WHILE THE USP STERILE COMPOUNDING COMMITTEE COMPLETES ITS review of comments received in response to the proposed changes to Chapter <797>, pharmacies across the country are beginning to identify the potential financial, procedural, and operational impact some of these changes may have on their operations. Perhaps one of the most significant revisions is an addition to the “Environmental Monitoring” section that will require gloved fingertip sampling of operators compounding preparations in an ISO Class 5 environment. This sampling may be new to Chapter <797>, but it has roots within many of the current standards and guidelines around monitoring personnel in cleanroom environments. As your pharmacy prepares for this change, there are several key items to consider when revising your environmental monitoring plan.

Why This Addition?
All of the references cited in this article, including <797>, speak to the fact that operators pose the highest risk of introducing to a cleanroom the microbial contaminants that could make their way into a sterile preparation. Operators whose hands are contaminated can compromise the sterility of a preparation by directly touching any surface that comes into contact with the drug or its components.

Many of the current global standards and guidelines on environmental monitoring of cleanrooms address gowning qualification and procedures for operators, including selection and donning of cleanroom garb, operator behavior, and routine fingertip and garb testing of operators to show continued compliance with these procedures. Adding gloved fingertip sampling to the environmental monitoring section of USP Chapter <797> aligns USP more closely with the standards referenced within its pages. More importantly, it provides pharmacies with an additional quality control mechanism to ensure its cleanroom environment remains in a state of control.

The following sections will give you an idea of some of the expectations set forth by the revisions, as well as considerations that may need to be made as your pharmacy plans to implement the changes outlined.

Sampling Frequency
The distinction between low-, medium-, and high-risk compounding in the proposed revisions is reflected in the minimum sampling frequencies proposed. High-risk level compounding will require daily sampling, while low-to medium-risk level compounding will require weekly sampling. In all of the risk levels, the proposed changes require that at least one operator or 10% of all compounding operators in the shift (whichever number is greater) complete
Operator sampling results should be trended to provide a picture of which aseptic operators may pose higher risks as “shedders,” as some staff members may tend to emit large numbers of particles and microcontaminants, even if they are appropriately certified and properly garbed.

Pharmacies considering outsourcing this testing should have procedures developed to address how the samples will be preserved during transport to the testing laboratory.

**Method**

Prior to use in sampling activities, contact plates should be visually inspected for signs of contamination or dryness. The manufacturer, lot number, and expiration date of the plates should be recorded in the pharmacy’s environmental monitoring log. Before sampling, the bottom of each plate should be labeled with a plate number, operator name or initials, the sampling date, and sampling location (i.e., right or left hand). Your pharmacy may also want to consider retaining a positive and a negative control for this sampling period.

Operators should exit the ISO Class 5 area to complete the sampling. Aseptic technique should be used to remove the lids of each plate. It is important to remember that gloves should not be disinfected prior to sampling as this activity may generate false negative results. The four fingers and thumbs for each hand should be pressed into their respective contact plates. If another operator is assisting with the sampling, he or she should hold each plate at an angle that will easily allow the operator being tested to first press his or her four fingers of one hand and then thumb into the first plate, and repeat with the opposite hand for the second plate. When done correctly, a visible impression of each finger will be present. Lids should be carefully replaced using aseptic technique, so as not to inadvertently contaminate the samples.

**Incubation**

Plates should be inverted and incubated according to Chapter <797> between 33° and 37° for two days. Results should be read, recorded, and trended in the pharmacy’s environmental monitoring log.

**Action and Alert Levels**

Action and alert levels will be triggered when a sample shows greater than or equal to three colony-forming units (CFUs). Results exceeding the established action and alert levels should prompt the retraining of personnel in hand hygiene and garbing procedures, as well as glove and surface disinfection procedures and cleanroom behavior. In addition, your pharmacy’s policies and procedures should require full retraining and/or recertification of technicians who have repeated excursions from established limits.

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tend to emit large numbers of particles and microcontaminants, even if they are appropriately certified and properly garbed. If trending data for a particular operator continues to come close to or exceed the established three CFU limit, it may be prudent to remove the operator from cleanroom operations altogether.2

### Other Steps to Take Toward a Robust EM Plan

**Gowning Certification**

Gloved sampling will provide a good picture of your staff’s performance in the cleanroom environment and will serve to complement your environmental monitoring program. Adding a formal gowning certification program can enhance your pharmacy’s aseptic training efforts, as well as establish baseline and routine measurements and qualification of staff. Within the program, operators should be able to demonstrate proper selection and donning of garb, and testing of gloved fingertips can be complemented by additional testing of areas including, but not limited to, an operator’s chest and forearms. USP Chapter <1116> on microbiological evaluation provides recommended acceptable limits for garbed areas as no more than five CFUs in an ISO Class 5 environment and 20 CFUs in an ISO Class 7 environment.

**Understanding Microbial Contamination and Garb**

Proper gowning is essential, and operators should be trained to understand that the protective clothing they wear is not 100% effective at preventing the escape of contaminants inside gowns into the cleanroom environment. Operators must understand that gowns, when touched, brushed, or shifted, have the potential to have a bellows effect. With this comes the potential to expel contaminants into the cleanroom environment, raising the risk of contamination of compounded medications. “Clothing should cover a person as completely as possible to prevent significant numbers of contaminants from being dispersed into a cleanroom.”3

Operators shed healthy skin scales at an average rate of 10,000 per minute. The flora on such skin scales has been shown to include staphylococcus aureus and micrococcus. Operators using poor hygiene have the potential to introduce more serious organisms like salmonella and e. coli into the cleanroom environment. Any of these can travel on shedded skin scales or be introduced through direct contact with the preparation.5 Further, operating behaviors, shedding patterns, and flora vary from person to person, and some may emit several million particles per minute and several hundred bacteria-carrying particles per minute. These folks are fondly referred to in industry terms as “shedders” and should be monitored closely when identified.

Cleanroom gowns are designed to allow comfort and breathe-ability and have a dual role to act as a barrier and a filter to reduce the risk of human contamination. In the end, gowns should ventilate well enough to prevent a bellows effect when an operator moves around during normal operations. Ideally, garb selection should keep “significant amounts of unfiltered body emissions” from getting into your cleanroom environment, while allowing your operators to work comfortably.6

**Staff Member’s Roles as Quality Watchdogs**

Operators should be trained to report deficiencies observed, illnesses, breaches of garb, etc. Being proactive in identifying areas of concern with respect to contamination will allow your pharmacy to mitigate the issue before it becomes a problem.6

### Conclusion

Proposed fingertip sampling is just one addition within the revised USP Chapter <797> that will have a direct impact on many areas of your pharmacy. Performing operational and financial impact analyses now will allow your pharmacy to properly address what will be required to comply with the chapter when it is released.

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### REFERENCES:

3. United States Pharmacopeia, Chapter <1116> - Microbiological Examination.

### WHERE TO FIND Sampling Media:

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