

IDENTIFICATION AND ABATEMENT OF AIRBORNE FUNGAL GROWTHS RESOLVE WORKERS' HEALTH COMPLAINTS

In the summer of 1994, the medical staff at Naval Hospital, Rota Spain, observed an unusual number of cases of upper respiratory complaints and allergy-like symptoms. The clinic staff noted that the individuals reporting these symptoms all worked in the same location, a 30-year-old office facility with an occupancy load of 350 to 400 personnel. The facility's Occupational Safety and Health Manager, Ms. Donna Pass-Otteni, contacted Mr. David Hiipakka, Head of Industrial Hygiene Services at the Naval Hospital and a Certified Industrial Hygienist, to investigate the probability that these cases were related to the work environment.



Naval Hospital, Rota Spain

Working together, they quickly learned that contractors and base maintenance personnel had not always had regular access to provide periodic preventive maintenance (PM) on the building's Heating, Ventilation and Air Conditioning (HVAC) system. In fact, no one was really certain when

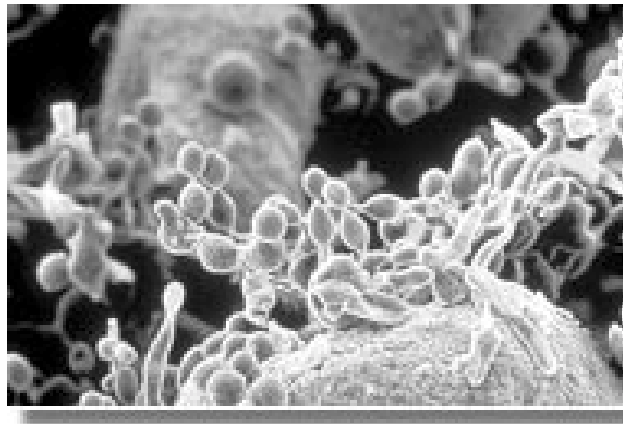


Existing HVAC chiller units (being replaced under currently funded contract) are representative of the age of the majority of the facility's HVAC systems.

the last HVAC PMs had been done. Mr. Hiipakka and Ms. Otteni obtained permission from the facility to initiate an indoor air quality investigation. They knew that a key component of such a specialized investigation would be accurate and positive identification of specific species of microbial air contaminants (e.g., fungi, bacteria, etc.).

Determining whether airborne concentrations of microbes are potentially hazardous to building occupants is a fairly new science. For this reason, LT John Buffington, a microbiologist with a Masters Degree in fungal organisms, came to Rota from Navy Environmental Preventive Medicine Unit Number 2 (EPMU-2), in Sigonella, Italy to offer his expertise in this situation.

With LT Buffington now at Rota, initial inspection of HVAC components by a quickly formed multi-faceted field team revealed visible fungal growth on air filters, in air ducts, and in cooling fan condensate drip pans. LT Buffington supervised initial air sampling at the office building and trained the Rota Industrial Hygiene staff in fungus sampling techniques so that the indoor air quality investigation could be completed in-house. Under LT Buffington's supervision, Rota's Industrial Hygiene staff collected the initial microbial air samples on Petri culture plates and sent them to LT Buffington's microbiology laboratory at EPMU-2. There, the microbiologist identified the fungi and counted their concentrations in the building's air samples.



Typical fungal organisms magnified 350 times

Initial air sampling for fungus contamination was accomplished using an Anderson N6 air sampler and Sabouraud dextrose agar media. Twenty-three air samples were collected for 5 minutes each at 28.3 liters/minute airflow. Blanks and control culture plates, which were collected in other buildings in the same geographical area that had not experienced similar worker health complaints, were also submitted for microscopic analysis. The cultures from the problem facility revealed contamination by approximately 6 separate fungal species that have been associated with human health complaints in indoor environments.

Immediate remediation actions included: hiring a dedicated HVAC repair mechanic to regularly access all areas needing preventive maintenance, replacement of HVAC air filters, cleaning of accessible HVAC components with a water and bleach solution, and repair of HVAC system mechanical components. The purchase of the specialized Anderson air sampler allowed the Rota Industrial Hygiene Department to conduct follow-up sampling for fungal contamination after each major abatement measure. The air samples were forwarded to LT Buffington at EPMU-2 to analyze for fungi. Repeat air sampling revealed a significant drop in airborne fungal colonies of up to 97% by the end of the abatement project.



Anderson N-6 Viable Bioaerosol Sampler

The Rota Industrial Hygiene Department devoted approximately 40 hours in field sampling and report writing time to this indoor air quality investigation. LT Buffington analyzed over 100 fungus samples from initial and follow-up testing. The estimated cost for outside consultants from the continental United States to conduct this indoor air quality investigation would have been at least \$10,000. After deducting \$1,000 for the purchase of the microbial air sampler, the Navy realized a net return of approximately \$9,000.

Contributor: David W. Hiipakka, CIH; Head, Industrial Hygiene Services, U.S. Naval Hospital, Rota Spain; dwhiipakka@rota.med.navy.mil