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Mr. Giambusso	1 signed			X	X

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ENCLOSURES:
REPORT: Unusual Event Report-Boron Analyses During Zero Power Physics Tests

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ACKNOWLEDGED
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PLANT NAME: Oconee Unit 1

FOR ACTION/INFORMATION 7-20-73 AB

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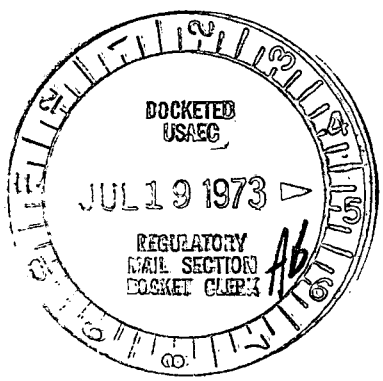
Regulatory File Cy.

DUKE POWER COMPANY
POWER BUILDING
422 SOUTH CHURCH STREET, CHARLOTTE, N. C. 28201

A. C. THIES
SENIOR VICE PRESIDENT
PRODUCTION AND TRANSMISSION

P. O. Box 2178

July 17, 1973



Mr. Angelo Giambusso
Deputy Director for Reactor Projects
Directorate of Licensing
U. S. Atomic Energy Commission
Washington, D. C. 20545

Re: Oconee Unit 1
Docket No. 50-269

Dear Mr. Giambusso:

Pursuant to Section 6.2 and 6.6.2 of the Oconee Nuclear Station Unit 1 Technical Specifications, please find attached a report concerning problems in determining boron concentrations during Zero Power Physics Testing at Oconee Unit 1.

Very truly yours,

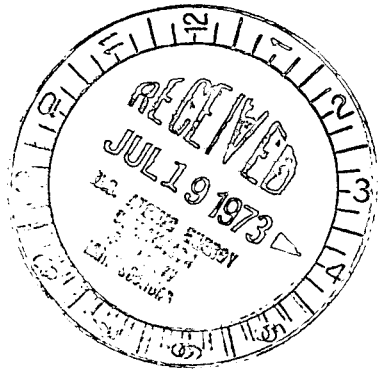
A. C. Thies

A. C. Thies

ACT:vr

Attachment

cc: Mr. Norman C. Moseley, Director
Directorate of Regulatory Operations
Region II - Suite 818
230 Peachtree Street, Northwest
Atlanta, Georgia 30303



5571

DUKE POWER COMPANY
OCONEE NUCLEAR STATION - UNIT 1
UNUSUAL EVENT REPORT
BORON ANALYSES DURING ZERO POWER PHYSICS TESTS

Introduction

This report discusses problems encountered in determining boron concentrations during the initial approach to criticality and zero power physics testing for Oconee Unit 1.

Description of the Incident

On April 19, 1973, deboration of Oconee Unit 1 reactor coolant system was in progress and the reactor was approaching initial criticality. When boron concentration in the reactor coolant system reached 1452 parts per million Boron (ppmB), extrapolation of the inverse multiplication (1/M) plot showed criticality would be reached at about 1000 to 1100 ppmB. The predicted value of boron concentration at criticality was 1334 $\pm$ 100 ppmB. An on-site evaluation by chemistry personnel showed the boron analysis results to be in error by approximately 2.4 percent. It was found that the normality of the sodium hydroxide solution used for the boric acid titration was incorrect, apparently due to the absorption of carbon dioxide over a period of several months. Boron concentrations determined before April 19 were corrected by multiplying by a factor of 0.976.

On April 24, 1973, it was found that a sodium hydroxide solution, which had been prepared on April 21, had been improperly evaluated as to normality, and that the boron readings from April 21 until April 24 were also in error. It was determined that a correction factor of 0.916 should be applied to the boron concentrations determined during the period April 21 to April 24.

Corrective Action

The following steps were taken to prevent recurrence of the problems with boron analysis which occurred during zero power physics testing:

1. Fresh batches of sodium hydroxide solution are prepared (approximately once per week) for use in titrating boron samples. The quantities prepared (2 liters) are kept small so that new solutions must be

prepared before the normality of the solution can change significantly.

2. A boron standard is checked in duplicate, twice each day to assure that the analysis drift does not occur with time.

3. Each sample is run in duplicate on a boron titrator to assure precision. If the two results differ by more than 10 ppm boron, a third test is done to verify results.

4. The boronometer provides an independent check of lab results. If there is disagreement, then an investigation will be initiated to determine which is in error.

Station boron standards are kept by the Technical Support Engineer. Periodically the lab is given a sample of one of these standards to check. If the result does not agree with the known standard concentration, an investigation will be made into the cause for the discrepancy.

Safety Analysis

The errors in the boron analyses made during zero power physics testing were systematic, having resulted from errors in determining the normality of the sodium hydroxide used in the titration. Using boron standards, a constant multiplication factor was determined, and this factor was then used to correct the boron concentrations. Although the absolute boron concentrations were not accurately known, plant performance was accurately predicted and controlled using relative concentrations. It is concluded that plant safety was not adversely affected.