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MIDDLE SOUTH UTILITIES SYSTEM

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Mr. R. L. Tedesco
Assistant Director for Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

SUBJECT: Waterford 3 SES
Docket No. 50-382
Net Shutdown Group Worth/Stuck CEA Test

Dear Mr. Tedesco:

In Amendment No. 18 to the Waterford FSAR, we included responses to several formal questions. Among these responses was that for Question 640.5 having to do with the criteria for determining when a first-of-a-kind demonstration would adequately apply to a later follow-on plant. Our response, by way of example, made it clear that we intended to use the first-of-a-kind test for a stuck CEA out of core, rather than performing a specific test at Waterford.

During review of the amendment, your staff (Mr. W. Long) indicated that a specific test would be required. While we realize that this test is not required by Regulatory Guide 1.68, Revision 2 (August, 1978), we will add the Net Shutdown Group Worth/Stuck CEA Test to the Low Power Physics Test Program. This will be a one-time test on the initial full core load of fuel.

Our previous response to Question 640.5 will be revised to remove reference to the Stuck CEA Test as only a first-of-a-kind test. This revision will be submitted in Amendment No. 20 as shown in the enclosure to this letter.

If you have any further questions in this matter, please contact us.

Yours very truly,

L. V. Maurin
Assistant Vice President
Nuclear Operations

LVM/MPF/sm

Enclosure

cc: Mr. R. L. Blake, Mr. W. M. Stevenson

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the first-of-a-kind tests would have also been within their acceptance criteria if they have been run. With this approach, the exposure of follow-on plants to off-normal conditions (reduced shutdown margin, out-of-spec CEA configurations, etc.) is greatly reduced and the plant startup time and costs are also reduced. This reduction of exposure, time, and cost is achieved with no loss of safety or operational assurance. In fact, the safety is enhanced by reducing the exposure to off-normal conditions and performance is improved by reducing the duration of the testing period.

If agreement with acceptance criteria on a follow-on plant is not achieved, the review process described previously is implemented. If necessary, tests normally performed only on first-of-a-kind plants are performed to assure the safety of the plant or to define the areas of difference between measurement and prediction even if safety is not a problem.

Examples of tests that are normally performed only on a first-of-a-kind plant are:

- Dropped CEA worth and power distribution
- Ejected CEA worth and power distributions
- Stuck CEA/net shutdown worth

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- Power coefficient/isothermal temperature coefficient at 20 percent and 80 percent
- Xe oscillation control demonstration
- Deep CEA insertion power distributions

As an example, one of the tests specifically referred to above as normally performed only on first-of-a-kind plants was the stuck CEA/net shutdown worth. The following is a more detailed explanation of how C-E testing philosophy applies to this specific test.

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For first-of-a-kind plants, there are three principal reasons for measuring the shutdown groups and the net shutdown worth: (1) to demonstrate that adequate shutdown is available; (2) to verify that the fuel and CEA loading are as specified; and, (3) to verify that codes and models adequately predict the shutdown groups' and the net shutdown worths. These three items are addressed by directly measuring the shutdown groups' and net shutdown worths, and performing a CEA symmetry

check. It may be inferred from the comparison of the calculated and measured CEA worths and from the results of the symmetry check that no misloading has occurred. If a substantial fuel or CEA misloading were to occur, the calculated CEA worths, which are extremely sensitive to flux distribution, would not agree with the measured values. In addition, any substantial misloading, unless it were symmetric, would introduce a local asymmetric tilt in the flux distribution, which would result in measured CEA worths that are asymmetrical.

For follow-on plants since the code/model verification has already been performed on the basis of the data from the first-of-a-kind plant (in this case, San Onofre Unit 2) and the level of expected agreement has been established, it is only necessary to demonstrate that the follow-on plant is not significantly different from its first-of-a-kind predecessor and that no misloading has occurred. The foregoing can be demonstrated by the measurement of the worths of the regulating CEA groups and the CEA symmetry check. Comparison of the measured CEA worths to the calculated values verifies that the global flux distribution is as expected. The symmetry check confirms that no local asymmetric exist. For these plants, th acceptance criteria for the agreement between the calculated CEA worths and the measured CEA worths are tightened to reflect the improvement in the predictions afforded by the model benchmarking performed with data from the first-of-a-kind plant. These acceptance criteria also reflect the fact that fewer measurements are made on the follow-on plant than on the first-of-a-kind plant. The reduction of the uncertainty due to this comparison is reflected in the use of the normal follow-on (more stringent) acceptance criteria presented in Table I. For follow-on plants shutdown margin calculations, the more conservative of SONGS Unit 2 measured worth of the shutdown groups or the follow-on plant's calculated values will be used; appropriately adjusted for measurement and/or calculational uncertainties.

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If following the measurement of the regulating CEA group worths, it is determined that the acceptance criterion is not met, and cannot be subsequently met or justified by either additional calculations or measurements, the testing for the follow-on plant will be extended to include the measurement of the net shutdown worth.

In summary, the above paragraphs define the methodology for the development and application of startup testing acceptance criteria. In addition, explanatory information is provided to show the relationship between the test results and operation throughout core life.