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U. S. Nuclear Regulatory Commission
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Subject: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
Power Uprate License Application Response to Request for Additional Information Regarding ANO-2's Instrument Setpoint Methodology

Gentlemen:

Entergy Operations, Inc. submitted a license application on December 19, 2000 (2CAN120001), to increase the authorized power level from 2815 megawatts thermal to 3026 megawatts thermal. NRC personnel from the Operator Licensing, Human Performance and Plant Support Branch asked five questions regarding the December 19, 2000, application. Verbal responses to these questions were discussed during a telephone conference call between members of the NRC and Arkansas Nuclear One (ANO) staffs on April 24, 2001. In a follow-up telephone call on April 26, 2001, the NRC staff requested written responses to three questions. The attachment contains the written responses. This submittal contains no regulatory commitments.

I declare under penalty of perjury that the foregoing is true and correct.

Very truly yours,

for Jimmy D. Vandergrift
Director, Nuclear Safety Assurance

JDV/dwb
Attachment

A001

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NRC Electrical/I&C Branch Reviewer's Questions and ANO Responses

NRC Question 1

Confirm that the ANO-2 instrument setpoint methodology meets the intent of standard ISA S67.04.

Response

ANO is not committed to compliance with Instrument Society of America (ISA) Standard S67.04, "Setpoints for Nuclear Safety-Related Instrumentation," although we satisfy the intent of the standard. The ANO setpoint methodology guide was developed using an early version of the ISA standard as a guide. The NRC has previously reviewed and approved License Amendment Requests 137 and 138 for setpoint changes to the ANO-2 plant protection system based on the ANO setpoint methodology. Additionally, ANO was a key participant on the industry committee from the late 1980s through the early 1990s that revised the standard in the 1994 version (ISA-S67.04, Part 1). Although the ANO setpoint methodology guide has not been revised to the 1994 version of the standard, our review of the ANO setpoint methodology guide, and reviews of recently completed ANO-2 setpoint calculations compared to ISA S67.04, Part 1 – 1994 methodology, demonstrates that ANO-2 calculations meet the intent of the standard and are considered consistent with industry practices.

NRC Question 2

Confirm that the instrument uncertainties are determined and combined with the 95/95 tolerance limits.

Response

The 95/95 criteria are contained in Regulatory Guide (RG) 1.105, "Setpoints for Safety-Related Instrumentation." Although ANO uses a conservative setpoint methodology that is consistent with the intent of the 95/95 criteria, we are not committed to RG 1.105.

The 95/95 criteria require mathematical tests of the instrument uncertainty data used in the setpoint calculation to ensure random and non-random (bias) uncertainties are properly classified, separated, and combined to ensure the 95/95 criteria are assured. For example, one would have to examine the population of data from which the uncertainty values are taken to ensure the tested population was sufficient size and normally distributed to ensure the rigorous 95/95 statistical criteria are met. ANO does not require statistical evaluation of vendor data prior to its use in a calculation. ANO's practice is to use vendor-provided data "as-is" without questioning its statistical pedigree unless we believe it to be confusing or possibly stated in error. The vendors typically provide little information to substantiate the pedigree of the data (i.e., sample size from which it is

derived, normality, etc.). In particular, accident induced uncertainties are usually derived from environmental qualification testing of instruments conducted by the vendor. Due to the high cost of this testing only a limited population of instruments are typically tested. In some cases data is missing or unavailable from the vendor altogether. In those cases, ANO uses engineering judgement or, in some cases, plant calibration records (as-left and as-found data) to substantiate drift assumptions. However, the effort to collect and reduce calibration data into drift uncertainty is manpower intensive and costly. Therefore, a formal, plant-wide drift trending program is not in place. Also, drift determined in this manner can reduce operating margin because other influences such as ambient temperature effects and measuring and test equipment (M&TE) uncertainties cannot be separated from the instrument drift during calibration activities making it impossible to establish a true measure of drift. Thus, operating margin could be negatively impacted by "double counting" some environmental and M&TE influences with the measured drift in the final setpoint calculation.

In summary, since ANO does not have sufficient information to certify that all vendor provided uncertainty information meets the rigid 95/95 test, does not routinely provide independent assessment of vendor data to ensure it meets 95/95, and in some cases may have to use engineering judgement where the information is missing altogether, we cannot say with complete confidence that the 95/95 criteria are met across the board. However, our setpoint methodology is conservative and consistent with the intent of the 95/95 criteria.

NRC Question 3

For those cases where the 95/95 criterion is not achievable, either because the information is not available or based on some other reason, provide the justification/compensatory measures used for these cases.

Response

As stated in the response to question 2, ANO cannot guarantee that the 95/95 criteria are met across the board nor is ANO committed to Regulatory Guide 1.105 which contains the 95/95 criteria. However, as stated in the response to question 1, our methodology meets the intent of S67.04. Care is taken in our calculations to interpret vendor and field calibration data conservatively. For example, if it is known that vendor data meets the higher 3 sigma standard deviation (99% probability) based upon documentation from the manufacturer, only then is the data converted to 2 sigma (95%). The same conversion to 2 sigma (95%) would not be used for a safety-related parameter where the statistical pedigree from the vendor is unknown.

Care is also taken to sort random error components from non-random components so only random components of error are combined under the radical using the Square Root Sum of Squares (SRRS) methodology. The non-random errors are added appropriately to the SRSS result to obtain the combined uncertainty. Room temperatures are typically

based upon the appropriate worst case normal or accident conditions to obtain the highest uncertainty unless less extreme conditions are specifically justified within the calculation.

Finally, safety-related instruments that fall outside the as-found calibration tolerance during maintenance activities are handled in accordance with the station corrective action program. The cause of the problem is identified and actions are issued to correct the condition. This, in turn, prompts an evaluation of the underlying assumptions for drift in the setpoint calculation to determine if the calculation and/or the procedural tolerance is appropriate in light of calibration history and needs to be revised.

Therefore, although ANO is not committed to the 95/95 criteria, ANO setpoint calculations and processes are conservative and contain inherent safeguards to provide conservative results for maintaining nuclear safety consistent with the intent of the 95/95 criteria.