Comment on the use of the MSU-EPRI Emissions Model in Equations 5.11 and 5.12 of the N Management Protocol.

The emissions model used in these two equations is a two-parameter nonlinear regression model based on a single study conducted for five rainfed field sites in Michigan. In the protocol it is being applied to all potential field sites in 12 states. This application represents a major extrapolation of a single study whose limitations are not indicated in the protocol document. These limitations are of two kinds: (1) The nonlinear regression model used in the study did not give a perfect fit to the observed field data—it is a statistical model whose two parameters each have a range of possible values termed a 95 % Confidence Interval. Put another way, the estimate of nitrous oxide emissions provided by the model is subject to statistical error that is not stated in the protocol document and, of course, not taken into account when the model results are interpreted and applied. (2) The Michigan field study was limited in several ways, most importantly, to a narrow range of climatic properties and soil types. For example, the soils studied were mostly of loam texture (one was a fine sandy loam), found under a narrow range of precipitation and temperature. Application of the model to soils that are not of loam texture or that exist under significantly different precipitation and temperature is not warranted without additional research to show that these properties are irrelevant to nitrous oxide emissions. It is also possible that irrigated or drained soils would give different results that cannot be described by the MSU-EPRI model.

There appears to be a discrepancy between the emissions factors cited in the N Management Protocol in Equations 5.11 and 5.12 and the factor appearing in the article describing the results of the field study. According to the field study this factor equals 0.0064, but a factor of 0.0067 is given in Equation 5.11 and a factor of 1.00 is given in Equation 5.12.