Proposed Change to Detroit Edison Technical Specifications Regarding Lowering the Source Range Monitor Downscale Rod Block Setpoint

Technical Specification Affected:

3/4.3.6 Instrumentation/Control Rod Block Instrumentation

3/4.3.7.6 Instrumentation/Source Range Monitors

3/4.9.2 Refueling Operations/Instrumentation

Discussion

The surveillance requirements of 4.3.7.6.c require that prior to withdrawal of control rods, the Source Range Monitor count rate be verified to be at least 0.7 counts per second (cps) with the detector fully inserted. Also, the surveillance requirements of 4.9.2.c require that prior to and during core alterations, the SRM count rate be verified to be at least 0.7 cps. In addition, Table 3.3.6-2 requires a SRM downscale trip set point of 0.7 cps for the control rod block function to be considered operable.

Based on the current SRM count rate, Detroit Edison estimates that the antimony-beryllium source strength may be insufficient to maintain 0.7 cps by February 15, 1986, due to normal decay of the sources.

The normal control rod withdrawal scheme is inefficient for source regeneration until after the low power setpoint is reached, which corresponds to about 20% core thermal power. For a "Group Notch Plant" like Fermi-2 the most conservative possible withdrawal scheme past the 50% control rod density does not reliably regenerate these sources until the reactor power level is in excess of 20 to 25% core thermal power.

Other means of meeting the 0.7 cps requirement include installing new sources which would result in delays in the startup test schedule. The delay is due mostly to the fact that the plant would need to enter into the refueling mode and open the reactor vessel and remove part of the fuel in order to replace the sources. Therefore, Detroit Edison proposes to temporarily lower the downscale SRM rod block trip setpoint count rate from 0.7 cps to 0.3 cps. The normal decay of the antimony-beryllium source strength to 0.3 cps allows Detroit Edison an additional 8 weeks before the rod block setpoint is reached. Operating with a setpoint of 0.3 cps would be allowed until a burnup of 2000 MWD/T on the first core (which is slightly less than 100 full power days) is achieved. This burnup restriction is proposed to allow sufficient flexibility in operating time and power levels to reliably regenerate the neutron sources.

The following factors justify a rod block setpoint count rate of 0.3 cps:

1) The SRMs are not required to perform any protective or mitigative safety function in the transients or accidents analyzed in Chapter 15 of the FSAR.

2) The SRMs have been demonstrated to be capable of monitoring count rates as low as 0.1 cps and maintain an acceptable signal-to-noise ratio.

As described in FSAR Section 7.6.1.12 the SRMs provide neutron flux information during reactor startup at low level flux operations until the IRMs are well up on scale (Range 3 of IRMs). The SRMs also provide an upscale rod block at 10^5 cps and a downscale rod block trip setpoint at 0.7 cps. These rod blocks prevent control rod withdrawal until the cause of high or low count rates is determined by the operator. However, the SRMs are not required to perform any protective or mitigative safety function in the transients or accidents analyzed in Chapter 15 of the FSAR. General Electric has reviewed this information and concurs that the SRM perform no mitigating functions for accidents.

The only important consideration in lowering the minimum count rate requirement and the downscale rod block is that sufficient monitoring capability be maintained to detect positive reactivity insertions from the initial subcritical condition in a smooth and continuous fashion. Important to the verification of this monitoring capability is providing assurance that: (1) the reading is well on scale and (2) the signal-to-noise ratio is greater than 2 to 1. It has been experimentally verified that the SRMs are capable of measuring 0.1 cps. After calibration of the SRMs, the noise level is below 0.1 cps. Therefore, the minimum count rate of 0.3 cps is sufficient to maintain an SRM signal-to-noise ratio of at least 2 to 1. The proposed value of 0.3 cps for the trip setpoint while maintaining a signal-to-noise greater than 2 is on scale and provides adequate neutron monitoring.

With regard to reactivity addition transients, the limiting fault at low power conditions is the Rod Drop Accident (RDA) which is analyzed by General Electric (GE) in NEDO-10527 and its supplements and is described in Section 15B.4 of the FSAR. It should be noted that no credit is taken for the SRMs in the Fermi 2 RDA analysis.

In addition to the above considerations, the known operational characteristics of the initial core indicate that the temporary reduction to the SRM downscale rod block trip setpoint does not present a hazard. The reactor has been brought critical several times since initial criticality on June 21, 1985 and the reactivity characteristics of the unaltered core are well known.

Significant Hazards Analysis

As stated in 10 CFR 50.92(c), a proposed amendment to an operating license involves no significant hazards consideration if operation of the facility in accordance with the proposed amendment would not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated, (2) create the possibility of a new or different kind of accident from any accident previously evaluated, or (3) involve a significant reduction in a margin of safety.

The proposed revisions to Fermi 2 Technical Specifications 3/4.3.6, 3/4.3.7.6 and 3/4.9.2 would lower the SRM downscale rod block setpoint and allow operation with the SRM's at a lower count rate. Since the SRM's are not required to perform any protective or mitigative safety function and are fully operable at the lower count rate, this proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

The proposed additions do not create the possibility of a new or different kind of accident from any accidents previously evaluated. The proposed setpoint is well within the demonstrated operating range of the SRM's to detect neutron levels in the core. Since the SRM channels with the lower setpoint will provide accurate neutron flux information to the operator during rod withdrawal and have no effect on RDA analysis results, new or different accident conditions are not created.

The proposed SRM setpoint change does not involve any reduction in margins of safety since the SRMs perform no mitigating function for accidents. In addition the SRMs have been demonstrated to reliably operate at count rates lower than the proposed change (as low as 0.1 cps).

Summary

Based on the justifications given above which show that SRMs have no safety function, and that the SRMs are capable of monitoring count rates as low as 0.1 cps, Detroit Edison believes that lowering the SRM rod block trip setpoint count rate from 0.7 cps to 0.3 cps until the first core has been irradiated to a burnup 2000 MWD/T is acceptable.

Given the justifications stated above, it has been determined that these changes to the Technical Specifications do not involve a significant reduction in safety margins since the SRMs are not required to perform any protective or mitigative safety function. Also, no increase in the probability or consequences of an accident previously evaluated is involved nor is the possibility of a new or different kind of accident from any accident previously evaluated created. Thus the proposed changes to the Technical Specifications do not involve any significant hazards considerations.

Reduction in SRM rod block setpoints to 0.7 cps has been reviewed and found acceptable by the NRC in a prior case. In this case the NRC found that the lowering the SRM setpoint was acceptable if it could be demonstrated the SRMs were operable at the new setpoint and did not involve a significant hazards consideration.

Specifically, a reduction to 0.3 cps was previously requested by the Nebraska Public Power District by a letter dated April 4, 1974. Nebraska Public Power District (NPPD) requested a temporary waiver of the Technical Specification minimum count rate to 0.3 cps for source range monitors during startup. NPPD requested the waiver to allow operational flexibility during the latter stages of startup operations since delays in the startup schedule resulted in decay of the neutron sources. This had resulted in a concern that the minimum count rate requirement would not be met on reactor restart. NPPD subsequently received approval for the requested Technical Specification amendment for Cooper Nuclear Station (Moore to Pilant letter, dated April 17, 1974).

SURVEILLANCE REQUIREMENTS (Continued)

b. Performance of a CHANNEL FUNCTIONAL TEST:

1. Within 24 hours prior to the start of CORE ALTERATIONS, and

2. At least once per 7 days.

c. Verifying that the channel count rate is at least 0.7* cps:

1. Prior to control rod withdrawal,

2. Prior to and at least once per 12 hours during CORE ALTERATIONS, and

3. At least once per 24 hours.

d. Verifying, within 8 hours prior to and at least once per 12 hours during, that the RPS circuitry "shorting links" have been removed during the time any control rod is withdrawn** unless adequate shutdown margin has demonstrated per Specification 3.1.1.

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* THE COUNT RATE MAY BE REDUCED TO 0.3 COUNTS PER SECOND PRIOR TO ACHIEVING A BURNUP OF 2000 MWD/T ON THE FIRST CORE PROVIDED THE SIGNAL-TO-NOISE RATIO ≥ 2. AFTER A BURNUP OF 2000 MWD/T, THE COUNT RATE MUST BE AT LEAST 0.7 CPS PROVIDED THE SIGNAL-TO-NOISE RATIO IS ≥ 2. OTHERWISE, 3 CPS.

~~*Provided signal-to-noise ratio is ≥ 2. Otherwise, 3 cps.~~

**Not required for control rods removed per Specification 3.9.10.1 or 3.9.10.2.

TABLE 3.3.6-2

CONTROL ROD BLOCK INSTRUMENTATION SETPOINTS

TRIP FUNCTION	TRIP SETPOINT	ALLOWABLE VALUE
1. ROD BLOCK MONITOR		
a. Upscale	$\leq$ 0.66 W + 40%*	$\leq$ 0.66 W + 43%*
b. Inoperative	NA	NA
c. Downscale	$\geq$ 5% of RATED THERMAL POWER	$\geq$ 3% of RATED THERMAL POWER
2. APRM		
a. Flow Biased Neutron Flux - High	$\leq$ 0.66 W + 42%*	$\leq$ 0.66 W + 45%*
b. Inoperative	NA	NA
c. Downscale	$\geq$ 5% of RATED THERMAL POWER	$\geq$ 3% of RATED THERMAL POWER
d. Neutron Flux - Upscale, Setdown	$\leq$ 12% of RATED THERMAL POWER	$\leq$ 14% of RATED THERMAL POWER
3. SOURCE RANGE MONITORS		
a. Detector not full in	NA	NA
b. Upscale	$\leq 1.0 \times 10^5$ cps	$\leq 1.6 \times 10^5$ cps
c. Inoperative	NA	NA
d. Downscale	$\geq$ 3 cps**	$\geq$ 2 cps**
4. INTERMEDIATE RANGE MONITORS		
a. Detector not full in	NA	NA
b. Upscale	$\leq$ 108/125 divisions of full scale	$\leq$ 110/125 divisions of full scale
c. Inoperative	NA	NA
d. Downscale	$\geq$ 5/125 divisions of full scale	$\geq$ 3/125 divisions of full scale
5. SCRAM DISCHARGE VOLUME		
a. Water Level-High	$\leq$ 589'11½"	$\leq$ 591'0"
b. Scram Trip Bypass	NA	NA
6. REACTOR COOLANT SYSTEM RECIRCULATION FLOW		
a. Upscale	$\leq$ 108/125% of rated flow	$\leq$ 111/125% of rated flow
b. Inoperative	NA	NA
c. Comparator	$\leq$ 10% flow deviation	$\leq$ 11% flow deviation
7. REACTOR MODE SWITCH SHUTDOWN POSITION	NA	NA

*The rod block function is varied as a function of recirculation loop drive flow (W). The trip setting of this function must be maintained in accordance with Specification 3.2.2.

**~~May be reduced to 0.7 cps provided the signal-to-noise ratio is $\geq$ 2.~~

THE DOWNSCALE ROD BLOCK SETPOINT COUNTRATE MAY BE REDUCED TO 0.3 CPS PRIOR TO ACHIEVING A BURNUP OF 2000 MWD/T ON THE FIRST CORE PROVIDED THE SIGNAL-TO-NOISE RATIO IS $\geq$ 2. AFTER A BURNUP OF 2000 MWD/T ON THE FIRST CORE, THE COUNT RATE MAY BE REDUCED TO 0.7 CPS PROVIDED THE SIGNAL-TO-NOISE RATIO $\geq$ 2.

INSTRUMENTATION

SOURCE RANGE MONITORS

LIMITING CONDITION FOR OPERATION

3.3.7.6 At least the following source range monitor channels shall be OPERABLE:

a. In OPERATIONAL CONDITION 2*, three.

b. In OPERATIONAL CONDITIONS 3 and 4, two.

APPLICABILITY: OPERATIONAL CONDITIONS 2*, 3, and 4.

ACTION:

a. In OPERATIONAL CONDITION 2* with one of the above required source range monitor channels inoperable, restore at least 3 source range monitor channels to OPERABLE status within 4 hours or be in at least HOT SHUTDOWN within the next 12 hours.

b. In OPERATIONAL CONDITION 3 or 4 with one or more of the above required source range monitor channels inoperable, verify all insertable control rods to be inserted in the core and lock the reactor mode switch in the Shutdown position within 1 hour.

SURVEILLANCE REQUIREMENTS

4.3.7.6 Each of the above required source range monitor channels shall be demonstrated OPERABLE by:

a. Performance of a:

1. CHANNEL CHECK at least once per:

a) 12 hours in CONDITION 2*, and

b) 24 hours in CONDITION 3 or 4.

2. CHANNEL CALIBRATION** at least once per 18 months.

b. Performance of a CHANNEL FUNCTIONAL TEST:

1. Within 24 hours prior to moving the reactor mode switch from the Shutdown position, if not performed within the previous 7 days, and

2. At least once per 31 days.

c. Verifying, prior to withdrawal of control rods, that the SRM count rate is at least 0.7*** cps with the detector fully inserted.

*With IRM's on range 2 or below.

**Neutron detectors may be excluded from CHANNEL CALIBRATION.

***~~Provided signal-to-noise ratio is ≥ 2. Otherwise, 3 cps.~~

THE COUNT RATE MAY BE REDUCED TO 0.3 CPS PRIOR TO ACHIEVING A BURNUP OF 2000 MWD/T ON THE FIRST CORE PROVIDED THE SIGNAL-TO-NOISE RATIO ≥ 2. AFTER A BURNUP OF 2000 MWD/T, THE COUNT RATE MUST BE AT LEAST 0.7 CPS WITH THE DETECTOR FULLY INSERTED AND PROVIDED THE SIGNAL-TO-NOISE RATIO ≥ 2. OTHERWISE, 3 CPS.