3.0 LIMITING CONDITIONS FOR OPERATION

3.1. REACTOR PROTECTION SYSTEM

Applicability:

Applies to the instrumentation and associated devices which initiate a reactor scram.

Obejective:

To assure the operability of the reactor protection system.

Specification:

A. The setpoints, minimum number of trip systems, and minimum number of instrument channels that must be operable for each position of the reactor mode switch shall be as given in Table 3.1.1. The time from initiation of any channel trip to the de-energization of the scram pilot valve solenoids shall not exceed 50 milliseconds.

4.0 SURVEILLANCE REQUIREMENTS

4.1 REACTOR PROTECTION SYSTEM

Applicability:

Applies to the surveillance of the instrumentation and associated devices which initiate reactor scram.

Objective:

To specify the type and frequency of surveillance to be applied to the instrumentation that initiates a scram to verify its operability.

Specification:

A. Instrumentation systems shall be functionally tested and calibrated as indicated in Tables 4.1.1 and 4.1.2, respectively.

consequences of reactivity accidents are functions of the initial neutron flux. The requirement of at least 3 counts per second assures that any transient, should it occur, begins at or above the initial value of 10% of rated power used in the analyses of transients from cold conditions. One operable SRM channel would be adequate to monitor the approach to criticality using homogeneous patterns of scattered control rod withdrawal. A minimum of two operable SRM's are provided as an added conservatism.

5. The consequences of a rod block monitor failure have been evaluated. These evaluations show that during reactor operation with certain limiting control rod patterns, the withdrawal of a designated single control rod could result in one or more fuel rods with MCPR's below the Safety Limit (T.S.2.1.A). During use of such patterns, it is judged that testing of the RBM system prior to withdrawal of such rods to assure its operability will assure that improper withdrawal does not occur. It is the responsibility of the Engineer, Nuclear, to identify these limiting patterns and the designated rods either when the patterns are initially established or as they develop due to the occurrence of inoperable rods in other than limiting patterns.

C. Scram Insertion Times

The control rod system is designed to bring the reactor subcritical at a rate fast enough to prevent fuel damage; i.e., to prevent the MCPR from becoming less than the Safety Limit (T.S.2.1.A). This requires the negative reactivity insertion in any local region of the core and in the overall core to be equivalent to at least the scram reactivity curve used in the transient analysis. The required average scram times for three control rods in all two by two arrays and the required average scram times for all control rods are based on inserting this amount of negative reactivity at the specified rate locally and in the overall core. Under these conditions, the thermal limits are never reached during the transients requiring control rod scram. The limiting operational transient is that resulting from a turbine stop valve closure with failure of the turbine bypass system. Analysis of this transient shows that the negative reactivity rates resulting from the scram with the average response of all the drives as given in the above Specification, provide the required protection, and MCPR remains above the Safety Limit (T.S.2.1.A).

Bases Continued 3.3 and 4.3:

The analysis assumes 50 milliseconds for Reactor Protection System delay, 200 milli seconds from de-energization of scram solenoids to the beginning of rod motion, and 175 milliseconds later the rods are at the 5% position.

Section 3.3.C.3 allows a lower MCPR limit to be used if the cycle average scram time (τ_{AVE}) is less than the adjusted analysis mean scram time (τ_B) (see Reference 7, of Section 3.11)

τ_{AVE} is the weighted cycle average scram time to the 20% insertion position (~notch 38) of all the operable. rods measured at any point in the cyce.

$$\tau_{AVE} = \frac{\sum_{i=1}^{n} N_i \tau_i}{\sum_{i=1}^{n} N_i}$$

where: n = the number of surveillance tests performed to date in this cycle.

i = number of control rods measured in the th test.

τ_i = average scram time to the 20% insertion position of all rods measured in the ith test.

τ_B is the adjusted analysis mean scram time to the 20% insertion position.

$$\tau_B = 0.710 + 0.0875 \left(\frac{N_1}{\sum_{i=1}^{n} N_i} \right)^{\frac{1}{2}}$$

where: N_1 = total number of active rods measured in the first test following core alterations.

0.710 = the mean scram time used in the analysis.

0.0875 = 1.65x0.053 where 1.65 is the appropriate statistical number to provide a 95% confidence level and, 0.053 is the standard deviation of the distribution for average scram insertion time to the 20% position, that was used in the analysis.

3.0 LIMITING CONDITIONS FOR OPERATION	4.0 SURVEILLANCE REQUIREMENTS
C. Minimum Critical Power Ratio (MCPR)	C. Minimum Critical Power Radio (MCPR)

C. Minimum Critical Power Ratio (MCPR)

1. During power operation the Operating MCPR Limit shall be $\geq$ 1.43 for 8x8 and 8x8R fuel, $\geq$ 1.47 for P8x8R fuel at rated power and flow, provided $\tau_B \geq \tau_{AVE}$* (see section 3.3.C.3). If at any time during operation it is determined that the limiting value for MCPR is being exceeded, action shall be initiated within 15 minutes to restore operation to within the prescribed limits. Surveillance and corresponding action shall continue until reactor operation is within the prescribed limits. If the steady state MCPR is not returned to within the prescribed limits within two (2) hours, the reactor shall be brought to the Cold Shutdown condition within 36 hours. For core flows other than rated the Operating MCPR Limit shall be the above applicable MCPR value time K_f where K_f is as shown in Figure 3.11.3.

2. If the gross radioactivity release rate of noble gases at the steam jet air ejector monitors exceeds, for a period greater than 15 minutes, the equivalent of 236,000 uCi/sec following a 30-minute decay, the Operating MCPR Limits specified in 3.11.C.1 shall be adjusted to $\geq$1.48 for all fuel types, times the appropriate K_f. Subsequent operation with the adjusted MCPR values shall be per paragraph 3.11.C.1.

*If $\tau_{AVE} > \tau_B$, the operating MCPR Limit shall be a linear interpolation between the limits in 3.11.C.1 and 1.48 for 8x8 and 8x8R fuel and 1.52 for P8x8R fuel.

C. Minimum Critical Power Radio (MCPR)

MCPR shall be determined daily during reactor power operation at $\geq$ 25% rated thermal power and following any change in power level or distribution which has the potential of bringing the core to its operating MCPR Limit.

TABLE 3.11.1

MAXIMUM AVERAGE PLANAR LINEAR HEAT GENERATION RATE vs. EXPOSURE

Exposure	MAPLHGR FOR EACH FUEL TYPE (kw/ft)							
MWD/STU	8DB262	8DB250	8DB219L	8DRB265L	P8DRB265L	8DRB282	P8DRB282	P8DRB284LB
200	11.1	11.2	11.4	11.5	11.6	11.2	11.2	11.4
1,000	11.3	11.3	11.5	11.6	11.6	11.2	11.2	11.4
5,000	11.9	11.9	11.9	11.7	11.8	11.6	11.8	11.8
10,000	12.1	12.1	12.0	11.8	11.9	11.7	11.9	11.9
15,000	12.1	12.1	11.9	11.7	11.9	11.7	11.8	11.9
20,000	12.0	11.9	11.8	11.6	11.8	11.5	11.7	11.7
25,000	11.6	11.5	11.3	11.3	11.3	11.3	11.3	11.4
30,000	10.3	10.6	10.2	10.3	10.5	10.4	10.7	10.6
35,000	9.3	9.3	9.3	9.2	9.5	9.2	9.5	9.5
(36,000)	9.1	9.0	9.1	9.0	9.3	9.0	9.3	9.3
40,000	8.9*							
45,000	8.0*							
50,000	7.3*							

*For extended burnup program test bundles

EXHIBIT C
Revision No. 1 to
License Amendment Request dated February 6, 1981

Docket No. 50-263
License No. DPR-22

Exhibit C is Revision No. 1 to the Supplemental Reload Licensing submittal for Monticello Nuclear Generating Plant Reload 8 (Cycle 9).