



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 180 TO FACILITY OPERATING LICENSE NO. DPK-49

IOWA ELECTRIC LIGHT AND POWER COMPANY
CENTRAL IOWA POWER COOPERATIVE
CORN BELT POWER COOPERATIVE

DUANE ARNOLD ENERGY CENTER

DOCKET NO. 50-331

1.0 INTRODUCTION

By letter dated July 6, 1990 (reference 1), the Iowa Electric Light and Power Company (IELP), the licensee, requested an amendment to the Technical Specifications (TS) for the Duane Arnold Energy Center (DAEC). The proposed amendment would change Technical Specifications (TS) and associated Bases to permit (1) removal of the Rod Sequence Control System (RSCS), (2) reduction of the Rod Worth Minimizer (RWM) low power setpoint, and (3) improvement of the organization, clarity and consistency with standard TS of Section 3.3, Reactivity Control. The initial NRC staff review of the submittal resulted in discussions with IELP on one aspect of the proposed changes (the staff requirement for minimization of RWM downtime), and the subsequent submittal of an amended proposal by IELP (reference 2) which included staff suggested operability requirements in the TS. The licensee subsequently determined that certain TS Sections should have been deleted from the submittals of references 1 and 2 to be consistent with the other proposed changes. The changes to pages 3.2-2 and 3.2-2a were submitted in a letter dated January 8, 1992, and delete Sections 3.2.C.2(a) and 4.2.C.2 from the TS. This change eliminates the Rod Block Monitor (RBM) requirements with Limiting Control Rod Pattern, which were already addressed in the changes to Section 3.3.C.3 submitted in reference 2.

2.0 DISCUSSION

The Rod Sequence Control System restricts rod movement to minimize the individual worth of control rods to lessen the consequences of a Rod Drop Accident (RDA). Control rod movement is restricted through the use of rod select, insert, and withdrawal blocks. The RSCS is a hardwired (as opposed to a computer controlled), redundant backup to the RWM. It is somewhat independent of the RWM in terms of direct inputs and outputs but the two systems are similar and compatible and have the same intent. The RSCS (and RWM) is designed to monitor and block, when necessary, operator control rod selection, withdrawal and insertion actions, and thus assist in preventing significant control rod pattern errors which could lead to a control rod with a high reactivity worth (if dropped). A significant pattern error is one of several abnormal events all of which must occur to have an RDA which might exceed fuel energy density limit criteria for the event. It was designed only for possible mitigation of the RDA.

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and is active only during low power operation (currently generally less than 20 percent power, but, because of measurement uncertainty, 30 percent for DAEC) when an RDA might be significant. It provides rod blocks on detection of a significant pattern error. It does not prevent an RDA. A similar pattern control function is also performed by the RWM, a computer controlled system. All reactors having an RSCS also have an RWM.

In August 1986 (reference 3), the BWR Owners Group (BWROG) in cooperation with General Electric proposed an Amendment 17 to GESTAR II (reference 3) which would eliminate the requirement for the RSCS and retain the RWM but lower the setpoint for turnoff (during startup) or turnon (during shutdown) from 20 percent to 10 percent. The NRC staff review concluded that the proposed changes were acceptable, and approved Amendment 17, but imposed several additional requirements which would be necessary to implement the changes. The staff safety analysis and additional requirements were presented and discussed in an attachment to reference 5. (This review and approval is also available in reference 4, page US.C-379.)

The additional requirements were:

- (1) Provisions should be made in the TS for minimizing operations without the RWM system operable.
- (2) The occasional necessary use of a second operator should be strengthened by a utility review of relevant procedures to assure that the second operator provides an effective and truly independent monitoring process. A discussion of this review should accompany the request for RSCS removal.
- (3) Rod patterns used should be at least equivalent to Banked Position Withdrawal Sequence (BPWS) patterns.

3.0 EVALUATION

The licensee has proposed changes to several Technical Specifications and associated Bases, in four categories, to accomplish the changes and to meet the requirements and TS improvements discussed above. These changes are:

- (a) Elimination of the current RSCS requirements.
- (b) Reduction of the RWM setpoint from 30 to 20 percent power. (Note that both the current and requested new setpoint values for DAEC are more conservative than required by the NRC staff to account for instrument inaccuracies in the feedwater/steam flow power level measurement system.)
- (c) Increased administrative control of RWM operability (intended to result in decreased use of the second operator as a substitute for the RWM). The licensee has also discussed the procedures for second operator actions, when required, to assure independent monitoring of the control rod patterns. A more restrictive version of the BPWS control rod patterns is already required by the DAEC TS, which will be changed to also permit the BPWS patterns.

- (d) TS Section 3.3, Reactivity Control, has been extensively changed to provide improved clarity and overall organization and a closer approach to the content of standard TS.

The NRC staff review and basis for approval of the removal of the RSCS and lowering of the setpoint for the RWM, as proposed by the licensee in sections of the submittal relating to topics A and B, are generic and are provided in references 3 or 4. The proposed changes fall within the scope of that staff review and approval. The present staff review of the proposed TS changes that implement these operational changes concludes that they are appropriate, clearly stated and are acceptable. The continued use of a 10 percent instrument uncertainty to increase the staff-approved 10 percent power for the RWM setpoint to 20 percent is also acceptable.

The licensee has increased the administrative control of the RWM, as required in the staff review of RSCS removal. The proposed revised TS require the RWM to be operable at the beginning of each startup, with only one exception per year. This follows the pattern of previously approved RWM TS for BWR 3 operation (discussed in reference 5) and previously reviewed for RSCS removal (e.g., Limerick). These have been found to provide the desired improvement in reliability for the system. Also, as required, the TS and procedures for the use of a second operator (when the RWM is inoperable) have been reviewed by the licensee and have been discussed in the submittal, and appear from the staff review to provide a suitable independent check on the rod patterns. Finally, as required, the TS (already) prescribe the use of rod patterns equivalent to the BPWS patterns approved by previous staff reviews to maintain low control rod reactivity worths. The changes and reviews are in accord with the staff requirements of reference 5 and are acceptable, and the proposed changes to the TS and Bases appropriately implement the changes.

The TS changes to implement the RSCS removal and the changes to RWM operational requirements and setpoint are included in the extensive changes to TS 3.3. This TS is currently divided into six sections (A through F) and remains so in the proposed revision. However, although the general organization remains essentially the same, the arrangement of topics, details of specifications, and language have been somewhat revised.

The current Section F material on initiation of shutdown has been moved to other sections as applicable. The current C, D, and E Sections, including section headings, have been changed to D, E, and F, with essentially no content change except for some deletions related to RSCS removal and expansion of (new) Section E (Reactivity Anomalies) to include statements about performance of analyses of reactivity difference. These changes are acceptable.

The current content of Section A (including heading) has been retained (although reworded) in the revised Section A, except for A.2.d and e (surveillance) on Scram Discharge Volume which has been improved in content and put in a new Section B (Scram Discharge Volume). The current Section B has been moved partially to the new Section A and partially to the new Section C (Reactivity Control Systems). Section A will contain subsections on (1) shutdown margin, (2) inoperable rods, and (3) housing support. Section C will contain the subsections on the RWM, Source Range Monitor and Rod Block Monitor. Specifications for the

RSCS have been removed and the changes to the RWM operations and setpoint (discussed above) inserted. The changes are largely reorganization and rewording for clarity or a closer approach to Standard Technical Specifications (STS). The latter sometimes results in changes in details of requirements. Revised requirements are:

- (1) One control rod accumulator is allowed to be inoperable for 8 hours (similar to STS);
- (2) Action for control rod position undetermined is referred to the new inoperable rod specification (A.2.e) which in turn consolidates and provides consistency in requirements which had appeared throughout 3.3; also requirements of "full in" and "full out" position indication are deleted since they are only required for RSCS use;
- (3) Control rod coupling is revised to be similar to STS and the requirement for nuclear instrument response (which is not a valid indication of coupling) is removed (refueling surveillance is moved to Section 4.9);
- (4) The stuck control rod specification is expanded to require compliance with shutdown margin and BPWS and a requirement for isolation of rod drive system;
- (5) RBM surveillance is expanded to require testing within 24 hours of withdrawal when one channel is inoperable; and
- (6) Inoperable control rods are to be separated by at least two operable rods in all directions (similar to STS).

These changes improve clarity, expand requirements and move closer to STS as well as provide for the staff requirements for RSCS removal. The review of the new TS Section 3.3 concludes that the changes achieve their objectives and are acceptable. In addition to the TS changes, the associated Bases for Section 3.3 have been revised to correspond to the new TS. These changes suitably describe the background and basis for the specifications and are also acceptable.

The staff has reviewed the reports submitted by the licensee for DAEC proposing TS changes relating to the removal of the RSCS and improvement of the reactivity control TS. Based on this review, we have concluded that appropriate documentation was submitted and the proposed TS changes satisfy staff positions and requirements in these areas. Operation in the modes proposed for DAEC is acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Iowa State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATIONS

This amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 or changes a surveillance requirement. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding (56 FR 31436, 56 FR 49920). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

The staff has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

7.0 REFERENCES

1. Letter and enclosures from D. Mineck, IELP, to T. Murley, NRC, dated July 6, 1990, "(RTS-208) Revision of TS Section 3.3, Reactivity Control."
2. Letter and enclosure from D. Mineck, IELP, to T. Murley, NRC, dated August 30, 1991, "(RTS-208A) Revision of TS Section 3.3, Reactivity Control."
3. Letter and enclosures from T. A. Pickens, BWR Owners Group, to G. Lainas, NRC, dated August 15, 1986, "Amendment 17 to GE Licensing Topical Report NEDE-24011-P-A."
4. NEDE-24011-P-A-9, September 1988, "General Electric Standard Application for Reactor Fuel," (GESTAR II).
5. Letter from A. Thadani, NRC, to J. Charnley, General Electric, dated December 27, 1987, "Acceptance for Referencing of Licensing Topical Report NEDE-24011-P-A, Revision 8, Amendment 17."

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