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Title: Censoring and the Detection of Environmental Contaminants

Date/Time: Thursday, February 14, 2019 12:30–2:00 p.m.

Speaker: Michael J. Messner, U.S. Environmental Protection Agency

Chair: Mike Bellow, NASS

Sponsor: WSS Methodology Section

Location: Bureau of Labor Statistics Janet Norwood Conference Center, Room 7 (Please check board in case of change of room)

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Abstract: As measurement methods improve, they can detect lower and lower levels of contamination in environmental samples. Unfortunately, this progress is often nullified by the use (and misuse) of minimum reporting levels, method detection estimates and other such limits to censor measurement results, making it appear that detected contaminants are not detected. In this presentation, I apply the language of statistical hypothesis testing to the detection problem and illustrate how detection limits are derived for both continuous and discrete measurements. Two case studies illustrate the utility of data that fall below detection limits and other data quality thresholds. The discrete case study is particularly enlightening, as it brings to light serious issues with poorly-defined and poorly-applied terminology. I'll close by suggesting three changes to the current practice:

1. End the too-common practice of censoring data that fall below detection limits and other data quality thresholds. Instead, report the numerical result, together with flags to indicate data quality issues.
2. Define "detection limit" as the critical level for testing the detection hypothesis, so that a measured value above this level may be declared a "detection" with high confidence.
3. Find a name other than "detection limit" for the true contaminant level that is great enough to ensure that confident detection by single measurements is highly likely.

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