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AUTH.NAME AUTHOR AFFILIATION
FITZPATRICK,E. Indiana Michigan Power Co. (formerly Indiana & Michigan Ele
RECIP.NAME RECIPIENT AFFILIATION
MURLEY,T.E. Document Control Branch (Document Control Desk)

SUBJECT: Informs of plans to remove alarming capabilities of saturation margin monitors in approx 90 days,per previous submittals re NUREG-0578,NUREG-0737 & GL 82-28.Justification for removal of alarming capability encl.

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Indiana Michigan
Power Company
P.O. Box 16631
Columbus, OH 43216

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AEP:NRC:1183

Donald C. Cook Nuclear Plant Units 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
JUSTIFICATION FOR REMOVAL OF THE B&W SATURATION MARGIN MONITOR ALARM AND THE PLANT PROCESS COMPUTER SATURATION MARGIN MONITOR PROGRAM ALARM

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Attn: T. E. Murley

February 12, 1993

Dear Dr. Murley:

In previous submittals concerning NUREG-0578, NUREG-0737 and Generic Letter 82-28, we mentioned that our B&W Saturation Margin Monitor and the Plant Process Computer Saturation Margin Monitor Program would have alarms that would be annunciated once subcooling margin dropped below 33°F (the set point was revised to 29°F in 1984). In the past few years, these alarms have become a nuisance since normal power operation has some core locations with less than 29°F subcooling. They are standing alarms and provide no useful information to the reactor operators.

There is no regulatory, technical specification, or UFSAR requirement for these alarms. These standing alarms could distract the operators and serve no purpose. Therefore, we intend to remove the alarming capability of the saturation margin monitors in Donald C. Cook Unit 1 and Unit 2 in approximately 90 days, unless we are informed otherwise by your staff.

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On February 2, 1993, a member of your staff, Mr. William M. Dean, and our Licensing Section Manager, Mr. Douglas H. Malin, discussed the possibility of removing the B&W Saturation Meter Alarm and the Plant Process Computer Saturation Margin Program Alarm. At that time, Mr. Dean requested that we submit to the staff our justification for removing the alarms.

Attachment Number 1 to this letter provides the justification for removal of the alarms, as requested by Mr. Dean. Attachment Number 2 includes the applicable correspondence we had with the staff concerning NUREG-0578, NUREG-0737 and Generic Letter 82-28.

Sincerely,

E. E. Fitzpatrick
Vice President

dr

Attachments

cc: A. A. Blind - Bridgman
J. R. Padgett
G. Charnoff
A. B. Davis - Region III
NRC Resident Inspector - Bridgman
NFEM Section Chief

bc: S. J. Brewer
D. H. Malin/K. J. Toth
M. L. Horvath - Bridgman
J. B. Shinnock
W. G. Smith, Jr.
W. M. Dean, NRC - Washington, D. C.
AEP:NRC:1183
DC-N-6015.1

Attachment No. 1 to AEP:NRC:1183

JUSTIFICATION FOR REMOVAL OF THE B&W SATURATION MARGIN MONITOR ALARM AND THE PLANT PROCESS COMPUTER SATURATION MARGIN MONITOR PROGRAM ALARM

JUSTIFICATION FOR REMOVAL OF THE B&W SATURATION MARGIN MONITOR ALARM AND THE PLANT PROCESS COMPUTER SATURATION MARGIN MONITOR PROGRAM ALARM

INTRODUCTION

As a result of the TMI accident, NUREG-0587 was issued. The NUREG provided lessons learned and short-term recommendations. One of the recommendations was to install instrumentation to monitor inadequate core cooling. One instrument that was determined capable of providing relevant information was a saturation margin monitor. Prior to January 31, 1980, a saturation margin computer program was installed on the PRODAC-250 plant process computer (PPC). A few months later, a dedicated digital saturation margin monitor, manufactured by Babcock and Wilcox (B&W), was installed. Both of the saturation margin monitors provided alarming capabilities to alert the operator if subcooling of the reactor coolant system dropped below a given set point.

In the past, the saturation margin monitors' alarms had given us only a few problems. For example, in 1984 the set point was recalculated and reduced to 29°F. This kept the alarms cleared for many years. With the current concerns of reactor vessel embrittlement, our current core designs have incorporated low leakage loading patterns (LLLP). An expected result of the LLLP was that some fuel assemblies in the center of the core would have hotter core exit temperatures. Our current Unit 2 Cycle 9 core design has a few core exit temperatures yielding approximately 24°F margin of subcooling. Thus, the current set point of 29°F is exceeded and the alarms are annunciated (standing alarm).

To relieve the operators of the standing alarms,the following options have been considered: reduce the set point again, abandon the LLLP to achieve a more "flat" power distribution, monitor only "cold" incore thermocouples, or remove the saturation margin monitors' alarming capability. The most reasonable of these options is to remove the alarming capability.

We believe that since the alarms currently provide the operator with no useful information, they should be removed altogether. This is justifiable since no credit is taken for the alarm in any of the plant's emergency operating procedures, nor is it mentioned in the Technical Specifications or UFSAR.

BACKGROUND - REGULATORY

As a result of NUREG-0578, item 2.1.3.b, "Instrumentation for Inadequate Core Cooling (Saturation Meter)", several actions took place at Donald C. Cook Nuclear Plant to comply with the recommendations:

1. Curves of saturation temperature versus reactor coolant pressure were provided to the operators.
2. A computer program was written for the Plant Process Computer (PPC) to monitor saturation margin.
3. A dedicated saturation margin monitor was installed.

These actions were documented in the following submittals:

AEP:NRC:00334B, March 10, 1980,

AEP:NRC:00334, January 18, 1980 (which supplemented the following submittals),

AEP:NRC:00253C, December 26, 1979,

AEP:NRC:00253B, December 19, 1979,

AEP:NRC:00253A, November 26, 1979, and

AEP:NRC:00253, October 24, 1979.

On March 20, 1980, the staff issued a safety evaluation report (SER), referencing the above submittals, stating that actions 2 and 3 satisfied the short term lessons learned requirements for NUREG-0578, item 2.1.3.b.

In response to Generic Letter 82-28, which refers to NUREG-0737 in regard to saturation margin monitors, we submitted two letters AEP:NRC:0761, dated March 11, 1983, and AEP:NRC:0761A, dated June 22, 1983. On December 19, 1983, the staff issued an SER, with an initial review of our responses. In the SER, our saturation margin monitors were described as functionally acceptable. (The reason the SER was not final was that more information was required by the staff to complete the SER; however, the saturation margin monitors' capabilities were not in question).

The submittals refered to in the 1979/1980 time frame made reference to the PPC saturation margin monitor alarming features. The June 22, 1983 submittal made reference to the B&W and PPC saturation margin monitor alarming features. As stated, information on the alarms' features was provided to the staff; however, these alarms were not regulatory requirements.

For the staff's convenience, the referenced submittals have been included in Attachment Number 2. Please note that in the March 20, 1980 SER, a few other submittals were referenced, but they had nothing to do with the saturation margin monitor. Therefore, they were not included in Attachment Number 2.

BACKGROUND - OPERATION WITH THE SATURATION MARGIN MONITOR

In 1984, the problem of standing alarms existed on the saturation margin monitors. The problem was eventually resolved by recalculating the set point to 29°F. (The set point calculation is based on the maximum error the saturation margin monitor could see during accident conditions.) This provided adequate margin until 1990, when Unit 2 Cycle 8 was started up. At that time, we had switched to a new fuel vendor who provided us with a LLLP. As result of the LLLP, more of the reactor power was in the center of the core. As expected, this caused some fuel assemblies to have higher relative powers. Thus, creating some hotter core exit temperatures yielding subcooling margins of less the 29°F, and causing the saturation margin monitors' standing alarms.

As mentioned in the introduction, the following options to eliminate the standing alarm were considered:

1. reduce the set point again,
2. abandon the LLLP to achieve a more "flat" power distribution,
3. monitor only "cold" incore thermocouples, and
4. remove the saturation margin monitors alarming capability.

The first three options were rejected for the following reasons:

1. Reducing the set point could only be justified by our experience-based knowledge that the incore thermocouples are accurate to approximately ±5°F (based on measured power distribution and calculating the expected exit temperatures). However, the saturation margin monitor is for post accident monitoring and we have no basis to remove the error tolerances built into the set point for accident conditions.
2. The benefits of the LLLP for reducing vessel embrittlement outweighs the benefits of having the alarms available, for which credit is not taken and are not required.
3. Monitoring only "cold" incore thermocouples would only defeat the purpose of the saturation margin monitor. During an accident, the first core locations that would most likely lose their saturation margin, or boil, would be the ones with fuel assemblies with the highest decay heat. These assemblies would typically be those with the highest core exit temperatures. Therefore, monitoring "cold" assemblies would not be prudent.

Thus, the only reasonable solution to clear the standing alarms is to remove the alarming capabilities of the saturation margin monitors.

REVIEW ACTION TAKEN / JUSTIFICATION

NUREG-0578, NUREG 0737 and Generic Letter 82-18 were reviewed to determine if any requirements existed committing us to install alarms on our saturation margin monitors. NUREG-0578 and Generic Letter 82-18 make no statements regarding saturation margin monitor alarms. The only reference of alarms was found in NUREG-0737. In Section II.F.2, INSTRUMENTATION FOR DETECTION OF INADEQUATE CORE COOLING, Clarification 10, the following is stated:

> "The types and location of displays and alarms should be determined by performing a human-factors analysis taking into consideration:
>
> (a) the use of this information by an operator during both normal and abnormal plant conditions,
>
> (b) integration into emergency procedures,
>
> (c) integration into operator training, and
>
> (d) other alarms during emergency and need for prioritization of alarms."

Clarification 10 reveals that NUREG-0737 allowed the licensee to consider what would provide the best information of inadequate core cooling to the operator. At the time we installed the saturation margin monitors, the alarms were a viable method for initially warning the operators of potential inadequate core cooling. Considering the changes in core designs over the years (LLLP), the alarms associated with the saturation margin monitors are no longer effective and do not assist the operator in assessing inadequate core cooling. The reason is that we have a standing alarm during normal operation. Thus from a human-factors standpoint, the operators are better positioned to identify inadequate core cooling by relying on saturation margin monitor readouts (°F margin) than seeing an alarm that is typically annunciating. In fact, in the plant's emergency operating procedures, no credit is taken for the alarms and the operators are instructed to check the amount of subcooling margin available from the B&W saturation margin monitor or safety parameter display system (on the technical support center computer display in the control room).

The UFSAR and Technical Specifications were reviewed for any reference to the alarms on the saturation margin monitors. The saturation margin monitors are referenced, but the alarms are not mentioned.

CONCLUSION

Even though the alarms were discussed in our submittals concerning inadequate core cooling instrumentation, there was no regulatory requirement to install alarms on saturation margin monitors. Since the alarms are on record from our previous submittals, we are providing this submittal showing adequate justification to remove both of the saturation margin monitors' alarming capabilities. This will be done in approximately 90 days. The alarms are a nuisance and provide no useful information to the reactor operator. The health and safety of the public will not be affected by removing the saturation margin monitors' alarming capabilities.