ANS Answers Inquiry on ANSI/ANS-3.11-2015, "Determining Meteorological Information at Nuclear Facilities" [revision of ANSI/ANS-3.11-2005 (R2010)]

(*Nuclear News*, August 2016)

Inquiry:

Section 5.2, "Sampling frequencies," Paragraph 2 says:

"Standard deviation values of selected meteorological parameters should be calculated using at least 180 equally spaced samples, but in no case should the sampling rate be greater than once every 5 s. One exception is that the single-pass calculation of the standard deviation of the horizontal wind direction using the Mitsuta method (see Appendix D.3) should be made on the basis of a sample rate not less frequent than once per second."

My questions concern only the phrase: "in no case should the sampling rate be greater than once every 5 s." A rate is usually "something per time." In this case, the rate would be "samples per second." The rate associated with "once every 5 s" would be 0.2 samples per second. Examples of "greater rates" would be 1 sample per second or 0.5 samples per second. So, I understand this phrase to mean:

1 sample every second (rate = 1 sample per second) is NOT acceptable.
1 sample every 2 seconds (rate = 0.5 samples per second) is NOT acceptable.
1 sample every 5 seconds (rate = 0.2 samples per second) is acceptable.
1 sample every 10 seconds (rate = 0.1 samples per second) is acceptable.

Response:

The assumption in the inquiry is incorrect. The sampling interval must be no longer than 5 seconds (i.e., 1 sample every 10 seconds is not acceptable). The Misuta method requires a sampling interval no longer than 1 second (i.e., 1 sample every 1 second is acceptable).

What is meant by Section 5.2 of ANSI/ANS-3.11-2015 is that for digital data acquisition systems, averaged values should be calculated using at least 30 equally spaced samples and the sampling rate should be at least once per 5 seconds. For multipoint recorders, the sampling rate per channel should be at least once per minute, and the selected chart speed should be selected to permit adequate resolution of the data. Standard deviation values of selected meteorological parameters should be calculated using at least 180 equally-spaced samples and the sampling rate should be at least once per 5 seconds. One exception is that the single-pass calculation of the standard deviation of the horizontal wind direction using the Mitsuta method (see Appendix D.3 of ANSI/ANS-3.11-2015) should have at least 180 equally spaced samples and the sampling rate should be at least once per second.

So, for example:

- full 10-min, 15-min, and 1-hour averages of wind speed, wind direction, and stability class from a digital data acquisition system should consist,

respectively, of 120, 180, and 720 equally-spaced samples based on the minimum sampling rate of one sample taken every 5 seconds;

- full 10- and 15-min values for the standard deviation of selected meteorological parameters (other than wind direction) consisting of a minimum of 180 equally-spaced samples would correspond, respectively, to minimum sampling rates of one sample taken about every 3 seconds, and one sample taken every 5 sec; and
- full 1-hour values for the standard deviation of selected meteorological parameters (other than wind direction), based on the minimum sampling rate of one sample taken every 5 seconds, should consist of a minimum of 720 equally-spaced samples.

Additionally, it should be noted that the definition of sample rate (or sample frequency) is the number of samples per unit of specified time.