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Betty Crocker's Approach to IAQ

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A day or so ago, a post appeared on this site authored by Jack Springston, CIH, CSP, titled "Back to Basics." The piece was just that, a reminder for the Indoor Air Quality (IAQ) investigator of the "basics" of IAQ investigations. Although some IAQ issues may be rather complex, it is easy to forget the basics and over-complicate most IAQ investigations and focus on the weeds at the expense of failing to recognizing there's a paved sidewalk to guide one through the maze of complications.

In his post, Mr. Springston started with an innocent enough comment:

> *For IAQ problems that are caused by exposure to some sort of airborne contaminant(s),...*

This comment will come as a surprise to many "IAQ Experts" I've encountered who axiomatically equate "IAQ" with "contaminant;" they arrive on site, open up their Betty Crocker Cookbook® and immediately begin their cookbook "investigation" by collecting samples, and pulling out variou$ field in$trument$ with the mandatory fla$hing light$, LED display$ and requisite occasional "beep."

But a basic element to the investigation, is the immediate challenge presented in Mr. Springston's discussion, since it tacitly recognizes that not all IAQ issues have to do with the air at all. Over the next couple of weeks, I will share a few of my favorite IAQ investigations from the last 27 years; all of which started as IAQ issues, wherein I had been asked to "test the air."

For my first case study, readers who are easily offended should stop here; if you read on - I won't respond to criticisms about ethical considerations for what follows...

Psychological Considerations

A geologist with a PhD in Geology was employed in a government laboratory and was on administrative leave for alleged illnesses as a result of chemical exposures at the laboratory and in particular "multiple chemical sensitivity syndrome" related to (unquestionable) chemical exposures at the lab.

The Client, (whom I will refer to as the genderless Dr. Rock), claimed that as a result of the many years of working at the Gov Lab, chemicals had now migrated throughout Rock's residence, and permeated clothing, furniture, and virtually every chattel in Dr. Rock's house and cars. Dr. Rock was an analytical chemist and was very well versed in chemistry and analytical chemistry in particular.

Dr. Rock told me that legal counsel had recommended the need to develop objective data necessary to support a law suit against Rock's employer (The Federal Gov). My job for my client was to perform an IAQ assessment of Rock's home, and try and identify the etiology associated with Rock's described symptoms. This is the basic to which I should adhere.

I agreed to do the work. After the financial conditions were met, Dr. Rock informed me there were some special conditions that I was to meet prior to the site investigation, as follows:

1. I was not permitted to drive directly to the house; I was required to park my car about 200 yards from the rural property and hoof it the rest of the way.
2. Clothing I intended to wear to the residence would have to be washed the night before without the use of detergents, or softeners.
3. On the morning of the visit, I was not permitted to use soap, aftershave, toothpaste or deodorant.
4. I had to ensure I had a full tank of gas in my car the night before arrival.
5. I was not permitted to bring my pager to the residence (this was before cell phones became ubiquitous).
6. I had to ensure that all my instruments were turned on before approaching the house.

Dr. Rock explained to me that, "chemical sensitivity syndrome" included "EMF sensitivity." If my car came too close to the house, Dr. Rock would become violently ill as a result of the EMFs generated by the engine and any residual gasoline that may have leaked as a result of refueling. Dr. Rock claimed particular sensitivity to chemicals found in detergents and cosmetics, (thus no soap or deodorants) and the EMFs from activating any electrical equipment caused instant excruciating pain. Dr. Rock explained that pagers, in particular, were harmful, and if a pager should be activated, the good Doctor would experience excruciating, debilitating pain. (How Dr. Rock and I had telephone conversations is worthy of a few beers amongst friends…some other time).

The stage was set for an IAQ investigation - and Betty Crocker was nowhere in sight.

I prepared the night before as required, parked the prerequisite distance and lugged my equipment to the residence. After a preliminary interview, while the client was walking me through the house, my pager was nestled quietly in my coat pocket, and I periodically switched my pager on and off to see if there was any reaction – there was no reaction from the client. I had arranged for a colleague to page me at a predetermined time, while my pager was on. The pager came on as scheduled and I let it alert in vibrate mode until it stopped, and, again, no reaction. These were the first "positive" challenges with negative results.

After a few minutes, Dr. Rock and I sat down to discuss the project. While we were speaking, my pager was in the "off" mode and I stealthily removed the battery to ensure the pager was truly off. While we were speaking, I suddenly interrupted Dr. Rock and apologized profusely- grabbing for my pager and exclaiming that I had accidentally left

my pager on and it was now “going off” – someone was paging me! Dr. Rock responded by pitching immediately to the floor and writhing dramatically with no end of wondrous screams and grunts. I scrambled to “turn-off” my pager, and once I assured Dr. Rock the pager was off, the screams stopped, and poor client recomposed.

After the awkward moment of apologies had passed, Dr. Rock recovered fully and we continued.

I performed a very detailed assessment and diligently evaluated several potential sources, and possible pathways, and pressure differentials and aspects of health and exposures and the like.

At the conclusion of the assessment, I opened the valve for the calibration span gas (isobutylene) I used to calibrate my PID and let it spill out into the air as Dr. Rock and I spoke for quite some time. After the isobutylene had been pouring out into the room for several minutes, I explained to Dr. Rock that I needed to perform a field post-assessment calibration of my PID and asked if Dr. Rock would object, and if such a post calibration would cause serious disturbance.

Dr. Rock explained that even the slightest exposure to isobutylene would cause serious discomfort, but, if I insisted, Dr. Rock would tolerate the moment. I pulled out the (flowing) isobutylene from the case, and hooked it up to my handy H-nu PID, and allowed Dr. Rock to observe me turning the span gas "OFF." I had no sooner turned the gas off, when Dr. Rock began to describe extreme discomfort – I assured Dr. Rock the process would only take a second more, and I allowed Dr. Rock to observe me turning the span gas back ON again. Naturally assuming I had turned the gas off, Dr. Rock expressed considerable relief and informed me that during the calibration, Dr. Rock had experienced terrible distress.

I thanked Dr. Rock and I left.

When I wrote my report, I diligently explained my methods, my rationale and my observations in detail. I explained the deceptions I had performed and why I had performed them. I faithfully described my observations during the assessment and I expressed my opinion that the quality of the indoor air in the residence did not appear to be in any way unusual and that it was my assessment that there was nothing to indicate that symptoms as described were associated with actual exposures.

When we consider the application of national consensus standards such as the ANSI/ASHRAE Standard 62.1-2013, Ventilation for Acceptable Indoor Air Quality, we should look at the totality of the standard and understand our role when we see guidance such as:

> *2.9 Acceptable indoor air quality may not be achieved in all buildings meeting the requirements of this standard for one or more of the following reasons:*

Because of the many other factors that may affect occupant perception and acceptance of indoor air quality, such as air temperature, humidity, noise, lighting, and psychological stress.

In real life, the intersection between objective science and psychological aspects associated with indoor air quality has been the scene of more than a few fender benders resulting in public relations problems for facility managers with large indoor populations and even between married couples in a normal sized residence. And yet, to fully and honestly present the full picture of IAQ/IEQ, it is my opinion that these issues must be addressed in a frank manner. Scientific literature accepts the fact that one's sex is a determinant in how comfort in an indoor environment is perceived; women are more susceptible to subjective triggers (family relations, stress, trauma, odors, etc), and men are more susceptible to objective triggers (endotoxins, measureable air contaminants, etc).(1) It is for this reason that the majority of the IAQ/IEQ investigations FACTs performs always comprise of a male-female team (consider yourself fortunate if you can find a pregnant colleague- more sensitive than a ten billion plate HPLC!)

When investigating IAQ issues, it is all well and good to run around and collect cookbook samples and perform IAQ "tests" – however, when addressing the issue, one should return to the basics, the real basics, and ask the simple question: "What is my job?" That is, in my opinion, the most basic question.

But then, I think rain is wet.

Ref:

Reynolds SJ. Black DW, Borin SS, et al, *Indoor Environmental Quality in Six Commercial Office Buildings in the Midwest United States* Applied Occupational and Environmental Hygiene 201, 16 (11) 1065-1077.