PARTICLES PLUS®

IAQ RADIO+

Show Number: 747 Blog

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Particle Counters: Fire and Smoke Assessment and the CA Wildfires

Good day and welcome to the IAQ Radio+ episode 747 blog. This week we welcomed Jim Akey Senior Sales Manager for Particles Plus to discuss particle counting and how particle counting technology can be used to help with disaster restoration assessment and remediation.

Jim Akey is Senior Sales Manager for Particles Plus. He has over 25 years of industry experience working with his customers, sharing his application experience and providing solutions for their controlled environment particle counting. Before joining Particles Plus, Jim spent 5 years as Inside Sales Manager for ART Instruments, a particle counter manufacturer that revolutionized the way that particle counters were assembled. Jim also spent 9 years working as Inside Sales Manager for Lighthouse Worldwide Solutions. Jim lives in Oregon and has been very busy working with professionals dealing with a wide variety of particle counting applications wildfire related issues and numerous other particles counting applications. He is a graduate of California State Fresno with a Bachelor of Business Administration.

Nuggets mined from today's episode:

Why were particle counters developed? Particle counters were designed for use in cleanrooms. Most people are unfamiliar with cleanrooms, never having entered one.

How do your particle counters work? Professional grade particle counters work on the scientific principle of light scattering. Air is brought into the optical block where each particle is viewed, measured and counted. This occurs rapidly and in real time.

Particle counting involves comparison, before and after particle counts are compared.

What is the price range for a professional grade particle counter? Pricing of professional grade meters is $1,500 and up.

Can you comment on low-cost particle counters? Low-cost meters (those under $1,500) use photometers, a technology previously used to notify consumers when their vacuum cleaner's bag was full. Photometers see particles and are unable to count them and are unable to differentiate whether there is a single large particle or thousands of small particles.

What is a cleanroom? An area where the cleanliness standard is ruled by a specific particle size. "*A cleanroom or clean room is an engineered space that maintains a very low concentration of airborne particulates. It is well isolated, well controlled from contamination, and actively cleansed. Such rooms are commonly needed for scientific research and in industrial production for all nanoscale processes, such as semiconductor device manufacturing. A cleanroom is designed to keep everything from dust to airborne organisms or vaporized particles away from it, and so from whatever material is being handled inside it. A cleanroom can also prevent the escape of materials. This is often the primary aim in hazardous biology, nuclear work, pharmaceutics and virology. Cleanrooms typically come with a cleanliness level quantified by the number of particles per cubic meter at a predetermined molecule measure. The ambient outdoor air in a typical urban area contains 35,000,000 particles for each cubic meter in the size range 0.5 µm and bigger, equivalent to an ISO 9 certified cleanroom. By comparison, an ISO 14644-1 level 1 certified cleanroom permits no particles in that size range, and just 12 particles for each cubic meter of 0.3 µm and smaller. Semiconductor facilities often get by with level 7 or 5, while level 1 facilities are exceedingly rare." SOURCE Wikipedia*

Where are your products sold? 40% of Particles Plus business is IAQ related and 60% is cleanroom related. Prominent customers include: US DOD (Dept. of Defense). US State Department, Aerospace Industry, Computer Chip makers, Auto Manufacturers including TESLA, etc.

Is there an expectation for particle counts? For IAQ and wildfire applications, Jim advises comparison of outdoor particle count measurements with indoor measurements, noting outdoors should usually be higher.

During remediation activities such as: demolition, post fire cleaning, mold remediation particle counts will dramatically increase temporarily during certain activities. Particle counts commonly temporarily increase during airside HVAC system cleaning when particles previously held by static electrical charges are dislodged from the system by agitation and vacuuming.

What are some common ways in which restorers and remediators can use particle counters? Particle counters can help locate sources of mold by indicating the presence of abnormally high levels of particles. Can narrow down what to look for and/or where to look deeper. Can steer you in the right direction.

What are some unusual applications in which particle counters are used? Monitoring particles during coal mining, measuring particles releases during and diesel engine exhaust emissions, measuring large particles during automotive painting operations (large particles cause unattractive blemishes in paint). Particle counters are used to monitor high pressure diffusers and gas lines.

Will high levels of airborne particles overwhelm particle counters? The screen will temporarily show errors when particle counter is overloaded with air.

Are you aware of any price gouging related to California wildfires? Due to the large number of homes being destroyed with families displaced; high demand and low availability has caused rental housing costs to rise dramatically.

What can be done to prevent professional grade particle counters from premature internal soiling? Particle counters undergo a deep internal cleaning during annual factory calibration. Particles settle out, so running particle counters continuously keeps them clean. Filters are available for heavy airborne contamination situations.

Are your particle counters being used in California wildfires? Yes, California Fire Dept., recently purchased ambient meters for use in conjunction with wildfire

monitoring, etc. Both fire damage assessors and remediators are using them on worksites. When you can see smoke residue and smell smoke outside; first measure outside, then measure inside.

Restorers use particle counters to measure airborne particle counts, before, during and after remediation; within containments, as QC and monitoring during fire damage restoration, mold remediation and abatement of HAZMATS. The most common use is inspecting Air Scrubbers and other equipment fitted with HEPA filters, use particle counter around the exterior edges to confirm proper fit. High particle counts in other areas indicate that the HEPA filter may be punctured.

Your particle counters have 6 channels, what is a channel? A channel is simply a bin into which particles fall. Each bin has a specific particle size range.

While your particle counters show numbers on the screen, some low cost meters show colors such as: green, yellow, red and even smiley or sad face? Cleanrooms are strictly focused on not exceeding a cleanliness governing number. For other industries the AQI (Air Quality Index) is very helpful where colors reflect the ranges between good and bad. The AQI would be confusing and a hindrance to cleanrooms.

Particle counters and health? We breathe billions of particles into our bodies and our bodies filter them. Smaller particles are usually more harmful than larger particles. PM 2.5 can penetrate deeply into lungs, nanoparticles go directly into the bloodstream. These particles affect different people differently, depending upon individual vulnerability and susceptibility. Particle count readings may be shared with occupants' physicians and healthcare pros. Surgical suites when not in use are ISO 7. European Hospitals are doing continuous monitoring of Temperature, Humidity, CO^2, and Particles. US hospitals aren't doing it out of fear of litigation. In the USA, no one has had the courage to put out health-related numbers as to what is safe and what is harmful.

RoundUp-

Global Restoration Watchdog and Industry Historian Pete Consigli:

- ATP was used to compare cleanliness before and after sewage intrusion remediation
- ATP used for Quality Control during mold remediation prior to 3rd party PRV.
- Suggests that Particle Counters can be used as QC prior to PRV by 3rd parties.

JIM's Slides

National Ambient Air Quality Standards

Standard		Old ($\mu g/m^3$)	Proposed ($\mu g/m^3$)	New ($\mu g/m^3$)
PM_{10}	Daily	150	---	150
	Annual	50	---	---
$PM_{2.5}$ ("fine")	Daily	65	35	35
	Annual	15	15	15
$PM_{10-2.5}$ ("coarse")	Daily	---	70	---
	Annual	---	---	---

Air Quality Index (AQI) Values	Levels of Health Concern	Colors
When the AQI is in this range:	...air quality conditions are:	...as symbolized by this color:
0 to 50	Good	Green
51 to 100	Moderate	Yellow
101 to 150	Unhealthy for Sensitive Groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Very Unhealthy	Purple
301 to 500	Hazardous	Maroon

Z-Man signing off

Trivia: Name the person commonly acknowledged as the inventor of the first light scattering device?

Answer: F.T. Gucker

Sorry: no correct answer