



Engineering Sciences Section – 2008

C51 Sampling for Airborne and Surface- Associated Microorganisms

Mark Buttner, PhD*, University of Nevada at Las Vegas, 4505 South Maryland Parkway, Box 454009, Las Vegas, NV 89154

Upon completion of this presentation, participants will be familiar with the theory and objectives of air and surface sampling, the equipment and methods available, and the factors to be considered in developing a monitoring plan for measuring the concentration and composition of airborne microorganisms and biocontamination sources.

The Microbiology Division of the Harry Reid Center for Environmental Studies has been involved in bioaerosol research for over twenty years and has extensive expertise and peer-reviewed publications in this area. As a result, this presentation will impact the forensic science community by providing the most current and relevant information to maximize the utility of the presentation to professionals in the forensic community that are interested in air and surface sampling and analysis.

The concentration and composition of airborne microorganisms is of interest in diverse areas such as agricultural and industrial settings, medicine, home and office environments, and military research. The term "bioaerosol" is used to refer to airborne biological particles, such as bacterial cells, fungal spores, viruses or pollen grains, and to their fragments and by-products. The objective of active bioaerosol sampling is the efficient removal and collection of biological particles from the air in a manner which does not affect the ability to detect the organism (e.g., alteration in culturability or biological integrity). A wide variety of bioaerosol sampling and analysis methods have been used and new methods are being developed. However, several problems remain to be solved. For instance, no single sampling method is suitable for the collection and analysis of all types of bioaerosols and no standardized protocols are currently available. Therefore, data between studies are often difficult to compare because of differences in sampler design, collection times, air flow rates and analysis methods. In addition, human exposure limits have not been established for bioaerosols because of the lack of exposure, dose, and response data. This complicates the use of sampling results for risk assessment. Measurement of airborne microorganisms with a bioaerosol sampler often aims at documenting the presence of specific sources. However, when no biological particles are collected and identified by air sampling, one cannot conclude that their sources are absent. To fully evaluate health effects associated with airborne spores, it is important to be able to measure airborne concentrations and the source strength. Therefore, surface samples are often collected in conjunction with air samples in the indoor environment to provide information about microbial sources. Direct source evaluation through surface sampling is used to locate and identify potential bioaerosol hazards and to predict the bioaerosol dispersal and deposition. Qualitative and quantitative information on the concentration and composition of surface-associated microorganisms can be obtained with surface sampling. It is important for the investigator to carefully consider the objectives of sampling before any samples are taken. After determining what information is desired, an appropriate sampling and analysis method can be selected and incorporated into the monitoring design. The purpose of this presentation is to present the principles of bioaerosol and surface sampling and various sampling methods available. Published performance evaluations and guidelines, equipment calibration, and other sampling considerations will also be discussed.

Bioaerosol, Airborne Microorganisms, Sampling