AREVA

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Revision 0

ACE/ATRIUM 11
Critical Power Correlation RAIs

Topical Report

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AREVA Inc.

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Nature of Changes

Item	Section(s) or Page(s)	Description and Justification
1	All	Initial Issue

Contents

List of Tables

1.0 INTRODUCTION

This document provides supplementary information to RAI number 29, Reference 1, page 84. That response provided details on how the ACE/ATRIUM 11 critical power correlation is implemented in other codes. The supplementary information provided here describes benchmarking of the ACE/ATRIUM 11 critical power correlation in S-RELAP5 as part of the AURORA-B methodology (Reference 2). The analysis is comparable to that provided in Reference 3, Section 7.3 for XCOBRA-T.

2.0 EVALUATION OF TRANSIENT CRITICAL POWER DATA

An industry accepted standard in BWR transient methodology is that steady-state dryout correlations are conservative for use in transient methodology. Transient dryout tests [ ] were performed to reconfirm this for ATRIUM 11 when using the ACE/ATRIUM 11 critical power correlation.

The limiting transient tests of interest are simulated load rejection without bypass (LRNB) events that consist of power and pressure ramps and flow decay; and simulated loss of flow events that consist of flow decay and power decay. The power, pressure, and flow were all controlled by a function generator. The forcing functions were programmed to produce the transient rod surface heat flux typical of the various events. Reference 3, Figure 2-1, page 7-43 shows the forcing function characteristics for a typical LRNB test and Reference 3, Figure 2-2, page 7-43 shows the comparable forcing function characteristics for a typical loss of flow event.

A total of [ ] ATRIUM 11 LRNB and loss of flow transients were run which were either measured or predicted to have dryout. An additional [ ] of these transients were run which were neither measured nor predicted to go into dryout. Of these [ ] transient critical power tests, [

] The initial conditions for all of the tests are provided in Reference 3, Table 7.20, page 7-36.

The AREVA transient thermal hydraulic code S-RELAP5 (Reference 2), was used to predict the transient test results using the ACE/ATRIUM 11 critical power correlation. The test power forcing function provides the boundary condition of power, which is modeled in S-RELAP5 [ ]

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The results are summarized in Table 1. [

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Table 1 S-RELAP5 ACE/ATRIUM 11 Transient Dryout Results

Table 1 S-RELAP5 ACE/ATRIUM 11 Transient Dryout Results (cont.)

[ ]

Table 1 S-RELAP5 ACE/ATRIUM 11 Transient Dryout Results (cont.)

Table 1 S-RELAP5 ACE/ATRIUM 11 Transient Dryout Results (cont.)

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Table 2 S-RELAP5 K-Factor Iteration Results

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3.0 REFERENCES

1. ANP-10335Q1P, Rev. 0, "ACE/ATRIUM 11 Critical Power Correlation – RAIs," August 2016.
2. ANP-10300P, Rev. 0, "AURORA-B: An Evaluation Model for Boiling Water Reactors; Application to Transient and Accident Scenarios," December 2009.
3. ANP-10335P, Rev. 0, "ACE/ATRIUM 11 Critical Power Correlation," February 2015.