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TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

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July 30, 1979

Mr. James P. O'Reilly, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Region II - Suite 3100
101 Marietta Street
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

OFFICE OF INSPECTION AND ENFORCEMENT BULLETIN 79-12 - RII:JPO
50-259, -260, -296 - BROWNS FERRY NUCLEAR PLANT UNITS 1, 2, AND 3

In response to your May 31, 1979, letter which transmitted IE Bulletin 79-12, we are enclosing the results of our investigations at Browns Ferry Nuclear Plant.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills by RLL

L. M. Mills, Manager
Nuclear Regulation and Safety

Enclosure
cc: Office of Inspection and Enforcement (Enclosure)
Division of Reactor Operations Inspection
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TVA'S REPONSE TO OIE BULLETIN 79-12
SHORT PERIOD SCRAMS AT BWR FACILITIES

We have reviewed the recent occurrences involving fast reactor periods at BWR facilities as summarized in IE Bulletin No. 79-12. While these events are of minimal safety significance since the rod worths encountered are considerably lower than those used in the safety analysis, the additional scrams are highly undesirable from a reporting and operational viewpoint. We have, therefore, reviewed our mthods and procedures regarding rod withdrawal during startup in order to eliminate future fast-period events at Browns Ferry.

RESPONSE TO ACTION ITEMS

Item 1: Review and revise, as necessary, your operating procedures to ensure that an estimate of the critical rod pattern be made prior to each approach to critical. The method of estimating critical rod patterns should taken into account all important reactivity variables (e.g., core xenon, moderator temperature, etc.).

Response

High individual rod worths have been the cause of short period in most cases. An uncertainty of ±0.3% in reactivity (which would be an accurate critical prediction due to localized xenon effects and time dependence) can be equivalent to as many as 20 control rods. Thus, an estimate of critical rod pattern is not a viable solution to short periods; and predictions for that purpose would be of no value. We believe that a more positive approach to eliminating fast periods is to modify our rod withdrawal sequences to reduce the relative worths of individual control rods and to prevent extensive notch override withdrawal of control rods during an approach to critical.

Items 2 and 3:

2. Where inaccuracies in critical rod pattern estimates are anticipated due to unusual conditions, such as high xenon, procedures should require that notch-step withdrawal be used well before the estimated critical position is reached and all SRM channel indicators are monitored so as to permit selection of the most significant data.

3. Review and evaluate your control rod withdrawal sequences to assure that they minimize the notch wroth of individual control rods, especially those withdrawn immediately at the point of criticality. Your reveiw should ensure that the following related criteria are also satisfied:

a. Special rod sequences should be considered for peak xenon conditions.

b. Provide cautions to the operators on situations which can result in high notch worth (e.g., first rod in a new group will usually exhibit high rod worth).

Response

The Browns Ferry control rod withdrawal sequences have been revised to reduce relative rod worths for individual control rods. These sequence revisions reduce the characteristic high worth of rods at the beginning of a Rod Worth Minimizer (RWM) group and, thus, better distribute rod worths within the group. For additional short-period prevention, we will revise our RWM to require bank rod withdrawal for the current groups 3 and 4 between position 04 and 12 as a minimum with notch withdrawal required between bank positions.

Beyond group 4 (black and white pattern), our rod withdrawal sequences will be revised to incorporate reduced notch worth approaches in conjunction with the Rod Sequence Control System (RSCS).

No special sequences are required as these changes address all normal and "abnormal" startup conditions.

Cautions will be added to the rod withdrawal sheets concerning the use of the notch override mode and high xenon conditions. In addition, the nuclear engineer will provide caution on the withdrawal sheets for any identified "high worth" rods, as necessary.

As always, the operators will visually monitor all SRM meters during an approach to critical with at least one detector being tracked on the available recording equipment.

Item 4: Review and evaluate the operability of your "emergency rod in" switch to perform its function under prolonged severe use.

Response

The applicable plant operating instruction (GOI 100-1) has been revised to include a required check of the Rod Out Notch Override (RONOR, i.e., "emergency rod in") switch operability before startups.

Item 5: Provide a description of how your reactor operator training program covers the considerations above (i.e., items 1 through 3).

Response

Each operator who presently holds a Reactor Operator or Senior Reactor Operator license has received instructions on this subject from engineering employees at the TVA Training Center. In addition, this bulletin, as well as other related material, has been discussed with operators in their supplemental training sessions.