

NOTICE OF VIOLATION

Carolina Power and Light Company
Brunswick Steam Electric Plant
Unit 2

Docket Nos. 50-324
License Nos. DPR-62
EA 96-442

During an NRC inspection completed on October 26, 1996, violations of NRC requirements were identified. In accordance with the "General Statement of Policy and Procedures for NRC Enforcement Actions," NUREG-1600, the violations are listed below:

- A. Facility Operating License Number DPR-62, Section 2.C.1, Maximum Power Level, authorizes the licensee to operate the facility at steady state reactor core power levels not in excess of 2436 megawatts (Mw) (thermal).

Contrary to the above, during the time periods listed below, the licensee failed to operate the facility within steady state reactor core power level limit of 2436 (Mw) (thermal):

<u>Dates</u>	<u>Power Level (MW)</u>	<u>Percent Power</u>
July 5, 1994 thru September 6, 1995 (including February 26, 1995 at	2446 Mw 2460 Mw	100.4% Power 101.0% Power)
March 26 thru August 28, 1996 (including April 17 thru 26, 1996 at and July 19 thru 26, 1996 at	2441 Mw 2492 Mw 2494 Mw	100.2% Power 102.3% Power 102.4% Power)(01013)

- B. Technical Specification 3.2.1 requires in part, that during power operation, the AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR), for each type of fuel as a function of axial location and AVERAGE PLANAR EXPOSURE shall not exceed limits based on applicable APLHGR limit values that have been approved for the respective fuel and lattice type and determined by the approved methodology described in GESTAR-II.

Contrary to the above, between December 10 and December 20, 1995, during power operation, the licensee failed to maintain the APLHGR within the applicable approved APLHGR limit values specified in Technical Specification 3.2.1. (01023)

These violations represent a Severity Level III problem (Supplement I).

Pursuant to the provisions of 10 CFR 2.201, Carolina Power & Light Company is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 with a copy to the Regional Administrator, Region II, and a copy to the NRC Resident Inspector at the Brunswick Steam Electric Plant, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for

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disputing the violation, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

Under the authority of Section 182 of the Act, 42 U.S.C. 2232, this response shall be submitted under oath or affirmation.

Because your response will be placed in the NRC Public Document Room (PDR), to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be placed in the PDR without redaction. However, if you find it necessary to include such information, you should clearly indicate the specific information that you desire not to be placed in the PDR, and provide the legal basis to support your request for withholding the information from the public.

Dated at Atlanta, Georgia
this 13th day of December 1996

LIST OF PREDECISIONAL ENFORCEMENT CONFERENCE ATTENDEES
DECEMBER 9, 1996

Carolina Power and Light Company

W. Orser, Executive Vice President, Nuclear Generation
W. Campbell, Vice President, Brunswick Nuclear Plant
H. Habermeyer, Jr., Vice President, Nuclear Engineering Department
J. Lyash, Manager, Brunswick Nuclear Engineering
T. Walt, Manager, Operations and Environmental Support
B. Boylston, Superintendent, Information Technology
M. Carroll, Manager, Nuclear Information Technology
B. Lindgren, Manager, Site Support Services
G. Smith, Superintendent, NSSS, Engineering
R. Hill, Reactor Engineer

Nuclear Regulatory Commission

L. Reyes, Deputy Regional Administrator, Region II (RII)
E. Merschhoff, Director, Division of Reactor Projects (DRP), RII
B. Uryc, Director, Enforcement and Investigation Coordination Staff (EICS), RII
M. Shymlock, Chief, Reactor Projects Branch 4 (RPB4), DRP, RII
M. Reinhart, Director, Directorate II-1, NRR (by phone)
D. Trimble, Project Manager, NRR
G. Golub, Engineer, Reactor Systems Branch, NRR
L. Watson, Enforcement Specialist, EICS, RII
C. Evans, Regional Counsel, RII
C. Patterson, Senior Resident Inspector, Brunswick, DRP, RII
J. Dixon-Herrity, Enforcement Coordinator, Office of Enforcement (by phone)

Predecisional Enforcement Conference Feedwater Flow Temperature Compensation

**Carolina Power & Light Company
December 9, 1996**



Agenda

Feedwater Flow Temperature Compensation

- **Introduction**
- **Background**
- **Event Description**
- **Root Cause**
- **Corrective Actions**
- **Follow-up Corrective Actions**
- **Safety Assessment**
- **Summary**

Introduction

- Self-Identified
- Corrective Actions
- Root Cause Analysis
- Comprehensive Follow-up Actions
- Safety Assessment

Plant Process Computer Replacement

Modification Background

- **Project Initiated 1/87**
- **Specification Approved 5/91**
 - ◆ **Utilized the Nuclear Plant Modification Program**
 - **Non-Safety System But Developed In Accordance With The Requirements Of The Nuclear Plant Modification Program**
- **Unit 1 Installation 9/93**
- **Unit 2 Installation 6/94**

Plant Process Computer Validation

Modification Background

● Generic System

◆ Generic Software Developed

- ABB Developed System Functions
- ABB Developed Factory Acceptance Tests (FAT) for Each Function
- Brunswick Engineers Review and Approve Test Design

◆ Factory Acceptance Test

- *Specific Test for Feedwater Compensation Executed*

● Unit 1

◆ Site Acceptance Test

◆ Startup Test

- Final Acceptance
- Specific Test to Validate Heat Balance

◆ Performance Test

- Validated Hardware/Software Performance

● Unit 2

◆ Adapted Unit 1 PPC

- Unloaded Unit 1 Database to Editable File
- Changed Unit 1 Designations To Unit 2
- Added Additional Points To Top Of File
- Loaded File
- Comparisons Executed for Adapted Functions and Tables

◆ Site Acceptance Test

- Same as for Unit 1

◆ Startup Test

- Final Acceptance
- Specific Test to Validate Heat Balance

◆ Performance Test

- Validated Hardware/Software Performance

Event Description

- Identified By CP&L Reactor Engineer And Computer Analyst During Review Of Core Thermal Power Calculations For System And Procedure Affirmation Associated With The Power Uprate Project
- Operated At Greater Than Licensed Thermal Power

Root Cause

- **Error Introduced In Adapting The Unit 1 PPC Database to Unit 2**
- **Database Validation Test Insufficient To Detect The Error**

Corrective Actions

- Reduced Power
- Corrected Feedwater Temperature Compensation
- Heat Balance Revalidation

PPC Validation

Follow-up Actions

- **Revalidation Of Critical PPC Functions**
- **Identification And Execution Of Areas For Improvement**
 - ◆ **Documentation Of Testing**
 - ◆ **Correction Of Failover Function**
- **Conclusion:**
 - ◆ **Critical Functions Validated And Recommended Improvements Incorporated**

Review Of Other Computer Applications

Follow-up Actions

● Selection Criteria Developed

- ◆ **Systems With Direct Control Functions**
- ◆ **Systems Utilized To Maintain Technical Specification
And Operating License Requirements**
- ◆ **Systems Utilized For Emergency Planning Decisions**
- ◆ **Systems Utilized For Radiological Effluent
Monitoring**

Review Of Other Computer Applications

Follow-up Actions

● 24 Systems Evaluated Including:

- Steam Leak Detection
- Rod Worth Minimizer
- Digital Feedwater Control System
- ERFIS/SPDS
- Security Computer System
- PowerPlex
- Refuel Bridge Controller
- Offsite Dose Calculation Software
- Chemistry Analysis Software

Review Of Other Computer Applications

Follow-Up Actions

- **Evaluation Performed To Confirm:**

- ◆ Controls In Place During Software Development, Installation, Testing, and Operation
- ◆ Verification and Validation
- ◆ Surveillance Testing
- ◆ Recovery Plans

- **Conclusion:**

- ◆ Confirmed Intended Functions

CP&L

Computer Product Control Enhancements

Follow-up Actions

- **Reviewed Brunswick Computer Experience**
- **Reviewed Industry Experience**
- **Compared Existing Controls With Industry Standards**

Computer Product Control Enhancements

Additional Actions

- **Improved Software QA Program**

- ◆ Software Quality Assurance Configuration Control And Life Cycle

- **Enhanced The Guidance For Review And Implementation Of New Software**

- **Training**

- ◆ Lessons Learned
- ◆ Software Configuration Control Training Planned For Engineers
- ◆ IT Personnel Enrolled In Engineering Training

Heat Balance Surveillance And Controls

Follow-up Actions

- **Evaluated Surveillance Practices**
- **Evaluated Control Of Heat Balance Inputs**
- **Conclusion:**
 - ◆ **Enhancements Of Controls And Surveillance Practices Are Warranted And Have Been Implemented**

Summary

- **Comprehensive Corrective Actions**
- **PPC Validation**
- **Review Of Other Important Computer Applications**
- **Computer Product Control Enhancements**
- **Heat Balance Surveillance And Controls**

Safety Assessment

- Majority Of Time During Event Error $\leq 1\%$
 - ◆ Within Reload Licensing Analysis
 - ◆ Within LOCA Analysis

Cycle 11

Safety Assessment

- Power Less Than 100% Of Rated
- MAPLHGR Calculated To Be 1.008
 - ◆ MAPLHGR Generic Curves Used
 - ◆ Generic Adjustment Factors Used
 - MAPLHGR Recalculated To Be 0.958
- LOCA Analysis (SAFER-GESTR) Performed At 110%

Cycle 12

Safety Assessment

- **16 Days Greater Than 102% Power**
 - ◆ Thermal Margins Greater Than 10%
 - ◆ LOCA Analysis (SAFER-GESTR) Performed At 110%
 - ◆ No Safety Concern
- **CP&L Plans To Conduct Feedwater Flow Venturi Testing To Evaluate Actual Flow And Reactor Power**

Summary

- Self-Identified
- Corrective Action
- Comprehensive Action Regarding Other Computer Programs
- Safety Assessment

PREDECISIONAL ENFORCEMENT CONFERENCE AGENDA

BRUNSWICK

DECEMBER 9, 1996

NRC REGION II OFFICE, ATLANTA, GEORGIA

- I. OPENING REMARKS AND INTRODUCTIONS
 S. Ebnetter, Regional Administrator
- II. NRC ENFORCEMENT POLICY
 B. Uryc, Director,
 Enforcement and Investigation Coordination
 Staff
- III. SUMMARY OF THE ISSUES
 S. Ebnetter, Regional Administrator
- IV. STATEMENT OF CONCERNS / APPARENT
 VIOLATION
 E. Merschoff, Director,
 Division of Reactor Safety
- V. LICENSEE PRESENTATION
 W. Campbell, Vice President - Brunswick
 Carolina Power & Light Company
- VI. BREAK / NRC CAUCUS
- VII. NRC FOLLOWUP QUESTIONS
- VIII. CLOSING REMARKS
 S. Ebnetter, Regional Administrator

ISSUE TO BE DISCUSSED

Facility Operating License Number DPR-62, Section 2,C,1, Maximum Power Level, authorizes the licensee to operate the facility at steady state reactor core power levels not in excess of 2436 megawatts (thermal).

Technical Specification 3.2.1 requires in part, that during power operation, the AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR), for each type of fuel as a function of axial location, shall not exceed limits based on applicable approved APLHGR limit values.

The licensee operated Brunswick Unit 2 at steady state reactor core power levels in excess of the license limit of 2436 megawatts (Mw) (thermal) for extended periods of time. Due to an error in the plant process computer software used for the calculation of core thermal power, the unit operated in excess of the license limits as follows:

7/5/94 - 9/6/95	2446 Mw	100.4% Power
(including 2/26/95 at	2460 Mw	101.0% Power)
3/26/96 - 8/28/96	2441 Mw	100.2% Power
(including 4/17-26/96 at	2492 Mw	102.3% Power
and 7/19-26/96 at	2494 Mw	102.4% Power)

The unit also exceeded the Average Planar Linear Heat Generation Rate thermal limit from December 10 through December 20, 1995.

NOTE: The apparent violation discussed in this conference is subject to further review and is subject to change prior to any resulting enforcement decision.