



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
SUPPORTING AMENDMENT NO. 22 TO FACILITY OPERATING LICENSE NO. DPR-18

ROCHESTER GAS AND ELECTRIC CORPORATION

R. E. GINNA NUCLEAR POWER PLANT

DOCKET NO. 50-244

1.0 INTRODUCTION

By letter dated October 24, 1986, from Roger Kober (RG&EC) to Harold R. Denton (NRC), the licensee submitted information regarding revisions to the R. E. Ginna Technical Specifications (TSs). These revisions resulted from a replacement of the analog rod position indication (ARPI) system with a Westinghouse microprocessor rod position indication (MRPI) system. The licensee stated that the ARPI system is being replaced because the system requires significant effort to maintain alignments, the system (because of age) is becoming prone to component failures, and system spare parts are difficult to obtain. Also, replacing the ARPI system will resolve human engineering discrepancies raised during control room design review. (This aspect of the staff review will be completed at a later date).

2.0 SYSTEM DESCRIPTION

A block diagram of the MRPI system is illustrated in attached Figure 1. The system consists of a digital detector assembly for each rod, a data cabinet located inside containment, and display racks located in the relay room. Rod position data is displayed on a color cathode ray tube (CRT) in the control room and transmitted to the plant process computer system (PPCS). The data cabinet inside containment contains two multiplexers which take rod position information from each of the rods and transmit it to the processors which are in the display racks located in the relay room. One processor supplies information to the CRT located on the control board, the other processor supplies information to the PPCS. Both processors produce a turbine runback and block rod withdrawal signal.

The MRPI system senses rod position in intervals of 12 steps for each rod. The digital detector assemblies consist of 20 discrete coil pairs spaced at 12 step intervals for a series of 12 step ranges which automatically vary as the rod is moved beyond the range limits. The MRPI system will normally indicate 0 rod position until the rod goes from the fifth to sixth step. When the rod is positioned between the fifth and sixth step, the indication range will normally switch from 0 to 12. When the rod goes from the seventeenth to the eighteenth step, the indication will normally switch from 12 to 24. The rod will normally be within ± 6 steps of the MRPI indication, however, if the transition uncertainty of ± 2 steps is considered the rod will always be within ± 8 steps of the MRPI indication.

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3.0 DISCUSSION AND EVALUATION

The proposed changes to the Technical Specifications basically (1) replace references to the ARPI system with references to the MRPI system, (2) provide clarification whether indicated position or demand positions is required, (3) allow the PPCS to be used as a backup to the MRPI CRT if the CRT should become inoperable, (4) remove the calibration requirement, and (5) modify the rod movement test. The PPCS backup is used because with the MRPI system, the position indication is lost for all rods if the CRT becomes inoperable. Whereas, with the ARPI system, there is one indicator for each rod and, as a result, an indicator failure would cause a loss of position indication for only one rod.

The staff could not verify from the licensee's initial submittal that the MRPI system was a non-Class 1E system that only performed non-Class 1E functions. This matter was clarified by the licensee's letter dated December 22, 1986, that the entire system described in the original submittal is non-Class 1E and not required for the safe shutdown of the plant or required to operate during and/or after a seismic event. The only significant, albeit non-Class 1E, concerns associated with replacing the ARPI system with the MRPI system are associated with generation of a turbine runback (TR) signal, generation of a block rod withdrawal (BRW) signal, and the ability to comply with the rod misalignment requirement.

The current ARPI system consists of one detector assembly per rod. The detector assembly is input to an ARPI drawer (one drawer processes two rods). The ARPI system drawers will sense a rod bottom for any rod and send an actuating signal to the turbine runback (TR) and blocked rod withdrawal (BRW) relays. The signal from one drawer is required to generate a TR and BRW.

The MRPI system consists of one digital detector assembly per rod. All the detector assemblies are multiplexed and become input to two redundant MRPI signal processors. Each signal processor independently monitors all rods and senses a rod bottom for any rod. A rod bottom signal from both signal processors is required to generate a TR and BRW. The two-out-of-two coincident signal reduces inadvertent TR and BRW. The rod drop analysis assumes a TR is generated by rod bottom indication from the MRPI system or negative flux rate, whichever is more limiting. Failure of a component may prevent a TR from the RPI system but not from the negative flux rate circuitry. However, failure of a processor or other components in the MRPI system will be annunciated on the main control board. This condition is the same as the existing ARPI system; failure of the drawer responding to a dropped rod will also not produce a TR from the position indication system. However the redundant negative flux rate TR will still be available in accordance with the safety analysis.

The MRPI system is designed to satisfy the rod misalignment requirement. The MRPI system determines rod position in 12 step intervals. The true

rod position is always within ± 8 steps of the indicated position (± 6 steps due to the 12 step interval and ± 2 steps transition uncertainty due to processing a coil sensitivity). The rod deviation alarm will be generated by the PPCS as is currently done for the ARPI system. The maximum deviation possible is 20 steps. This is bounded by the accident analysis which assumes a maximum 25 step rod misalignment. Another possible situation is the rod to rod misalignment within a group or a bank.

If the rods are required to have the same indicated position, the maximum actual position difference would be 15 steps. This is bounded by the accident analysis. Therefore, replacing the ARPI system with the MRPI system is acceptable since TSs 3.10.4.3.2a and 3.10.5.3a have been changed to require the affected rods to be aligned to the same indicated position.

The final safety issue concerns response time for the TR. The MRPI system processes rod position information several times a second. Westinghouse has calculated the response time to be approximately one second. This is less than the calculated response time of the ARPI system. Since the MRPI response time is faster than the ARPI response time, replacing the ARPI system with the MRPI system does not change the results of the current safety analysis.

Calibration as defined in the current Ginna TS 1.7.1 is "The adjustment as necessary of the channel output so that it responds with the necessary range and accuracy to known values of the parameter which the channel monitors." The licensee has stated that this definition is inappropriate for a digital system. Once the MRPI system is installed and the digital detector assemblies positioned, the licensee believes that the system does not need periodic calibration and has proposed removing the calibration requirement from Table 4.1-1. The licensee believes that the shift checks and the monthly functional test (moving each rod or bank a known distance and verifying the data output to the CRT) will insure proper functioning of the MRPI system. The staff agrees with the licensee in that calibration as defined above is inappropriate for the MRPI system. However, the staff believes that a total operational check (a movement of each rod from bottom to top) should be performed before start-up after each refueling outage and that this change of position should be verified by the MRPI system. This will insure complete operability of the MRPI system. On this basis the proposed technical specification change was modified to include the surveillance requirements dealing with the operational check of the MRPI during each refueling outage. This modification was discussed with and agreed upon with the licensee.

Based on our review of the licensee's submittals, we conclude that the MRPI system is used for normal operation and it is not relied on to perform safety functions but it does control plant processes that have a significant impact on plant safety. As a result, the MRPI system is classified as a non-Class 1E system that only has to meet the criteria of Section 7.7 of NUREG-0800, "Standard Review Plan."

The staff has determined that the proposed changes have minimal impact on the probability of occurrence or the consequences of an accident previously evaluated because (1) the MRPI system will indicate rod misalignment within the bounds of current safety analyses, (2) the MRPI system response time is faster than the ARPI system, and (3) the response to a control rod drop coincident with a system single failure is essentially the same as that of the ARPI system.

Since the MRPI system maintains system variables within prescribed operating limits, it satisfies this aspect of GDC 13. On this basis, the staff concludes that failure of the MRPI system or a consequence of failure of supporting systems such as power sources does not result in plant conditions more severe than those bounded by the analyses of anticipated operational occurrences.

The proposed changes do not create the possibility of a new or different kind of accident from any previously evaluated because the MRPI system provides the same interfaces as the existing ARPI system. Failure of MRPI only causes loss of indication which is consistent with a failure of the ARPI system. Therefore, the staff has concluded that the proposed changes to the TSs do not involve a reduction in a margin of safety (the existing bounding conditions used in the safety analysis for the ARPI system are also applicable to the MRPI system). On this basis, the staff finds the proposed revisions to the Ginna TSs as modified to include a total operational check of the MRPI system during each refueling outage are acceptable.

4.0 ENVIRONMENTAL CONSIDERATION

This amendment involves a change to a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and a change to the surveillance requirements. 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 this amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, this 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 this amendment.

5.0 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; and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

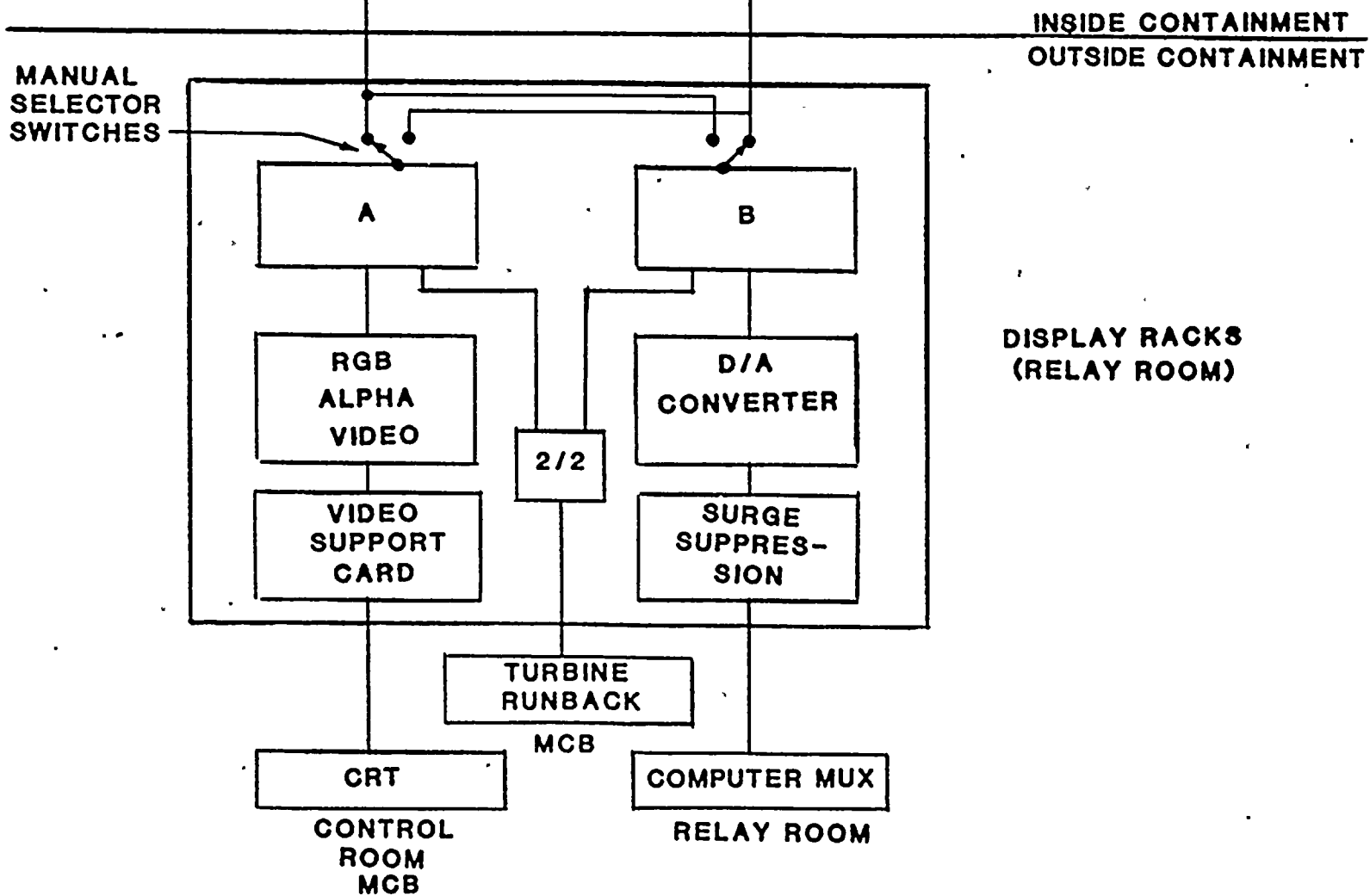
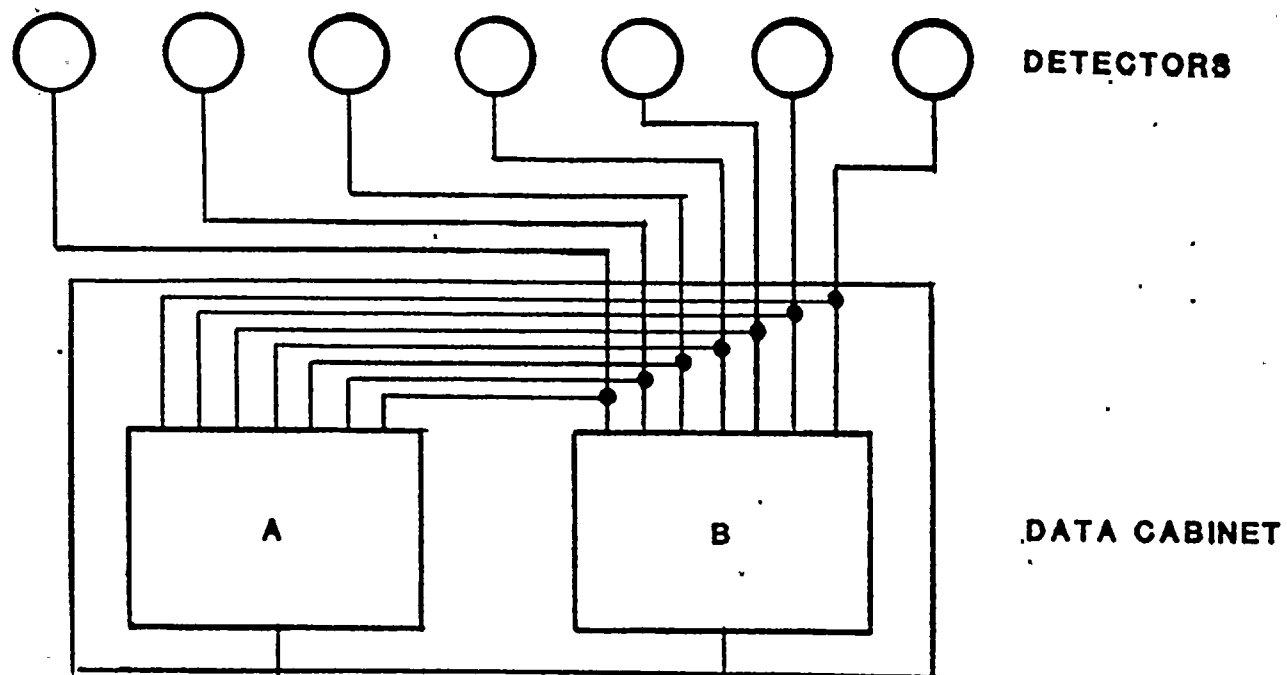
6.0 ACKNOWLEDGEMENT

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FIGURE 1

MRPI SUBSYSTEM ARCHITECTURE



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NRC PDR

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