

# CONSTRUCTION FUMES ENTER NURSES' AREA THROUGH EXPANSION JOINTS

P-TRAK™ ULTRAFINE PARTICLE COUNTER CASE STUDY #3

## Background

When a hospital began renovating its first floor, the second-floor staff located directly above the construction area immediately complained of odors and other discomforts, including headaches. When building management investigated the complaints, they could not detect any odors and could not understand why only this small group of second-floor workers was experiencing these symptoms.

When the nurses' complaints persisted, building management inspected the first-floor work area to determine whether construction practices were actually the source of the problem. An inspection of the air-handling system serving the construction area showed that it had been properly sealed to prevent contaminants from entering the air system. Negative air units were also installed to exhaust this air. Building management then shared this finding with the second-floor staff. To further assure the nurses that the first floor was not the source of their complaints, building management described the building's HVAC system and showed them that the second floor was actually served by an air-handling system completely separate from the one used for the first floor. The second-floor staff did not believe management because their symptoms persisted.

## Problem Assessment

Building management realized that conventional techniques would not identify the root cause of these complaints and authorized an investigation of ultrafine particle (UFP) levels in the nurses' area. The investigator used a P-Trak™ Ultrafine Particle Counter to measure UFP levels in outside air and at various locations throughout the second floor. All readings were recorded in particles/cc.

### UFPs Tracked to the Source...

• Background (outdoors)	9,440
• Second-floor supply air	562
• Second-floor adjacent offices	550
• Second-floor nurses' area	14,200
• Second-floor expansion joint	158,000
• Nurses' area after repair	562

Within two hours, the investigator measured background UFP levels and surveyed the complaint area and adjoining work areas. The average background UFP reading, taken at ground level and upwind of the hospital, was 9,400. On the second floor, the UFP levels in supply air and adjoining work areas were 562 and 550, respectively. The average reading in the nurses' area was 14,200—nearly 30 times greater than the surrounding areas.



Additional investigation of the nurses' area revealed a UFP level of 158,000 coming in through a floor expansion joint directly above the first-floor construction area. Despite careful planning and controls, construction fumes were migrating to the second floor through this unexpected pathway because of a pressure differential between the spaces.



## 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.

## Outcome

Once the floor expansion joint was identified as a UFP pathway, building maintenance quickly applied a temporary seal of duct tape to block air movement. The P-Trak™ Ultrafine Particle Counter confirmed the effectiveness of this measure when UFP levels dropped to those of surrounding areas. The nurses' complaints ended immediately, and the tape was left in place until the construction was finished.



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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