

# INVESTIGATION REVEALS FAULTY EXHAUST FAN

P-TRAK™ ULTRAFINE PARTICLE COUNTER CASE STUDY #2

## Background

Workers in the poison control center of a hospital emergency department were experiencing symptoms possibly related to poor indoor air quality (IAQ) and shared their concerns with building management. These symptoms included headaches, eye irritation, sore throats, chest pains, and fatigue.

Of the entire emergency department, only the poison control staff experienced these symptoms even though a single air-handling unit supplied the department. The complaints could not be correlated to time of day or specific events; however, all of the complaints had occurred within the previous three months and were growing in severity and frequency.

Building management made many attempts to address these complaints. These actions included several investigations using conventional IAQ measurements and additional testing for volatile organic compounds. None of the results revealed any problems.

## Problem Assessment

After established procedures failed to identify the source of the complaints, building management authorized an investigation of ultrafine particle (UFP) levels to evaluate building conditions. The investigator used a P-Trak™ Ultrafine Particle Counter to measure UFP levels in outside air and at various locations within the emergency department. All readings were recorded in particles/cc.

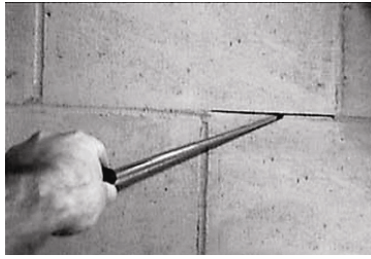
### UFPs Tracked to the Source...

• Background (outdoors)	11,800
• Supply air and surrounding areas	850
• Poison center	13,200
• Above ceiling tile in poison center	29,700
• At wall abutting ambulance bay	162,000
• Poison center after exhaust fan repair	850

Within 15 minutes after the investigator's arrival, building management had a clear understanding of the conditions in the department. The background UFP level outside was 11,800. As expected with the 95 percent efficient bag filters and 60 percent efficient prefilters, UFP levels in the supply air and other emergency department locations were 800 to 900. The poison center, however, exhibited a much higher level of 13,200.



Since the UFPs were not entering the poison center through the air supply system or from other occupied areas



of the emergency department, the investigation centered on the poison center itself. By checking wall and ceiling penetrations, the investigator quickly identified the source pathway. Elevated UFP levels were entering the poison center through the ceiling tiles. Further investigation showed UFP readings above the ceiling tiles as high as 29,700. Using the P-Trak™ Ultrafine Particle Counter, the investigator tracked increasingly higher UFP levels to joints in the concrete wall blocks, where measurements exceeded 162,000. On the other side of the wall, the investigator found an ambulance bay and learned that an ambulance had just left the area.

## Outcome

The high UFP levels at the wall, in combination with those in the adjoining ambulance bay, prompted building management to check the ambulance bay exhaust system. Management quickly determined that the starter motor for an exhaust fan was malfunctioning.

After maintenance repaired the exhaust fan starter and sealed the block joints in the wall, a follow-up survey using the P-Trak™ Ultrafine Particle Counter showed UFP levels in the poison center equal to those in supply air and adjacent offices. Complaints from the poison center staff ended.

## The P-Trak™ Ultrafine Particle Counter from TSI...

Tracking UFPs with the P-Trak™ Ultrafine Particle Counter is a new and effective method for identifying the root cause of problems. Targeting the true source, or sources, of unexpected ultrafine particle concentrations helps to clarify indoor air quality and other problems. Removing, repairing or controlling the source and shutting down pathways has been shown to effectively eliminate related complaints.



The P-Trak™ Ultrafine Particle Counter uses fundamental measurement technology proven around the world in research and industrial applications since 1978. Its data logging feature allows the user to download field measurements for evaluation in TSI's TrakPro™ Data Analysis Software or in common word processing and spreadsheet programs, simplifying record keeping and reports.

See [www.tsi.com](http://www.tsi.com) for more information on the P-Trak™ Ultrafine Particle Counter and TSI's full line of IAQ instruments.



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