

REAL-TIME VIABLE PARTICLE DETECTION FOR DEFINITIVE ROOT CAUSE INVESTIGATION

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Traditional Methods Often Fall Short

Investigations into viable air excursions are very difficult to perform using traditional methods. The data generated is very limited and not very timely. This often leads to high levels of frustration as the problem persists, with vast amounts of time and resources being consumed while the root cause remains elusive.

No matter how extensive the investigation, due to the limitations of the traditional tools available, luck often plays a large role in actually identifying an elusive “smoking gun.” As stated by the FDA in the Guidance for Industry, Sterile Drug Products Produced by Aseptic Processing—Current Good Manufacturing Practice: “Environmental monitoring methods do not always recover microorganisms present in the sampled area. In particular, low-level contamination can be particularly difficult to detect.”

Unfortunately, total particle counts do not necessarily correlate with viable contamination and may direct the root cause analysis in the wrong direction. If viable samples are taken, either the investigation is delayed until results are available, or there is a risk that work will need to be repeated because the initial assumptions were not correct.

Key—Real-Time Viable Particle Detection

The key to identifying definitive root cause is being in the right place at the right time, especially considering the low contamination levels seen in pharmaceutical manufacturing. Improving investigations with viable particle detection must include:

Viable Particle Detection In the Right Place

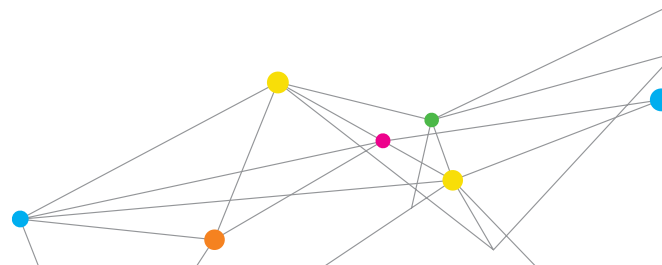
Scanning features that can be used to scan equipment, utility penetrations, filters, etc., and provide rapid, real-time indication of a source of viable contamination.

Viable Particle Detection At the Right Time

Continuous location monitoring to capture transient events of elevated viable contamination that can be directly correlated to the activities being performed in the area.



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How It Works—Improving Root Cause Investigation

A real-time viable particle counter like the TSI BioTrak® Real-Time Viable Particle Counter is key to providing process improvement in real-time viable particle detection for definitive root cause investigation. Included herein is a flowchart of a typical root cause investigation process. The colored boxes indicate the critical process steps where integration of the BioTrak Real-Time Viable Particle Counter is valuable as part of a root cause investigation—in the right place...at the right time.

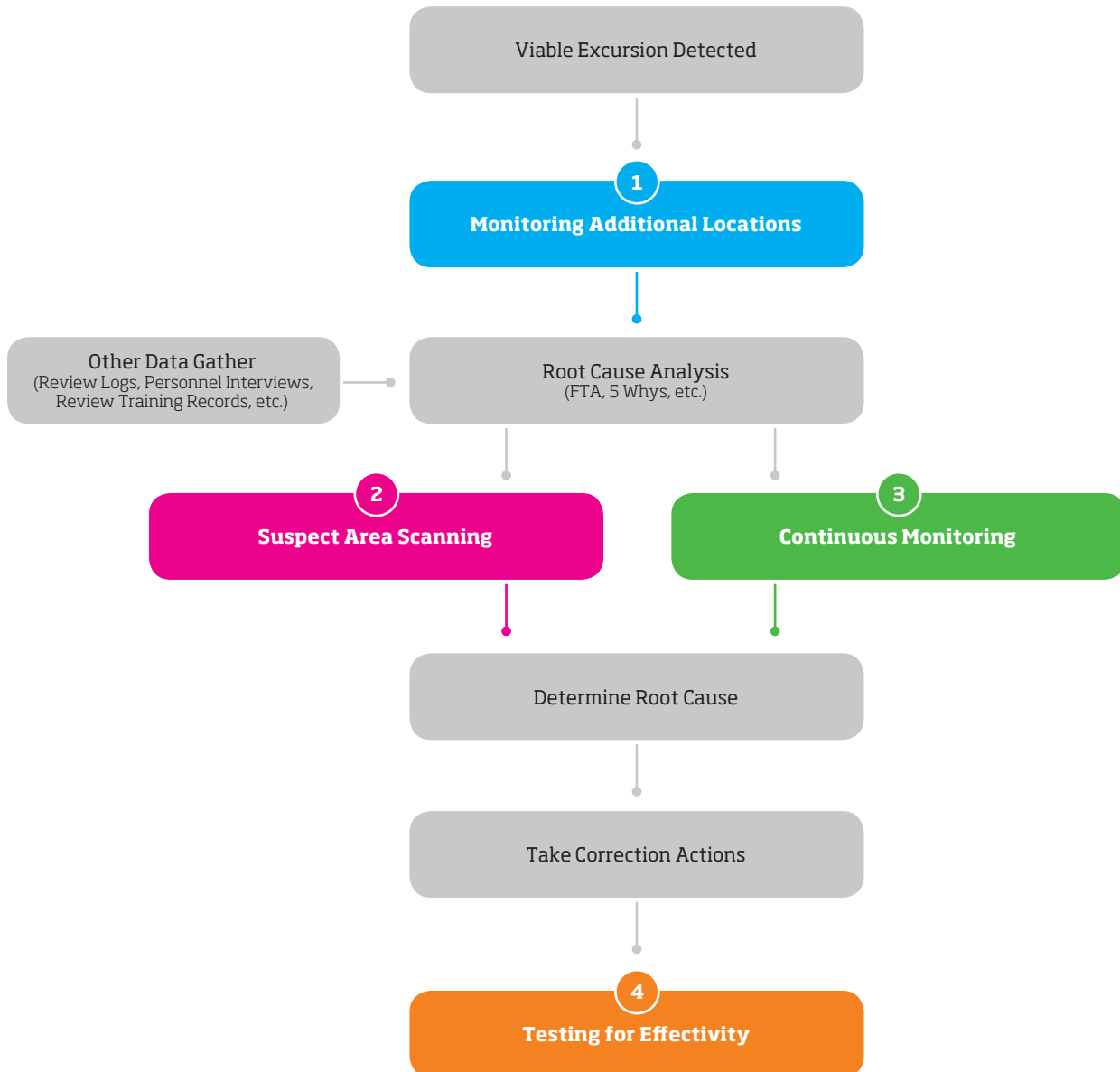


Figure 1: Critical process steps where integration of the BioTrak Real-Time Viable Particle Counter is valuable as part of a root cause investigation (as noted by colored boxes above and explained below).

1 Monitoring Additional Locations

Routine monitoring locations may or may not have other locations in close proximity to the excursion location. Monitoring at additional locations around the site of the excursion can help better pinpoint the location of the possible cause. Particle counts need to be taken in these areas to collect real-time reference data. Sampling with a real-viable detection instrument, like the BioTrak Real-Time Viable Particle Counter, can more efficiently measure the level of airborne viable contamination—in real-time—to immediately pinpoint problem areas. It uses laser induced fluorescence (LIF) technology to detect all particles with fluorescent characteristics consistent with viable microorganisms, irrespective of its metabolic state or culturability. Results obtained from sampling the additional sites require review to see if there is an indication that the contamination source is related to a particular area in close proximity. Sampling approximately one cubic meter of air is recommended. This will generate a result that is comparable to those that have historically been obtained using an active air sampler.

If sampling at additional locations does not indicate a particular location is an issue, the BioTrak Real-Time Viable Particle Counter can easily be moved at the original site of the excursion for continuous real-time monitoring to identify what is driving the increased contamination levels. Often times this can be correlated to manufacturing activities, shift changes, cleaning, equipment operation, HVAC cycles, etc. Comparing data collected over a 24 hour period can determine the effect of any cyclical events that occur on a daily basis. When this data is reviewed, along with the other data compiled during the investigation, a root cause analysis can be completed.

2 Suspect Area Scanning

If the root cause analysis identifies a possible contamination source, a handheld filter scanning probe can be used with the BioTrak Real-Time Viable Particle Counter to scan a source and supply immediate feedback on airborne viable levels from a discrete location. Configuring the instrument is necessary to compare baseline viable particle levels for the area to those collected by moving the probe methodically over all areas of interest, while performing one-second sampling. Using a beep alarm indicator, the level of viable contamination at a location can be determined and indicated by the frequency of the beeps emitted during scanning a particular location.



3 Continuous Monitoring

If the root cause analysis identifies a possible root cause related to an event or an activity that was performed in an area, the BioTrak Real-Time Viable Particle Counter can continuously sample over a long period with short sample times to directly correlate to an event or activity in real-time. Any spikes in viable particles while performing suspected activities or simulating a suspected event will provide immediate feedback to determine if it is the root cause.

4 Testing for Effectivity

Once a root cause has been identified and corrective actions have been taken, testing must be performed to confirm that those actions have been effective. Repeat scanning and/or continuous monitoring with a real-time viable particle monitor is the only way to verify that the issue has been resolved and the area can be immediately returned to use—providing confidence that the issue has truly been resolved.

**Save Time and Money with
Definitive Root Cause Identification**

Root cause analysis performed using traditional methods is expensive and time consuming. Contamination issues go undetected effecting product safety and yield. Using a real-time viable particle counter, like the TSI BioTrak Real-Time Viable Particle Counter, is a powerful tool that can make this process more efficient with a much higher likelihood of identifying sources of contamination. With the capability to provide airborne viable counts in real-time along with immediate feedback scanning abilities, puts you in the right place at the right time to confidently identify the root cause and return your cleanroom to a state of complete control as quickly as possible. This is the only way to reliably reduce line-stoppages, increase efficiency and capacity, enhance process understanding and improve profitability.



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