How to PARCC Your DQOs

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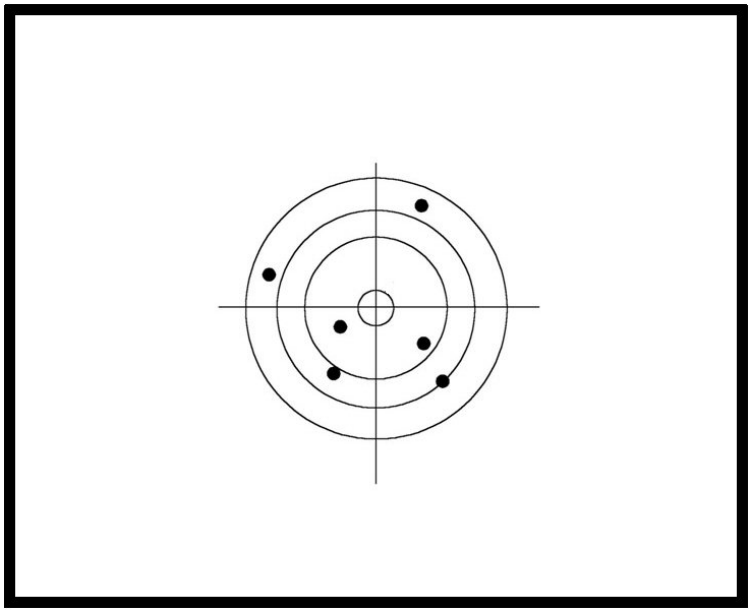

MY WORLD is filled with “samples” and “tests.” Very often a client will call and ask me to “test the air” to find out "what’s in the air." That would, of course, be all well and good if the client had a couple hundred thousand dollars to spend on analysis. More often however, the client actually has an ulterior question and they just think that “testing” the air will necessarily answer the ulterior question.

In the last few years, I have seen a proliferation of pseudo-professionals who similarly believe that complaints regarding indoor environmental quality are necessarily addressed (and solved) by “testing.” This is all part of what I call the “CSI Effect.”

Particularly in the arena of indoor air quality (IAQ), poorly trained practitioners seem to think that all they have to do is go to a project site and “collect samples.” They believe that somehow, the samples will know what they are for and speak for themselves and answer questions, and somehow the laboratory will interpret the data for them. This is the “CSI Effect.”

In my experience, about 75% of all IAQ issues and about 100% of all mould related issues can be resolved without the collection of any samples. Also in my experience, in about 99% of the cases where a self-proclaimed IAQ “expert” has collected samples, the samples are utterly and completely useless, and were a waste of the client’s financial resources. (Not surprising, increasingly, the untrained consultant is a “certified” mould goober (CMG).

In fact, the collection of samples is necessary only when the investigator has a ***specific*** question that can only be answered within the context of an *a priori* statement of precision, an *a priori* statement of accuracy, an *a priori* statement of representativeness, an *a priori* statement of comparability and an *a priori* statement of completeness. Collectively, these are the "PARCC" parameters of an *a priori* "sampling plan" and are the basis of the data quality objectives (DQOs). The establishment of a sampling plan is a QA/QC component of a larger decision making process; the results of which may heavily influence those decisions.

A laboratory report doesn't contain a sampling plan and never contains general answers – a laboratory report contains numbers and names, and it is up to the investigator to convert those numbers and names into results and data. That can only be done in the context of the sampling plan's DQOs.

By contrast, DQOs ensure, through their prescription, that a sufficient number of samples are collected from statistically representative locations and times in an acceptable manner by a recognized method with a known (or at least quantifiable) error.

The DQOs will further specify that the samples are submitted to a laboratory that is capable of proficiently analyzing the samples to within a definable uncertainty, using valid methods. Lastly, the sample results are interpreted according to "PARCC" parameters. DQOs are what make your data meaningful and tenable. Without DQOs, you do not have data, you simply have numbers or names on a lab report.

The U.S. EPA SW 846 describes DQOs thusly:

> *"2.1 DATA QUALITY OBJECTIVES*
> *Data quality objectives (DQOs) for the data collection activity describe the overall level of uncertainty that a decision-maker is willing to accept in results derived from environmental data. This uncertainty is used to specify the quality of the measurement data required, usually in terms of objectives for precision, bias, representativeness, comparability and completeness. The DQOs should be defined prior to the initiation of the field and laboratory work. The field and laboratory organizations performing the work should be aware of the DQOs so that their personnel may make informed decisions during the course of the project to attain those DQOs. More detailed information on DQOs is available from the U.S. EPA Quality Assurance Management Staff (QAMS) (see references 2 and 4)."*

As an example, following the Waldo Canyon Fire and Black Forest Fire - both in Colorado - several family residences in the area had been evacuated under force of arms. After the fire, the families returned to their homes and neighborhoods where they were flooded with "Public Adjusters." Two such "public adjusters" had contacted my firm and explained they were looking for an Industrial Hygiene firm that would help them spread the word that these houses were now filled with toxic materials. (Naturally, this was an altruistic endeavor to help the homeowners …make huge claims against their insurance policies).

In response, untrained CMGs similarly flooded the neighborhoods collecting "samples" to "prove" the residences were contaminated. For whatever reasons (probably because the method is fast, simple and, importantly – expensive), several of these CMGs decided that they would collect samples using the EPA TO-15 Method.

As a result, the untrained CMGs produced very elaborate laboratory reports replete with colored bars, chromatograms, graphs, laboratory QA/QC and very complicated looking tables containing data qualifiers and chemical names (many of which, the practitioner was quick to point out, were extremely toxic). In short the laboratory reports clearly showed… nothing at all. Utterly useless, but looked impressive to the untrained eye.

However in the hands of an astute CMG the laboratory report clearly identified **toxic chemicals!** (The fact that the concentrations of the toxic compounds were often below the analytical detection limit always seemed to go unnoticed by the practitioner).

Once we would get involved, our first step was to point out that the samples were utterly useless, and the results were exactly as we would have predicted before the collection; so no news there. That is, it is seldom good practice to make your hypothesis: "The air is going to be exactly as one would confidently expect for exotic compounds."

Oftentimes, merely debunking the report by the practitioner was sufficient. Sometimes, we were required to make a site visit and perform a legitimate **assessment**. Sometimes we were required to make a site visit and perform legitimate **sampling**. Regardless, in virtually every case, the net result was that the client (not the Public Adjuster) had wasted a tremendous amount of money on utterly useless "testing" and paid a small fortune for an utterly useless (but perfectly legitimate) laboratory report. One such client asked with exasperation: "You mean this laboratory report is toilet paper?" to which I answered – "No sir, toilet paper is useful; that lab report is used toilet paper."

In upcoming series, I'm going to address the establishment of DQOs and PARCC parameters in the context of real life scenarios. The discussions will be broken into the following segments:

1) Ask the right question – (Hypothesis testing)
2) Why always missing the target isn't so bad – (Precision)
3) What's in a number? – (Accuracy)
4) Great sample; wrong location – (Representativeness)
5) The results are high (and low) – (Comparability)
6) The question answered – (Completeness)

In closing, in the context of sampling for indoor moulds, I will leave you with some comments from the US EPA in their booklet "*Mold Remediation in Schools and Commercial Buildings*"

The EPA warns:

> *Sampling should be done **only** after developing a sampling plan* [DQOs] *that includes a confirmable theory regarding suspected mold sources and routes of exposure. Figure out what you think is happening and how to prove or disprove it before you sample!*

…

> *Sampling for mold should be conducted by professionals with specific experience in designing mold sampling protocols, sampling methods, and interpretation of results.*

The EPA document continues with:

> *Inadequate sample plans may generate misleading, confusing, and useless results.*

The EPA states:

> *For someone without experience, sampling results will be difficult to interpret. Experience in interpretation of results is essential.*