June 17, 2004

Mr. Alex Marion
Nuclear Energy Institute
1776 I Street, NW
Suite 400
Washington, DC 20006-3708

Dear Mr. Marion:

The purpose of this letter is to provide comments in response to your letter dated December 5, 2003, "SA S67.04 Method for Determining Trip Setpoints and Allowable Values for Safety-Related Instrumentation." Your letter provides the Nuclear Energy Institute's (NEI's) perspective on the regulatory requirements and technical bases associated with the trip setpoint and allowable value (AV) determination methods. The Nuclear Regulatory Commission (NRC) staff is considering the discussions in your paper as we develop our long term strategy regarding the use of the Instrumentation, Systems, and Automation Society (ISA) Standard, ISA S67.04, Part II, Method 3.

In our previous letter to you dated February 20, 2004, we concluded that the use of Method 3 did not raise significant generic concerns that would prevent the review of amendments currently being considered by the staff. As such, the reviews of those amendments are continuing. However, the NRC staff remains concerned about the calculation of the AV using Method 3. A more complete discussion of the NRC staff's concerns regarding the use of Method 3 is attached. Please consider these concerns as the NRC staff's reply to your request for comments.

We look forward to working with you on the resolution to this issue, including our upcoming meeting with you and the Setpoint Methods Task Force planned for June 2004. If you have further questions or need further information, please contact Christopher Gratton of my staff at (301) 415-1055 or e-mail address cxg1@nrc.gov.

Sincerely,

/RA/

Ledyard B. Marsh, Director
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Enclosure: As stated

cc: Mike Schoppman, NEI (mas@nei.org)

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NRC COMMENTS ON “SA S67.04 METHOD FOR DETERMINING TRIP SETPOINTS AND ALLOWABLE VALUES FOR SAFETY-RELATED INSTRUMENTATION

Date: June 17, 2004

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PROBLEM STATEMENT ON THE USE OF

INSTRUMENTATION, SYSTEMS, AND AUTOMATION SOCIETY (ISA) STANDARD ISA 67.04

PART II, "METHODOLOGY FOR THE DETERMINATION OF SETPOINTS FOR NUCLEAR

SAFETY-RELATED INSTRUMENTATION," METHOD 3

Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.36, "Technical Specifications," requires that the Technical Specifications (TSs) include limiting safety system settings (LSSS) for automatic protective devices related to those variables having significant safety functions. Section 50.36(c)(1)(ii)(A) further specifies that: "...Where a limiting safety system setting is specified for a variable on which a safety limit has been placed, the setting must be so chosen that automatic protective action will correct the abnormal situation before a safety limit is exceeded." Section 50.36(c)(3) specifies that: "...Surveillance requirements are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met."

Regulatory Guide (RG) 1.105, Revision 3, "Setpoints for Safety-Related Instrumentations," Regulatory Position C.3 states that to satisfy the requirements of 10 CFR 50.36, the LSSS must be specified as a TS-defined limit. Regulatory Position C.4 states that the allowable value (AV) is the limiting value that the setpoint must not exceed when tested periodically, and that the channel must be declared inoperable when the setpoint is beyond this value. RG 1.105 also states that corrective action must be taken in accordance with the TSs when the channel is declared inoperable.

Standard TSs Bases provide a summary statement of the reasons for specifications required by 10 CFR 50.36. The Bases state that TSs contain values related to the operability of equipment required for safe operation of the facility. Operable is defined in TSs as "...being capable of performing its safety function(s)." For automatic protective devices, the required safety function is to ensure that a safety limit (SL) is not exceeded; therefore, the LSSS, as defined by 10 CFR 50.36, is the same as the operability limit for these devices. In order to define operability of devices in TSs, the Bases designates the AV to be equivalent to LSSS. Therefore, a channel is operable if the trip setpoint (TSP) is found not to have exceeded the AV during Channel Operational Test (COT) or Channel Functional Test (CFT).

ISA S67.04, "Setpoints for Nuclear Safety-Related Instrumentation" Part I, where the instrument uncertainties are identified and the methodology for combining these uncertainties is described, was issued in 1994 and was endorsed by RG 1.105, Revision 3, dated December 1999. Part II of the standard, "Methodology for the Determination of Setpoints for Nuclear Safety-Related Instrumentation," includes three different methods for combining uncertainty terms when calculating an AV to be used as LSSS. Part II of the standard was not endorsed by the Nuclear Regulatory Commission (NRC) staff. Methods 1 and 2 calculate AVs that are sufficiently conservative and are acceptable to the NRC staff, as they clearly meet the requirements of

10 CFR 50.36. AVs calculated using Method 3, however, may not provide adequate margin to assure that the analytical limit (AL) is not violated. The NRC staff believes that this method may not meet the requirements of 10 CFR 50.36.

Method 3 subtracts the value of the total loop uncertainty (TLU) from the value of the AL to derive the value of the TSP, and then adds back the uncertainty terms associated with the instrument COT/CFT to derive the AV. The TLU is the statistical combination of all uncertainties of a given instrument channel. The COT/CFT uncertainty is the statistical combination of all uncertainties associated with those instrument channel components that would be included during the COT/CFT (e.g., instrument drift, instrument reference accuracy, and setting tolerance). This calculational method for AV raises concerns because it does not account for all uncertainties that are not measured during COT/CFT. An acceptable method for deriving the AV would require an independent calculation (i.e., check calculation) that would assure that margin between the AV and AL would include all the uncertainties not measured during COT/CFT. ISA S67.04.02, however, only recommends a check calculation be performed when the calculational method for determining AV is not consistent with the method used to determine the TSP. For example, if a square root of the sum of the squares (SRSS) combination is used for determining the TSP and an algebraic combination is used for the allowance between the TSP and the AV, then a check calculation should be performed.

Many licensees have not performed a check calculation to properly account for all uncertainties not measured during COT/CFT. It is the NRC staff's position that once a COT/CFT is performed, the instrument uncertainties are a measured value and cannot be treated as a random variable of instrument uncertainty. Licensees should consider the results of the COT/CFT as a bias and should add the results to uncertainties not measured by COT/CFT. Therefore, if the TSP during the COT/CFT is allowed to approach the TS limit of the AV calculated using Method 3, the actual process parameter being measured could exceed the AL before the protective action takes place, in violation of the licensing basis. If the AL is exceeded without clearly defining the margins between the AL and the associated SL, exceeding the AL could also result in the SL being exceeded during operational transients or design-basis events. As a result, AVs established based on Method 3 could result in violating 10 CFR 50.36(c)(1)(ii)(A).

For example, in a recent application a sample calculation based on Method 3 was included for containment pressure with an AL of 6.0 psig. The uncertainties not measured during COT (e.g., uncertainties associated with the containment pressure transmitter) have a value of 0.85 psig. The TLU calculated by the licensee was 1.39 psig, resulting in a calculated TSP of 4.61 psig. The uncertainties that were included in COT were calculated to be 1.1 psig, resulting in an AV of 5.71 psig. The margin, therefore, between AL and AV is only 0.29 psig as opposed to the 0.85 psig needed to account for all the uncertainties not measured during COT. The NRC staff is concerned, therefore, that Method 3 does not calculate an AV that assures the associated AL will not be violated.

The setpoint-related statistics of the channel described above have been evaluated using standard statistical techniques and a presumption of normalcy. Two salient facts result from that analysis:

1. Given an as-found setpoint at the Method 3 AV, the probability of failure-to-trip within the AL is approximately 25 percent or greater. Specifically, the probability that the actual setpoint is within the AL given that the measured setpoint is at the Method 3 AV is approximately 25 percent or greater, depending upon relationship between the estimated uncertainty and standard deviation for each element of uncertainty for each instrument component.

2. The 95/95 criterion of RG 1.105, Position C.1 indicates that the probability of failure-to-trip at the AL should be less than 5 percent. Each individual element of uncertainty for each instrument component is taken as meeting 95/95, and the SRSS process preserves this limiting value in the aggregation of the elements into a composite uncertainty figure. In the example above, an allowance of 0.85 psig is required to ensure that 95 percent of the possible values for the uncertainty contributions from instruments excluded from the test are accounted for. But the example provides only 0.29 psig between the Method 3 AV and the AL. Assuming a setpoint found to be at the Method 3 AV, the 95 percent point would occur at 0.85 - 0.29 = 0.56 psig beyond the AL. In other words, the AL must be exceeded by 0.56 psig to ensure a trip probability of at least 95 percent. Note that 0.56 psig is slightly more than 40 percent of the TLU (1.39 psig), which is the allowance between the setpoint and the AL. Thus, the pressure at which the trip probability attains 95 percent exceeds the AL by more than 40 percent of the established allowance between the computed setpoint and the AL.

In summary, the staff is concerned that there may be instances where an instrument channel is believed to be operable following a periodic surveillance (e.g., CFT, COT), even though the channel may not meet the definition of operability because the process parameter being measured may exceed the AL assumed in the plant's safety analysis should an accident occur without initiating the required actuation. This is probable because Method 3, the calculational method used by some licensees to determine the value by which those licensees determine the operability of instrument loops, does not fully account for the uncertainties that are not addressed during periodic surveillances. Under the conditions described above, if the instrument channel is not declared inoperable, the NRC is concerned that licensees may not take appropriate actions to correct the problem, as discussed in 10 CFR 50.36. For these reasons, Method 3 should not be used to calculate AVs where the AV is used as an LSSS.