



## Engineering Sciences Section – 2004

### C43 Certified, My (Beep)!

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After attending this presentation, attendees will understand that certification of a laboratory by some agency does not guarantee that the results they produce will be valid.

This presentation will impact the forensic community and/or humanity by demonstrating that analytical results can be wrong even when they are reported by a "certified" laboratory.

Why on earth would anyone want to validate pH data? It's a no brainer, right? You get the meter ready, standardize with a couple of buffers and start analyzing. This is not rocket science.

Well, let's just pretend that you are asked to validate, for some unknown reason, the pH data for a set of samples. And say those samples happen to be soils. Everything looks good in the raw data, the standards look good, replicate readings are close, and the de-ionized water gives consistent readings. Not much to say. It looks like the results are good. But wait, the results on the summary forms in the data package don't agree with the results on the final reports. As a matter of fact they differ by two, three, even four pH units. Not only that, but the laboratory also gave sample-specific reporting limits for pH and they vary from soil sample to soil sample. What happened? You won't believe the answer to that question. Maybe validating that data wasn't such a bad idea after all.

Next, we're looking at data for volatile organic compounds by EPA Method 524. The laboratory purges 25 mLs of a water sample and analyzes it with a benchtop mass selective detector (MSD). The calibration curve is established between 0.5 ug/L and 50 ug/L. That means, from the instrument's point of view, the calibration represents a range of 12.5 nanograms to 250 nanograms of the target compound in the column. That's a reasonable range for most compounds on an MSD.

But what is the lab reporting? In this particular instance, the laboratory reported carbon disulfide in one water sample at 0.041 ug/L and 1,1-dichloroethane at 0.077 ug/L in another. Both results were qualified as estimated, as they well should be, but what about these numbers? According to the calibration, they can't accurately quantify anything below 0.5 ug/L. So why are they reporting a result down to 0.041 ug/L? Another good question, with a not-so-good answer.

The laboratories that reported the results described above happen to be "certified." But what, exactly, does certification mean? When you are remediating a site, reporting data to an agency, or using data to support some other action on a project or site you will often hear, "we used a certified lab," or "we want to make sure the lab is certified," or "you need to use a certified lab, we'll only accept results from a certified lab." Okay, so you used a certified lab, but does that mean you're going to be getting good results? Maybe. Maybe not.

The incidences described above, as well as a number of other common and uncommon laboratory mistakes gleaned from experiences in data validation, will be presented to illustrate that results can be wrong, even from a certified laboratory.

### Certification, pH Analysis, Calibration