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January 28, 1994

US Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

MONTICELLO NUCLEAR GENERATING PLANT
Docket No. 50-263 License No. DPR-22

Supplemental Response to April 30, 1993 NRC letter
Regarding Regulatory Guide 1.97 - Boiling Water Reactor
Neutron Flux Monitoring - MPA A-17 - (TAC M511008)

In a letter dated April 30, 199[illegible] the NRC requested [illegible] perform a review of the Monticello neutron flux monitoring instrumentation against the criteria listed in NEDO-31558 and provide the NRC with a letter documenting the results of that review. NSP responded to that request in a letter dated July 6, 1993 in which we provided the preliminary results of our review. Additional time was needed to complete our review, so we committed to provide a follow-up letter discussing the final results as well as our plans and schedule for any follow-up a[illegible]ons that were identified. This letter is intended to provide that information.

Our review of the Monticello neutron monitoring system with respect to the criteria in NEDO-31558 has been completed. Through this review, we have determined the following:

1) As indicated in our July 6, 1993 letter, Monticello conforms with Criteria 5.2.1, 5.2.3, 5.2.6, 5.2.7, 5.2.9, 5.2.11, 5.2.13, and 5.2.16 of NEDO-31558.

2) Upon further review, we have determined that Monticello also conforms with Criteria 5.2.4, 5.2.5, 5.2.10, 5.2.12, 5.2.14, and 5.2.15 of NEDO-31558.

3) We have received clarification of the intent of Criterion 5.2.2 (Accuracy) and we have determined that Monticello also conforms with this item.

4) As indicated in our July 6, 1993 letter, Monticello does not conform to Criterion 5.2.8 (Power Sources). However, we have completed our assessment of this issue and have concluded that our existing configuration is adequate and that a deviation from NEDO-31558 Criterion 5.2.8 is acceptable for Monticello. The technical justification for this deviation is provided in Attachment 1.

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Attachment 1 to this letter contains the following new NRC commitment:

> We will perform a modification during our 1994 refueling outage to re-route power to half of the panel C05 APRM recorders such that they are powered from the Division I Class 1E UPS (Inverter Y-71). This will ensure that the loss of a single inverter will not result in a total loss of APRM recorder function on panel C05.

Please contact Terry Coss, Sr Licensing Engineer, at (612) 295-1449 if you require additional information.

Roger O. Anderson

Roger O Anderson
Director
Licensing and Management Issues

cc: Regional Administrator-III, NRC
NRR Project Manager, NRC
Resident Inspector, NRC
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Attn: Kris Sanda
J Silberg

Attachment 1: Discussion of NEDO-31558 Criteria 5.2.8

Attachment 1

Discussion of NEDO-31558 Criteria 5.2.8

In a letter dated April 30, 1993, the NRC requested, among other things, that NSP perform a plant specific review of the power supplies to neutron flux monitoring instrumentation, including recorders, as compared to the Criterion of NEDO-31558. Our review has been completed and the results are provided below.

1. APRM Recorders:

The APRM recorders on C05 (Reactor Control Panel) are currently powered from the Division II Class 1E UPS (Inverter Y-81). In order to improve the independence and diversity of power supplies, we are planning to perform a modification during our 1994 refueling outage to re-route power to half of the recorders such that they are powered from the Division I Class 1E UPS (Inverter Y-71). This will ensure that the loss of a single inverter will not result in a total loss of APRM recorder function on C05.

It should be noted that although APRM recorder power sources will be Class 1E inverters, the inverter output will be routed to the recorders through non-Class 1E distribution panels (Y-10 and Y-30). However, the distribution panels are extremely reliable passive devices and their use will not significantly impact the overall reliability of the APRM recorder power supply.

In the unlikely event the APRM recorders were to fail, the Safety Parameter Display System (SPDS), one of many post-TMI modifications implemented at Monticello, can also provide operators with on-line APRM indication on the front panels in the control room. The SPDS system is powered from Inverter Y91, which is backed by the No. 17 250VDC battery and No. 13 diesel generator. Although Inverter Y91 and its power sources are not considered Class 1E, they do represent a reliable power supply that is separate and diverse from the APRM recorder power supplies.

2. Other Elements of the Neutron Monitoring System:

With respect to other elements of the Neutron Monitoring System, Criterion 5.2.8 (Power Sources) is not fully satisfied by the Monticello configuration. However, based on our review we conclude that reliable and sufficient alternate means are available to confirm that the reactor is shutdown and that a deviation from the requirement that the redundant neutron flux monitoring channels be powered from different uninterruptible power supplies (UPS) is technically justified for Monticello.

The Monticello Average Power Range Monitoring (APRM) System is powered by two Reactor Protection System Motor Generator (RPS MG) sets (one MG set per Division). The RPS MG sets provide a high quality, highly reliable source of power for the APRMs, but the MG sets are not powered from uninterruptible power supplies and would not be available upon a loss of off-site power.

Each RPS MG set is comprised of a motor-generator-flywheel set. The momentum of the flywheel will maintain output voltage and frequency within acceptable limits for about 2 seconds, thus ensuring that RPS bus power will not be lost due to momentary interruptions or perturbations of the AC source power. The two RPS MG sets are supplied with AC power from different divisions to provide diversity and increase reliability. Provision is made for each RPS bus to be supplied with power from a common alternate source to permit on-line maintenance of a RPS MG set. Mechanical interlocks prevent the alternate source from supplying both RPS buses at the same time.

The offsite power supply to Monticello is diverse and redundant. Monticello can be supplied with offsite power from three different sources (1R, 1AR, and 2R transformers) through three independent transmission line corridors. In our initial review, we calculated that the probability of loss of off-site power (LOOP) concurrent with an ATWS was very low, on the order of 2E-6/year. By crediting the Alternate Rod Injection System (ARI), which was installed specifically to address the possibility of an ATWS event, the probability of a LOOP concurrent with a failure of the control rods to insert is further reduced to be on the order of 1E-6/year. Because of these low probabilities, it is extremely unlikely that both divisions of the APRM System would lose power and be unavailable to provide the operator with reactor power indication during an ATWS or ATWS with ARI failure event. Nonetheless, if this scenario (concurrent LOOP and ATWS, with or without ARI failure) were to occur, alternate means would be available for operators to confirm the reactor was shutdown.

The Monticello Rod Position Information System (RPIS) would remain available during an ATWS plus LOOP to provide the operator with reliable information as to whether or not the reactor was subcritical based on control rod positions. The RPIS is powered from a Class 1E UPS (Inverter Y71) through a passive non-Class 1E distribution panel (Y-10) that is a separate and diverse power supply from the sources of power to the RPS MG sets which power the APRM channels. We have concluded that due to the existing diversity in power supplies, Monticello is not susceptible to a simultaneous loss of RPIS and APRM indications such as that experienced by Nine Mile Point-2 in 1991 (Reference: NRC Information Notice 91-64, "Site Area Emergency Resulting From a Loss of Non-Class 1E Uninterruptible Power Supplies", dated October 9, 1991).

In addition to the rod position information provided by the RPIS full core display on panel C05 (Reactor Control Panel), rod positions during an ATWS plus LOOP can also be determined using the Nuclear Analysis Measurement Rod Worth Minimizer (NUMAC RWM). The NUMAC RWM, which is also powered from the Division 1 UPS (Inverter Y71), obtains rod position inputs from RPIS and includes programming which examines any rod pattern to determine:

(a) Whether all rods are fully inserted (if so, the RWM answers "yes" to "All Rods In?" query) and,

(b) Whether all rods have inserted to or beyond their Maximum Subcritical Banked Withdrawal Position (cycle specific, position 04 for current Monticello core loading). If so, the RWM answers "yes" to "Shutdown?" query.

In the event that one or more rods fail to insert to at least position 04, the full-core display of rod positions and a list of non-fully-inserted control rods provided by the RWM can be used to determine which rods have not inserted. Such a condition would place the plant into a Failure to Scram sequence within the Emergency Operating Procedures (EOPs). This sequence results in Boron injection via the Standby Liquid Control System (SBLC) to shutdown the reactor. If the RPIS full core display in the control room on panel C05 were to fail, information on individual rod positions can be obtained using the RWM provided rod position signals are still being received.

As noted above, the RPIS and the RWM are both supplied by the Division I Class 1E UPS (Inverter Y71), thus both systems would be lost if their common power supply were to fail. However, we do not consider it credible to postulate a scenario involving an ATWS concurrent with a LOOP concurrent with a failure of the Division I UPS. Such an scenario has an extremely low probability of occurrence and is considered beyond the Monticello design and licensing basis. Nonetheless we have considered the consequences of this occurring. A failure of the RPIS and RWM during an ATWS/LOOP event would cause operators to follow the Failure to Scram sequence within the EOPs, which calls for the injection of Boron via the SBLC system. Boron injection would be either an appropriate or conservative response to this condition, so that even with RPIS and RWM failure, there is no significant decrease in plant safety.

As a third alternative to the APRM system, the operators could use the Intermediate Range Monitor (IRM) system to determine core power. The IRM system, which can be used below 15% power, utilizes detectors that are withdrawn from the core during operation at higher power levels to prevent damage from high neutron flux. The IRM drives are supplied with power from an essential bus through a passive non-Class 1E distribution panel (L-38). The IRM electronics are powered by two 24VDC battery chargers, supplied from essential buses, which are backed up by redundant 24VDC batteries. Thus, the IRM system would remain available if a LOOP were to occur. If necessary, the IRMs could be inserted into the core and used as another separate and diverse means to confirm reactor shutdown.

In view of the low probability of an ATWS event concurrent with a LOOP, and in consideration of the alternate methods that would be available either singly or in combination to either confirm reactor shutdown via known rod position (using the RPIS and RWM as described above) or the IRMs, or to ensure shutdown through SBLC Boron injection, we conclude there would be no significant increase in safety resulting from modifying the plant to supply the APRMS from Uninterruptible Power Supplies and that there is no need for Monticello to be in strict conformance with Criterion [illegible].8 of NEDO-31558.