - 1993", is the basis of this probability. Appendix C, paragraph C-1.1.7 explains the basis for the number. Because there was very little data to base the number of restart demands for the valve, some educated estimating was made. This resulted in a very high uncertainty for the value used. The failure rate used for the valve alone, which would lead to a HPCI failure, is higher than the total system failure rate that is used by most of industry, and that used at the site for total system failure by a factor of three. Rerunning the SPAR model with a value of .1 (the same value the SDP sheets use for total HPCI system failure rate) results in an annual risk change rate of 1.7E-5.

Sequences 56-05 and 56-04 concern the case where HPCI is available, so MSIV isolation is not expected, and feedwater should be recoverable. If the importance for these sequences is subtracted from the total, then 10% is added back in for the sequences in which recovery fails, the required adjustment should have been accomplished. When these contributions are subtracted from the delta:

When the adjustments are made:

1.7E-5 - .9[(cdp for 56-05)-(ccdp for 56-05)]-9[(cdp for 56-04)-(ccdp for 56-04)]=
1.7E-5 - .9*(7.8E-6+3.2E-7) = 1.7E-5 - 7.23E-6
9.8E-6/year

Delta CDF for Exposure Time

245 days had elapsed
9.8E-6/year * 245 / 365 = 6.6E-6/year

The contribution due to external events and fires is not considered to impact the calculation significantly, since the delta is dominated by TRAN, which has a relatively high initiating event frequency. Any increase in frequency due to these other infrequently occurring contributors would have minimal impact. Most external weather or grid related initiators result in loss of feedwater anyway.

V. Conclusions/Recommendations - Risk increase over the base case was 6.6 E-6. The issue is White, primarily due to the duration, and the assumption that all trips result in a loss of feedwater.