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SUBJECT: Forwards info requested by SER for Amend 66 to License NPF-22 re reactor level instrumentation.

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

Information Requested by the Safety Evaluation Report
for License Amendment No. 66
Concerning Reactor Level Instrumentation

The Safety Evaluation Report for License Amendment No. 66 requested additional information on the reactor level instrumentation be submitted. This information, concerning set point methodology for the reactor level instrumentation, is attached.

Please contact us if you have questions related to this material.

Thomas M Parker
Manager
Nuclear Support Services

c: Regional Administrator - III, NRC
NRR Project Manager, NRC
Senior Resident Inspector, NRC
G Charnoff

Attachment

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SETPOINT METHODOLGY

In the transient analyses, certain setpoints are assumed for the instruments that mitigate the event. The plant instruments should then be set at a value consistent with that used in the analyses with an allowance for "real world" conditions such as drift and calibration uncertainties. This situation is recognized in the Technical Specifications by the concept of "allowable deviation". A nominal setpoint is provided in the Specifications along with an allowable deviation; whenever a calibration is performed, the instrument must be left at the nominal setpoint, but may be found at the nominal setpoint plus allowable deviation. This "as found" condition is acceptable because the transient analyses are performed using the (nominal + allowable deviation) setpoint (referred to hereafter as "allowable value"). Only if the as found setpoint is beyond the allowable value must additional evaluation be performed. It should also be noted that additional conservatism is provided in that the actual setpoints specified in plant documents are generally slightly below the nominal setpoints stated in the Technical Specifications.

In the original plant design, the values for the allowable deviations were selected based upon engineering judgment and experience with similar instruments. This is a valid method for the simple on-off pressure switches used in the original design because there is only a single component in the instrument "loop" and only a single calibration device is needed for calibration. In addition, the calibration device uncertainty is only a small fraction of the total allowable deviation; the remainder of the allowable deviation is then "available" for drift, operator setting error, etc. Nearly 18 years of operation has confirmed that the values chosen are acceptable since instruments are almost never found at a setpoint exceeding the allowable value.

However, when protective functions are converted to modern analog transmitter - trip unit systems, confirmation of the validity of the allowable deviation value becomes considerably more complex. Now, the loop is composed of at least two components requiring at least three calibration devices. Consequently, a more analytical approach is required. To meet this need, the Instrument Society of America (ISA) developed standard S67.04, Setpoints for Nuclear Safety Related Instrumentation, which identifies the considerations and methods for calculating allowable values and nominal setpoints (identified as "trip setpoints" in the Standard).

Some interpretation is necessary in applying this standard to an old, non-standard Technical Specification plant. Consequently, the following assumptions and clarifications are made:

1. The "trip setpoint" of the Standard corresponds to the "limiting trip setting" or "trip setting" of the Monticello

Technical Specifications. The "allowable value" of the Standard is the sum of the trip setpoint and the "allowable deviation" of the Monticello Technical Specifications.

2. The allowable value is assumed to be the "analytical limit" described in the Standard. This is conservative because uncertainties caused by design basis events such as seismic and radiation effects will be included in the calculation of allowable deviation. The method of the Standard includes these effects in the margin between allowable value and analytical limit rather than in the margin between trip setpoint and allowable value.

In addition, the following plant-specific items should be considered when performing the calculation:

1. Effects whose magnitude is 10% or less of the magnitude of another effect in the same root-sum-squares calculation may be neglected.

2. For effects that are a function of another condition, such as temperature effect on accuracy, a linear interpolation should be used to convert the specified conditions to anticipated plant conditions, unless better information is available.

3. Temperature related effects should be evaluated over the range of temperatures specified in the Equipment Qualification Central File for the events for which the instrument is required to function. For locations that are not included in the Central File, the HVAC design specification should be used, for example Bechtel specification 5828-M-118 for the original plant.

4. Effects that are specified in terms of Upper Range Limit should be multiplied by the "turndown" (Upper Range Limit/Calibrated Span) to determine the actual effect in terms of percent calibrated span.

5. The effect of insulation resistance may be neglected for all instruments that are not required to function in a harsh environment.

A calculation to confirm the validity of the allowable deviation, using the methods of ISA S67.04 and the assumptions, clarifications and considerations described above, as appropriate, should be performed for each safety-related instrument loop using an analog transmitter - trip unit.

INSTRUMENT LOOP ERROR ANALYSIS COVER SHEET

LOOP DESCRIPTION: REACTOR LEVEL SCRAM, ISOLATION AND ECCS INITIATION

TRANSMITTERS: LT-2-3-72A-D
LT-2-3-57A-B
LT-2-3-58A-B

The attached Instrument Loop Error Analysis worksheet shows that the total loop error for these instruments is 2.19% of calibrated span. The calibrated span is 100" level and thus the loop error is 2.19". This is less than the minimum allowable deviation of 3" specified for these instruments in the bases of Technical Specifications 3.1 and 3.2. Thus, the overall loop accuracy requirements are satisified in that the trip setpoint can be set at the "trip setting" of the Technical Specification with assurance that the actual trip value would be less than the ["trip setting" + "allowable deviation"].

Attachments: Instrument Loop Error Analysis, Reactor Level Scram, Isolation and ECCS Initiation Draft 4

LOOP DESCRIPTION: REACTOR LEVEL SCRAM, ISOLATION AND ECCS INITIATION

TRANSMITTERS: LT 2-3-72A-D
LT 2-3-57A-B
LT 2-3-58A-B

TRANSMITTER:

TRANSMITTER MODEL:	1153DB4R	(Rosemount)
CALIB SPAN:	70.7	in WC
UPPER RANGE LIMIT:	150	in WC
TURNDOWN (URL/CS):	2.12	

CALIBRATION UNCERTAINTIES	% CS/URL	REMARKS
INPUT DEVICE:	0.79	CS, .56 in WC
OUTPUT DEVICE:	0.31	CS, .05 mV
SETTING TOLERANCE:	1.00	CS, specified

NORMAL OPER UNCERTAINTIES		
ACCURACY:	0.25	CS, Reference 1
DRIFT:	0.20	URL, 24 mos, Reference 3
TEMPERATURE:	0.50	CS, Note 1, Reference 1
STATIC PRESSURE EFFECT-		Reference 1
SPAN:	0.21	CS, Note 2, Note 6
ZERO:	0.20	URL, Note 2
POWER SUPPLY EFFECT:	0.00	Note 3

DBE UNCERTAINTIES		
SEISMIC:	0.50	URL, Reference 1
ENVIRONMENTAL:	NA	Note 4

TRIP UNIT:

TRIP UNIT MODEL:	710DU

CALIBRATION UNCERTAINTIES	% CS/URL	
INPUT DEVICE:	0.13	CS, .02 mA
SETTING TOLERANCE:	1.00	CS, specified

LOOP DESCRIPTION: REACTOR LEVEL SCRAM, ISOLATION AND ECCS INITIATION

TRANSMITTERS: LT 2-3-72A-D
LT 2-3-57A-B
LT 2-3-58A-B

NORMAL OPER UNCERTAINTIES

REPEATABILITY:	0.20	CS, Reference 2
TEMPERATURE:	0.05	CS, Reference 2, Note 5
POWER SUPPLY EFFECT:	0.00	Included in repeatability

DBE UNCERTAINTIES

SEISMIC:	0.00	Included in repeatability
ENVIRONMENTAL:	NA	Mild environment

LOOP ERROR CALCULATION:

	% CS
ACCURACY:	0.06
DRIFT:	0.22
TEMPERATURE:	0.25
CALIBRATION EQUIPMENT:	0.74
SETTING TOLERANCE:	2.00
STATIC PRESSURE:	0.40
SEISMIC/DBE:	1.13
TOTAL:	2.19 RSS OF INDIVIDUAL ERRORS

NOTES:

1 24 degF change from 80 degF calibration temperature.
2 Static pressure effects considered mutually dependent.
3 Negligible (less than 0.005%).
4 Not required to function under harsh environmental conditions.
5 14 degF change from specified 90 degF max normal temperature.
6 Static span effect determined at 9 inches indicated level.

REFERENCES:

1 Rosemount Manual 4302 Rev E (NX-20483)
2 Rosemount Manual 4471-1 Rev A (NX-17059)
3 Rosemount long term stability testing, July 1989