



The following policies and procedures are being provided to the American Society of Health-System Pharmacists and can be used with permission from Clinical IQ, LLC by the end-users for the purposes of developing institutional policy and procedures only.

Sample Pharmacy
VIABLE AIR SAMPLING LOG
 Page 1 of 2

Test Date: _____ Test Type: Semi-Annual Monthly Retest Other: _____

Media supplied by: Pharmacy Certification Vendor: _____

Person pulling, labeling and performing sample collection: _____

Type Air Sampling Device Used: _____ Device sampling capacity: _____ liters/minute

Time for each sample size: 1000 liters (1 cubic meter): _____ minutes

Calibration N/A Air Sampling Device Calibrated ➔ Signature of person calibrating: _____

Media Information: TSA Manufacturer: _____ Lot #: _____ Expiration: _____

MEA/SDA Manufacturer: _____ Lot #: _____ Expiration: _____

General Growth Medium Samples (TSApl incubated inverted at 30-35°C for 48 – 72 hours)												
Date placed in incubator: _____			Time placed in incubator: _____ AM/PM									
Plate Location Information*		Date Out	Time Out	# CFU	Alert Level CFU/plate	Action Level CFU/plate	Results				Comments	Inspected By
ISO Area	Specific Location						Alert Level		Action Level			
							P	F	P	F		
N/A	Control Plate				0	0						
ISO 5 PECs <i>Sample 1000 liters at each location</i>	Left Laminar Flow 1				1	>1						
	Right Laminar Flow 1				1	>1						
	Left Laminar Flow 2				1	>1						
	Right Laminar Flow 2				1	>1						
	Laminar Flow 3				1	>1						
Hazardous Compounding	BSC				1	>1						
ISO 7 Non Hazardous Buffer Area <i>Sample 1000 liters at each location</i>	Buffer Room Air 1				>5	>10						
	Buffer Room Air 2				>5	>10						
	Buffer Room Air 3				>5	>10						
Hazardous Compounding Buffer Area	Hazardous Room Air 1				>5	>10						
	Hazardous Room Air 2				>5	>10						
ISO 8** Ante-area <i>Sample 1000 liters at each location</i>	Ante-Area 1				>50	>100						
	Ante-Area 2				>50	>100						

*See Environmental Viable Sampling Plan Diagram **Ante-areas must be ISO 7 or better if contiguous with negative pressure hazardous drug room

NOTE: N/A ANY UNUSED SECTIONS

See page 2 for Fungal Specific Media Samples

Sample Pharmacy
VIABLE AIR SAMPLING LOG
 Page 2 of 2

Fungal Specific Growth Medium Samples (MEA/SDA incubated right side up at 26 - 30°C for 5-7 days)												
Date placed in incubator: _____						Time placed in incubator: _____ AM/PM						
Plate Location Information*		Date Out	Time Out	# CFU	Alert Level CFU/plate	Action Level CFU/plate	Results				Comments	Inspected By
ISO Area	Specific Location						Alert Level		Action Level			
							P	F	P	F		
N/A	Control Plate				0	0						
ISO 5 PECs <i>Sample 1000 liters at each location</i>	Left Laminar Flow 1				1	>1						
	Right Laminar Flow 1				1	>1						
	Left Laminar Flow 2				1	>1						
	Right Laminar Flow 2				1	>1						
	Laminar Flow 3				1	>1						
Hazardous Compounding	BSC				1	>1						
ISO 7 Non Hazardous Buffer Area <i>Sample 1000 liters at each location</i>	Buffer Room Air 1				>5	>10						
	Buffer Room Air 2				>5	>10						
	Buffer Room Air 3				>5	>10						
Hazardous Compounding Buffer Area	Hazardous Room Air 1				>5	>10						
	Hazardous Room Air 2				>5	>10						
ISO 8** Ante-area <i>Sample 1000 liters at each location</i>	Ante-Area 1				>50	>100						
	Ante-Area 2				>50	>100						

*See Environmental Viable Sampling Plan Diagram **Ante-areas must be ISO 7 or better if contiguous with negative pressure hazardous drug room

NOTE: N/A ANY UNUSED SECTIONS

Results of BOTH General and Fungal Growth Media reviewed by:

Reviewed By: _____ **Date** _____
 (Pharmacy Manager or designee)

- Report any out of limit findings to Pharmacy Manager/designee immediately.
- Any sample with CFUs (regardless of whether or not it triggers the Action or Alert Levels) will be sent for speciation to the genus level.
- Area samples that trigger Alert Level values will be resampled. Depending on how many consecutive times Alert Level has been triggered, additional actions such as cleaning, retraining or speciation may be necessary.
- If an Action Level/s is triggered, refer to P-200 for required actions.
- If an Action Level is triggered 2 consecutive times for any location, speciation of the samples is required.
- Actions in response to positive VAS occur on the Facility and Environmental Sampling Action Report (F-204.b)

Sample Pharmacy
SURFACE SAMPLING LOG
 Page 1 of 2

Test Date: _____ Test Type: Monthly Retest Other: _____

Method Type: Plate Swab ➔ requires same number plates and swabs, template and Tween water

Person pulling, labeling and performing sample collection: _____

Media Information: TSApl Manufacturer: _____ Lot #: _____ Expiration: _____

MEA/SDA Manufacturer: _____ Lot #: _____ Expiration: _____

Generic Growth Medium Samples (TSApl incubated inverted at 30-35°C for 48 – 72 hours)												
Date placed in incubator: _____			Time placed in incubator: _____ AM/PM									
Plate Location Information*		Date Out	Time Out	# CFU each plate	Alert Level CFU/plate	Action Level CFU/plate	Results				Comments	Inspected By
ISO Area	Specific Location						Alert		Action			
							P	F	P	F		
N/A	Control Plate				0	0						
ISO 5 PECs Buffer Area Complete space with type of PEC (LAFW or CAI)	Left _____ 1				>1	>3						
	Right _____ 1				>1	>3						
	Left _____ 2				>1	>3						
	Right _____ 2				>1	>3						
Hazardous Compounding	BSC/CACI				>1	>3						
ISO 7 Buffer Area	Metro Cart 1				>2	>5						
	Top of shelving				>2	>5						
	Wall right of shelving				>2	>5						
	Pass thru				>2	>5						
Hazardous Compounding	Metro cart				>2	>5						
	Shelving				>2	>5						
	Pass Thru				>2	>5						
ISO 8** Anteroom or Ante-area	Shelving Dirty Side				>50	>100						
	Clean cart				>50	>100						
	Pass Through				>50	>100						

*See Environmental Viable Sampling Plan Diagram **Anterooms must be ISO 7 or better if contiguous with negative pressure hazardous drug room

NOTE: N/A ANY UNUSED SECTIONS

See page 2 for Malt Extract Agar Surface Samples

**Sample Pharmacy
SURFACE SAMPLING LOG
Page 2 of 2**

Fungal Growth Medium Samples (MEA incubated right side up at 26 - 30°C for 5-7 days)												
Date placed in incubator: _____				Time placed in incubator: _____ AM/PM								
Plate Location Information*		Date Out	Time Out	# CFU each plate	Alert Level CFU/plate	Action Level CFU/plate	Results				Comments	Inspected By
							Alert		Action			
ISO Area	Specific Location						P	F	P	F		
N/A	Control Plate				0	0						
ISO 5 PECs Buffer Area Complete space with type of PEC (LAFW or CAI)	Left _____ 1				>1	>3						
	Right _____ 1				>1	>3						
	Left _____ 2				>1	>3						
	Right _____ 2				>1	>3						
Hazardous Compounding	BSC/CACI				>1	>3						
ISO 7 Buffer Area	Metro Cart 1				>2	>5						
	Top of shelving				>2	>5						
	Wall right of shelving				>2	>5						
	Pass thru				>2	>5						
Hazardous Compounding	Metro cart				>2	>5						
	Shelving				>2	>5						
	Pass Thru				>2	>5						
ISO 8** Anteroom or Ante-area	Top gowning supply				>50	>100						
	Clean cart				>50	>100						
	Shelving "dirty" side				>50	>100						

*See Environmental Viable Sampling Plan Diagram **Anterooms must be ISO 7 or better if contiguous with negative pressure hazardous drug room

Results of both General and Fungal Growth Media reviewed by:

Reviewed By: _____ **Date** _____
(Pharmacy Manager or designee)

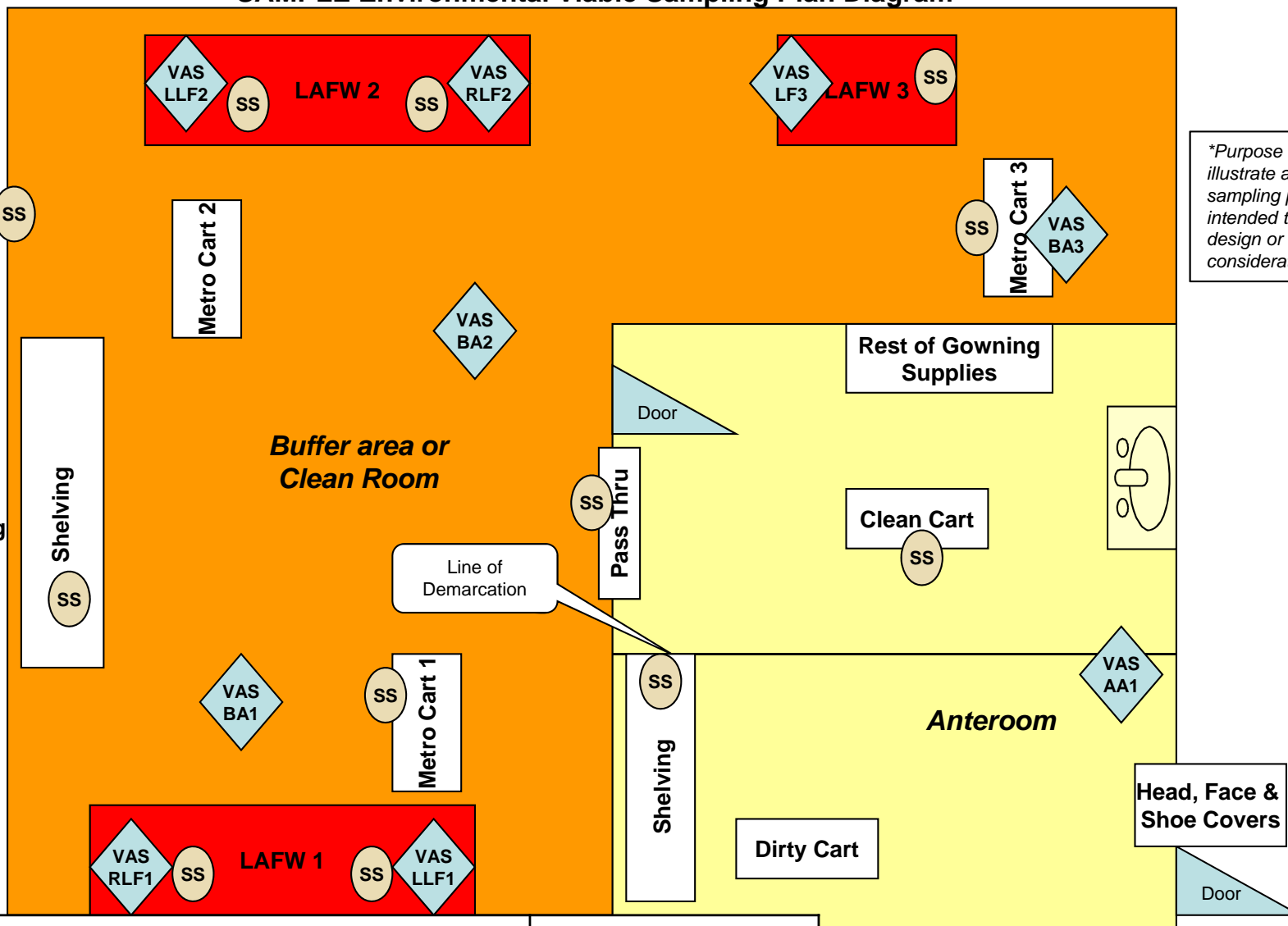
- If any sample exceeds its designated Action Level, do not discard that sample/s and notify Pharmacy Manager immediately
- The area of the sample that exceeded the Action Level will be cleaned and resampled.
- All actions taken in response to positive Surface Samples are documented on the Facility and Environmental Sampling Action Report (F-204.b)

Sample Pharmacy
SAMPLE Environmental Viable Sampling Plan Diagram*

LAFW = laminar flow
 LLF = left laminar flow
 RLF = right laminar flow
 BA = buffer area air
 AA = ante area air

VAS = Viable air sampling
 SS = Surface sampling

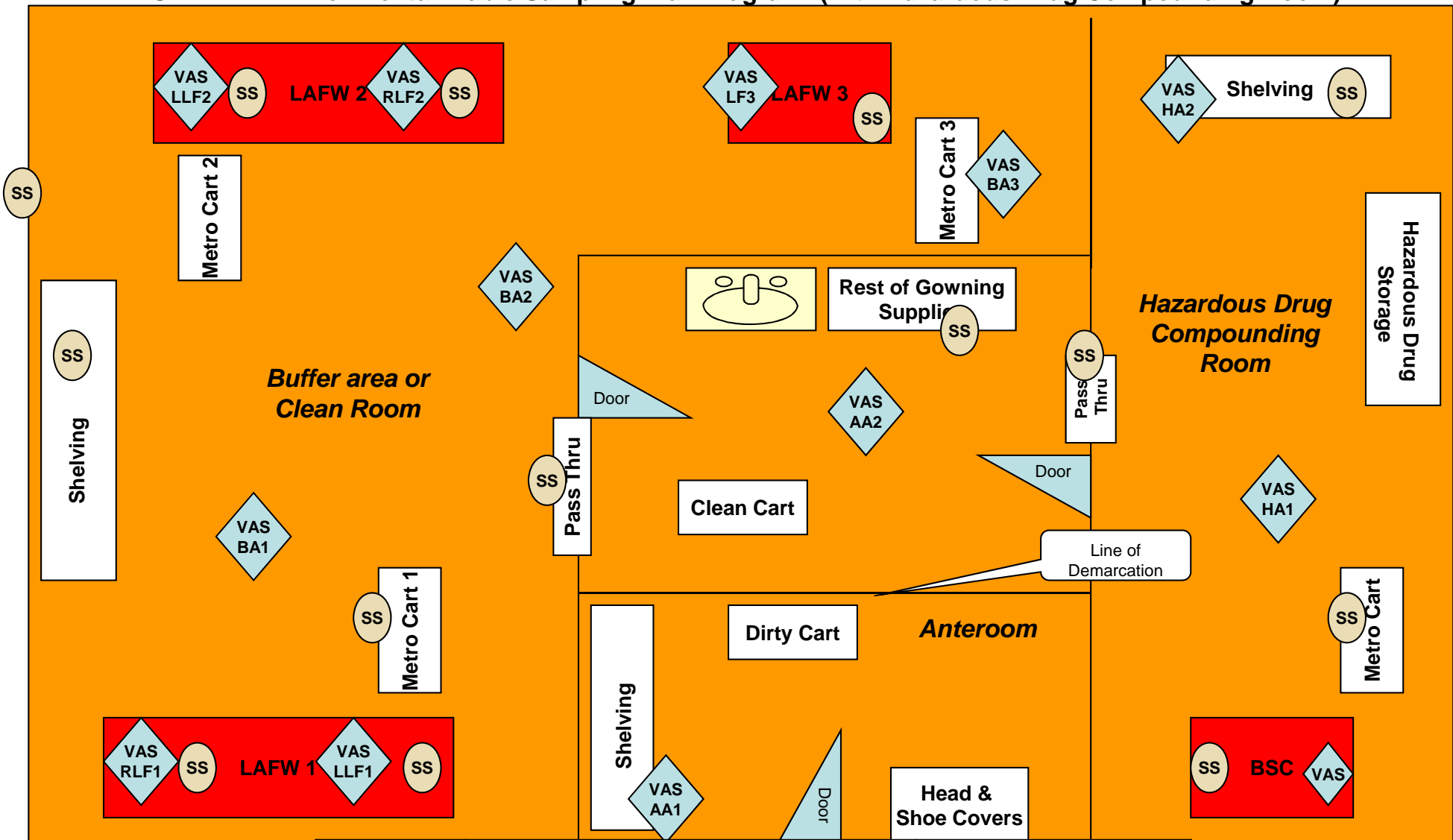
**Purpose of diagram is to illustrate a potential sampling plan and is not intended to suggest design or engineering considerations.*



ISO Class	Volumetric Air Sampling Action Level CFU per 1000 liters of air/plate**	Surface Sampling Action Level CFU/plate
ISO Class 5	> 1 CFU	> 3 CFU
ISO Class 7	> 10 CFU	> 5 CFU
ISO Class 8	>100 CFU	> 100 CFU

If < 1000 liters of air sampled per plate must convert to 1000 liter equivalent (e.g., If 400 liters sampled in ISO Class 7, Action Level = >4 CFU/plate)

Sample Pharmacy
SAMPLE Environmental Viable Sampling Plan Diagram* (with Hazardous Drug Compounding Room)



LAFWF = laminar flow
 LLF = left laminar flow
 RLF = right laminar flow
 BA = buffer area air
 AA = ante area air
 HA = hazardous room air

ISO Class	Volumetric Air Sampling Action Level CFU per 1000 liters of air/plate**	Surface Sampling Action Level CFU/plate
ISO Class 5	> 1 CFU	> 3 CFU
ISO Class 7	> 10 CFU	> 5 CFU
ISO Class 8	>100 CFU	> 100 CFU

**If < 1000 liters of air sampled per plate must convert to 1000 liter equivalent (e.g., If 400 liters sampled in ISO Class 7, Action Level = >4 CFU/plate)

VAS = Viable air sampling
SS = Surface sampling

**Sample Pharmacy
Facility and Personnel Environmental Sampling Action Report**

Employee Name: _____ (if applicable)

- Type of Unit: Gloved Fingertip Sampling (GFS) ➔ # CFU L hand: _____ R hand: _____ Date sampled: _____
 Media Fill Unit (MFU) ➔ # units positive: _____ Date units prepared: _____
 Viable Air Sampling (VAS) Unit ➔ describe unit/s location based on ESP: _____
_____ Date sampled: _____
 Surface Sampling (SS) Unit ➔ describe unit/s location based on ESP: _____
_____ Date sampled: _____

Complete the following actions and document additional information in the space provided below:

1. Pharmacy Manager notified Yes No
2. Employee removed from compounding operations Yes No N/A if VAS/SS
3. Correct procedure followed for preparation of GFS MFU VAS SS Yes No
4. Incubated Plates/MFUs were not exposed/leaking during incubation Yes No
5. Certification of PEC associated with units reviewed Yes No
6. Historical viable air sampling of location reviewed Yes No
7. Procedures reviewed (check all that apply) Hand hygiene/garbing Aseptic Technique Facility cleaning
 Other: _____ Yes No N/A
8. Area recleaned. Yes No N/A
9. Retest: GFS MFU VAS SS Date: _____ Yes No
10. Subsequent to positive GFS, MFU, SS (optional), employee successfully completes each of the following (attach forms)
 - a. Competency assessment for Hand Hygiene and Garbing (F-410a) Yes No N/A
 - b. Competency assessment for Aseptic Technique (F-410.b) Yes No N/A

Use the space below to document additional pertinent information

Signature of Person Completing Form

Date

Check if microbiological analysis performed: VAS GFS MFU SS

Results attached: Yes No N/A

Based on the results of the microbiological analysis, have additional actions been taken? No Yes ➔ describe

Description of actions taken _____

Action Report completed by: _____

Date completed: _____

Signature of Pharmacy Manager after review

Date: _____

**Sample Pharmacy
DAILY PRESSURE DIFFERENTIAL LOG**

Facility: _____ Month: _____ Year: _____

Day	Column A Cleanroom to Anteroom	Column B Anteroom to Non Classed	Column C = Sum columns A + B must be ≥ 0.02 " wc	Hazardous Room to Anteroom must be at least -0.01" wc NEGATIVE pressure	Signature Individual Reading
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					

Signature of Pharmacy Manager after document review

Date

**Sample Pharmacy
TEMPERATURE AND HUMIDITY MONITORING LOG**

Month: _____

Year: _____

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Controlled Cold Temperature: 2° to 8° Celsius (36° to 46° Fahrenheit)																																
Refrigerator #1																																
Refrigerator #2																																
Controlled Frozen Temperature: -30° to -10° Celsius (-13° to 14° Fahrenheit)																																
Freezer #1																																
Freezer #2																																
Incubator: 30° to 35° Celsius (85° to 95° Fahrenheit)																																
Incubator																																
Controlled Room Temperature: 20° to 25° Celsius (68° to 77° Fahrenheit) allowing excursions from 15° to 30° Celsius (59° to 86° Fahrenheit)																																
Storage# 1																																
Storage #2																																
Clean Room Temperature: 18-21° Celsius (64° - 70° Fahrenheit)																																
Cleanroom #1																																
Cleanroom #2																																
Cleanroom Humidity: 25-60% Relative Humidity																																
Cleanroom #1																																
Cleanroom #2																																
Initials of Recorder																																

Signature of Pharmacy Manager after review

Date

Sample Pharmacy
TEMPERATURE AND HUMIDITY CORRECTIVE ACTION LOG

Date Of Occurrence	Affected Unit or Storage Area	Date Reported	Initials Of Reporter	Description of Out of Limit Occurrence	Cause/Detail	Correction Action/s Taken*	Date Resolved
	<input type="checkbox"/> Buffer area _____ <input type="checkbox"/> Ante-area: _____ <input type="checkbox"/> Refrigerator: _____ <input type="checkbox"/> Freezer _____ <input type="checkbox"/> Incubator _____ <input type="checkbox"/> Storage area: _____						
	<input type="checkbox"/> Buffer area _____ <input type="checkbox"/> Ante-area: _____ <input type="checkbox"/> Refrigerator: _____ <input type="checkbox"/> Freezer _____ <input type="checkbox"/> Incubator _____ <input type="checkbox"/> Storage area: _____						
	<input type="checkbox"/> Buffer area _____ <input type="checkbox"/> Ante-area: _____ <input type="checkbox"/> Refrigerator: _____ <input type="checkbox"/> Freezer _____ <input type="checkbox"/> Incubator _____ <input type="checkbox"/> Storage area: _____						
	<input type="checkbox"/> Buffer area _____ <input type="checkbox"/> Ante-area: _____ <input type="checkbox"/> Refrigerator: _____ <input type="checkbox"/> Freezer _____ <input type="checkbox"/> Incubator _____ <input type="checkbox"/> Storage area: _____						

***NOTE:** The Pharmacy Manager or design must document the corrective action in detail therefore attach additional information if necessary.

 Pharmacy Manager Signature after document review

 Date

Sample Pharmacy

Section Name: Quality Management	Policy Name: Viable Air Sampling
Policy and Version #: 200.7	Last Revision/Review: 02/14/2014

1.0 Definition and Purpose

To outline the procedures utilized to monitor and quantify viable contaminants in the direct compounding area (DCA) inside ISO Class 5 air as well as other ISO classified room environments where compounding related activities occur. Viable air sampling is a facility metric of the Environmental Sampling Plan (ESP). The objective of viable air sampling (VAS) is to obtain representative estimates of viable bioburden in compounding areas. Data are evaluated by pharmacy leadership and while it is important to review all environmental data as sampling occurs, it is essential that data are trended and reviewed over extended periods of time to identify trends that may indicate adverse shifts in the compounding environment which may compromise the state of control.

2.0 Policy

- 2.1 Viable air sampling must be performed at least semi-annually in conjunction with the recertification of primary and secondary engineering controls however it is recommended that pharmacies performing low/medium risk level compounding perform viable air sampling monthly and those performing high risk level compounding perform viable air sampling weekly.
- 2.2 Viable air sampling occurs under dynamic operating conditions, that is, while compounding and compounding related activity is occurring. This has also been called active air sampling.
- 2.3 Volumetric air sampling is performed using a device that draws a predetermined volume of air onto an agar plate. Gravimetric sampling is not acceptable as the only method of viable air sampling.
- 2.4 It is preferred that the device used to perform the volumetric air sampling device use impaction methodology.
- 2.5 Volumetric Sampling must occur at the following locations:
 - 2.5.1 One viable air sample at each discrete primary engineering control (LAFW, BSC, CAI, CACI) or at each workspace (if contiguous compounding bench) in zones of air backwash turbulence within the PEC,
 - 2.5.2 Chapter <797> requires one viable air sample in each PEC however it is a best practice recommendation that in PECs that are 8 linear feet or longer, perform one (1) viable air sample for each 4 feet of ISO Class 5 linear compounding surface.
 - 2.5.2.1 This recommendation would accommodate vertical flow clean benches that are integrated into a cleanroom. In those cases, there is more vertical space.
 - 2.5.2.2 It recommended that a viable air sample is taken in every direct compounding area therefore if, for example, an 8 foot LAFW is accommodates 2 workspaces (not ideal but may be done if there is a physical separation between the work spaces), then 2 viable air samples should be taken in that hood, one for each DCA.
 - 2.5.3 Sampling of room air in the ISO Class 7 buffer area/cleanroom where air turbulence might be expected such as the area near doors or pass throughs as well as work areas near ISO Class 5 areas.

- 2.5.4 Sampling of room air in the ISO Class 7/8 anteroom where staging and gowning occur and where contamination is more likely such as areas of turbulence or “dead” zone areas where there may be less air exchange.
- 2.6 Air samples must sample volumes of air at least equal to 400 - 1000 liters for each sample based on Chapter <797> requirements however consider the following:
 - 2.6.1 Since ISO Class 5 air conditions are much cleaner with respect to particulates than Classes 7 or 8, it is expected that the contaminants per liter of air are less prevalent than in the air of a Class 7/8 area. With this in mind, it is strongly recommended that the air volume sampled within an ISO Class 5 area is 1000 liters per sample in order to improve the level of detection of particles whereas sample sizes of 400 liters are acceptable in ISO Class 7/8 areas (however it is still recommended that sample sizes of 100 liters are taken regardless of air cleanliness).
 - 2.6.2 Air Sampler Manufacturer’s information should be reviewed regarding the following:
 - 2.6.2.1 The extent to which the air sampling unit substantially affects (or not) air flow within the ISO Class 5 primary engineering controls.
 - 2.6.2.2 The sampling capacity (the number of liters per minute drawn through the sampler and across the media sample) of the unit. The higher the sampling capacity, the shorter the time it will take to sample the predetermined volume needed at each location.
 - 2.6.2.3 Some samplers sample at a high rate such as 180 liters/minute so a 1000 liter sample is obtained in 5.5 minutes whereas other samplers may take much longer.
 - 2.6.2.4 Some air samplers come with dual heads so that one sampling time of 5.5 minutes can sample using a separate bacterial and fungal specific media simultaneously (180 liters/minute).
 - 2.6.2.5 Faster sample speeds are important to prevent:
 - 2.6.2.5.1 Drying of media which can occur as air is drawn across the plate and exposure to air for longer periods of time dries the media and potentially reduces its ability to sustain growth thereby potentially causing false negative findings.
 - 2.6.2.5.2 Prolonged disruption of air flow within the ISO Class 5 direct compounding area.
- 2.7 USP Chapter <797> requires that two types of growth media must be used for each sample location for pharmacies performing high risk level compounding however it is best practice recommendation that two different types of media regardless of compounding risk level as follows:
 - 2.7.1 A general microbiological growth medium such as Soybean-Casein Digest medium and
 - 2.7.2 Malt Extract Agar (MEA) or Sabouraud Dextrose Agar (SDA) are media that supports the growth of fungi.

2.8 USP Chapter <797> requires the use of Action Levels only however it is a best practice recommendation to include the use of both Alert and Action Levels which are as follows for viable air sampling:

Type of Air	Alert Level <i>(not required)</i> Sample = 1000 liters/plate	Action Level* Sample = 1000 liters/plate
ISO Class 5 Air	any growth is problematic	>1 CFU
ISO Class 7 Air	>5 CFUs	> 10
ISO Class 8 Air	>50 CFUs	> 100

* CFUs per cubic meter of air per plate (cubic meter = 1000 liters) are taken from Table 2 in Chapter <797> so if < 1000 liters of air sampled per plate must convert to 1000 liter equivalent (e.g., If 400 liters sampled in ISO Class 7, Action Level = >4 CFU/plate).

2.9 Alert Levels (used at discretion of Sample Pharmacy and not required by USP Chapter <797>). This is a best practice recommendation.

2.9.1 In general, if Alert Levels are used, they are generally set at a level approximately 50% of the action level.

2.9.2 Alert levels ensure that a potentially finding or trend is verified after repeat cleaning and sampling prior to the initiation of the more robust and costly activities associated with Action Level triggers.

2.10 Alert and/or Action levels may be re-evaluated after sufficient microbial environmental data has established a baseline for a given ISO classed area at a pharmacy. Limits may not be higher than those set above, but may be lowered (more stringent).

2.11 Personnel conducting air sampling will follow Hand Hygiene and Garbing (P-404) and Conduct of Personnel in Controlled Areas and Aseptic Technique Overview (P-412). All personnel (internal or contracted vendors) will be trained and knowledgeable in the use of the specific air sampling device being used as well as in all aspects of this procedure.

2.11.1 The vendor should provide documentation to the pharmacy demonstrating education, training and competency of personnel performing this activity.

2.12 In the event that VAS samples are collected by a cleanroom certification technician and samples sent out to an independent microbiologic laboratory for evaluation, the technician may take temperature and relative humidity readings at each sample location. If this is the case:

2.12.1 Ascertain that the technician cleanses the temperature/humidity monitor with sterile IPA prior to bringing it into the clean room and prior to putting it into each primary engineering control to take readings.

2.12.2 Inspect the temperature/relative humidity device does not have a “rope” or is made from other non cleanable materials. All materials must be impervious and cleanable.

2.12.3 If the pharmacy is taking their own VAS samples or if a clean room certification technician obtains the samples, but the samples are incubated in an onsite incubator, then temperature and humidity readings are not required at each sample site since compounding pharmacies are already recording temperatures and humidity in their clean rooms.

- 2.13 Two types of controls may be performed at each occurrence of VAS however USP Chapter <797> does not require either of these controls.
- 2.13.1 Negative Control Plate/s:
- 2.13.1.1 One unopened plate from the same manufacturer and lot # (for each media type) is labeled as “negative control” and dated and incubated along with samples to verify that the plates used were free from contamination upon receipt from the vendor.
- 2.13.1.2 No action is taken on the control plate other than to secure the top in place and label it.
- 2.13.2 Positive Control Plate/s:
- 2.13.2.1 All media used for VAS must have an accompanying “Certificate of Analysis” or “Certificate of Quality” which demonstrates that this lot of media was exposed to known amounts and types of stock organisms and demonstrated the ability to support the growth of all of them.
- 2.13.2.1.1 All plates received from a vendor can be pre-incubated for 24-48 hours prior to use to ensure no microbial contamination of the plates.
- 2.13.2.2 Further investigation and positive control plates are strongly encouraged should sampling during any one occasion return “no growth” results at all locations.
- 2.13.2.3 When multiple volumetric air samples taken from ISO Class 5, 7 and 8 locations universally produce no growth, it should be strongly suspected that the media used might not have been capable of supporting growth.
- 2.13.2.4 At that time, contact your local microbiology vendor to set up positive control testing of the same media type and lot.
- 2.14 Sampling order is from the cleanest to the dirtiest areas therefore sampling will begin in the ISO Class 5 areas. All ISO 5 areas are sampled before beginning sampling of ISO Class 7 areas followed by ISO Class 8 areas.

3.0 General Information

- 3.1 Depending on the air sampling device used, each sample may take a significant period of time to obtain so the following information bears consideration:
- 3.1.1 The sampling speed of the air sampling device to be used must be identified and documented on the *Viable Air Sampling Log; F-200.a*.
- 3.1.2 Calculate the exposure time of each sample based on the volume of air being sampled at each location.
- 3.1.3 Example: If the air sampling device samples at 180 liters per minute then it would 5.5 minutes to obtain a 1000 liter sample.
- 3.1.4 The *Viable Air Sampling Log (F-200.a)* can be customized to reflect the type of air sampling device used.
- 3.1.5 Instead of purchasing the air sampling device, pharmacies can investigate whether the company that performs semi-annual certification is willing to provide the equipment during the certification. If so, consider the following:
- 3.1.5.1 Ascertain that the device is an impaction device
- 3.1.5.2 Ascertain the sampling capacity (speed in liters per minute)
- 3.1.5.3 Ascertain the type of media required so they may be obtained by the pharmacy

3.1.5.4 If the media is provided by the certifying vendor, ascertain that they are kept under proper storage conditions at all times. The vendor should provide proof of annual service according to NIST standards if required by the manufacturer.

3.1.5.5 Ascertain device calibration requirements and verify that the device is calibrated immediately prior to use.

3.1.5.6 Ensure that any personnel conducting this sampling with a sampler are properly trained and competent to perform this task.

4.0 Reference Documents:

- 4.1 *Viable Air Sampling Log; F-200.a*
- 4.2 Hand Hygiene and Garbing; P-404 and related forms
- 4.3 Cleaning and Disinfecting of the Compounding Area; P-304 and related forms
- 4.4 Conduct of Personnel in Controlled Areas and Aseptic Technique Overview; P-412
- 4.5 Quality Management and Environmental Monitoring; P-204
- 4.6 *Environmental Viable Sampling Plan Diagram; F-204.a*
- 4.7 *Facility and Personnel Environmental Sampling Action Report; F-204.b*

5.0 Equipment and Materials

- 5.1 Volumetric air sampling device that uses impaction method and that has been calibrated following manufacturer's instructions
- 5.2 Calibrated incubators (30-35°C for TSA and 26-30°C for MEA/SDA) that have been certified annually to meet NIST standards
- 5.3 Calibrated monitoring device/thermometer that has been certified to meet NIST standards
- 5.4 # of plates of each media type (appropriate to the air sampling device above) is equal to the number of samples to be taken plus 1 (1 for the Control for each of the two media types)
- 5.5 *Environmental Viable Sampling Plan Diagram; F-204.a*
- 5.6 *Viable Air Sampling Log; F-200.a*
- 5.7 Lint-free wipes
- 5.8 Sterile 70% IPA
- 5.9 Tape
- 5.10 Permanent "Sharpie" marker
- 5.11 Sterile gloves
- 5.12 Timing device to ensure each location is sampled for the correct duration. (Suggest a kitchen timer in a plastic bag) so that the bell will alert the sampler when time is elapsed if sampler used does not have its own timer.
- 5.13 Clean bin to bring supplies into cleanroom

6.0 Procedures

- 6.1 Preparation for Sample Collection
 - 6.1.1 Clear counter to be used and clean with IPA.
 - 6.1.2 Gather supplies listed in Section 5 and place on cleaned counter. Note: Refrigerated plates should be removed from the refrigerator approximately 1 hour before sampling is planned to allow them to come to room temperature.

- 6.1.3 Remove outer packaging of plates and lay out the number of each type of plate needed. Note: if outer packaging is not intact do not use.
 - 6.1.4 Replace unused media back into its storage location in a properly sealed bag
 - 6.1.5 Inspect each plate carefully.
 - 6.1.5.1 Do not use if any growth is present. Note: if growth is present, manufacturer should be notified.
 - 6.1.5.2 Check expiration date. If expired, do not use. Obtain additional unexpired plates. The plates must not expire during the incubation period.
 - 6.1.6 Complete the top portion of the *Viable Air Sampling Log (F-200.a)* noting the following:
 - 6.1.6.1 Test date and type
 - 6.1.6.2 Media types and who supplied by (pharmacy or certification vendor)
 - 6.1.6.3 Type air sampling device used and device sampling capacity
 - 6.1.6.4 Time in minutes for desired sample size/s
 - 6.1.6.5 Calibration of air sampling device
 - 6.1.6.6 Name of person pulling, labeling and performing sample collection
 - 6.1.6.7 Media types, manufacturer, lot #/s and expiration date/s
 - 6.1.7 Label the negative control plate/s as “negative control” along with the date, time and sampler’s initials. Tape the “control” plate/s closed in at least 2 places and leave on the counter.
 - 6.1.8 Label the back of each plate (and the side of each tube if using swab method) with the following:
 - 6.1.8.1 Sample site (per locations noted on the *Viable Air Sampling Log (F-200.a)*)
 - 6.1.8.2 Date
 - 6.1.8.3 Time
 - 6.1.8.4 Sampler’s initials
 - 6.1.9 Place labeled plates into a clean bin for transport to the ISO Classified area.
 - 6.1.10 Calibrate the air sampling device according to manufacturer’s instructions if required.
 - 6.1.11 Clean all surfaces of the air sampling device with sterile IPA and allow to dry.
 - 6.1.12 Place all supplies in clean bin for transport to controlled areas.
- 6.2 Sample collection
- 6.2.1 While compounding related activities are occurring and in conjunction with certification activities, bring the bin with supplies into the ante-area.
 - 6.2.2 Perform hand hygiene and garbing according to P-404.
 - 6.2.3 Upon entering the buffer area/cleanroom, place the bin with materials on a stainless steel cart that has been cleaned with sterile 70% IPA or another suitable disinfectant.
 - 6.2.4 Begin sampling with the PECs. Note: Be careful to select the labeled plate that corresponds to each location being sampled.

- 6.2.5 Immediately before entering the ISO Class 5 area to start sampling, cleanse air sampling device, required plates and gloved hands with sterile 70% IPA and allow IPA to dry.
- 6.2.6 Clean the impactor head with sterile IPA between samples and allow to dry.
- 6.2.7 Remove the cover from the plate (begin with the Competency Plates) and lay the cover on the stainless steel deck of the PEC being careful not to touch the inside of the cover.
- 6.2.8 Load the next plate according to the manufacturer's instructions and turn on the air sampling device and sample for the period of time required according to the Environmental Sampling Plan and type of Air Sampling device.
- 6.2.9 Be vigilant to coordinate with the personnel compounding in the area so that possible inadvertent touch contamination is avoided.
- 6.2.10 Turn on the timing device used to track sample time, if the air sampling device does not have a timer.
- 6.2.11 When sampling is completed, turn off the air sampling device and remove it from the sampling location being careful to resanitize gloved hands with sterile 70% IPA prior to entering the ISO Class 5 area.
- 6.2.12 Carefully remove the exposed plate from the sampling device and replace the cover being careful not to touch the inside surface of the sampling plate or the cover.
- 6.2.13 Place the plate on the stainless steel cart outside of the clean bin. Hint: Keep the plates not yet used for sampling in the bin. As samples are taken, replace the covers and lay them cover side up on the stainless steel cart where they can all be secured with tape after all the samples for a particular room has been obtained.
- 6.2.14 Collect the remainder of the samples in this order: PECs, ISO Class 7 buffer area/cleanroom air followed by ISO Class 7/8 ante-area/room air.
- 6.2.15 Clean the air sampling device between samples per the manufacturer's instructions.
- 6.2.16 Carefully place the collected samples into the bin once all of the samples have been taken. You can tape them in the anteroom or you can carefully place the plates in the bin and take them outside to secure them.
- 6.3 Incubation
 - 6.3.1 Return to a work counter that has been cleaned with IPA.
 - 6.3.2 If not already secured, carefully remove the plates from the bin and secure the top of each plate with tape in at least 2 locations.
 - 6.3.3 Place the plates into an incubator as follows:
 - 6.3.3.1 TSApl plates are incubated inverted (upside down) @ 30-35°C for 48 -72 hours.
 - 6.3.3.2 MEA plates are incubated right side up @ 26-30°C for 5 to 7 days.
 - 6.3.4 Record the time that the plates are placed in the incubator on the *Viable Air Sampling Log (F-200.a)*.
 - 6.3.5 Place the partially completed *Viable Air Sampling Log (F-200.a)* in the tickler system used to track incubating samples.
- 6.4 Reading and Documenting Results
 - 6.4.1 When incubation is complete, remove the plates from the incubator and obtain the *Viable Air Sampling Log (F-200.a)* that corresponds to this batch of plates.

- 6.4.2 Without removing the tape, read the results by counting the number of discrete colony forming units (CFUs) that appear on each plate.
- 6.4.3 Read the "control" plate first. There should be no growth on the plate. If there is growth present, then the entire surface sampling of that lot is invalid and must be repeated. Note: Notify the manufacturer and report contamination to an unexposed plate providing lot number. Return unused plates with that lot # and use a different lot for subsequent testing.
- 6.4.4 Carefully document the number of CFUs that appear on each plate in the corresponding box for that location on the *Viable Air Sampling Log*.
- 6.4.5 Record a "0" in the column corresponding to the # CFU if there is no growth on the plate.
 - 6.4.5.1 These plates will be disposed.
 - 6.4.5.2 Plates with no growth can be disposed, still sealed in the regular trash.
- 6.4.6 Place a check mark in the column for "pass" or "fail" based on the observed # of CFUs that correspond to the Action / Action Level for each location, any comments applicable to each location and initials of the employee reading the sample of each location.
- 6.4.7 Note N/A in any used sections of the form.
- 6.4.8 Retain all plates with any growth (regardless of whether or not they are below the action or alert levels)
- 6.4.9 File the form for review by the Pharmacy Manager.
- 6.5 Laboratory examination of plates that demonstrate Growth (whether below or above the Alert Level)
 - 6.5.1 USP Chapter <797> requires that any plate that demonstrates growth even if that growth is below the Action (or Alert) levels, be sent to a properly credentialed and licensed laboratory for speciation at least to the genus level.
 - 6.5.2 The rationale for this requirement is that there are some microorganisms that cannot be tolerated in the cleanroom (at any level) such as gram-negative microorganisms which are typically pathogenic.
 - 6.5.3 Speciation also can provide critical information about point source of the captured bioburden (e.g., personnel, water).
 - 6.5.4 If VAS is performed by your cleanroom certification professional, it is essential that Sample Pharmacy verify that they:
 - 6.5.4.1 understand this requirement
 - 6.5.4.2 are sending it to a properly credentialed and licensed lab
 - 6.5.4.3 that you will be notified of the results in a timely fashion (e.g. not acceptable to wait until the final certification report is sent)
- 6.6 Actions to take if results exceed Alert or Action Levels
 - 6.6.1 Report any out of limit results to the Pharmacy Manager or designee immediately.
 - 6.6.2 If the results exceed the designated Alert Level (but do not exceed the Action Level), retest the area/s affected at the end of that particular work day or shift.
 - 6.6.3 If subsequent results exceed the designated Alert Level for a second time or exceed the designated Action Level at any time, perform cleaning and disinfection activities per P-304; Cleaning and Disinfecting of the Compounding Area and retest the area/s affected.

- 6.6.4 If the retested area/s exceeds the:
 - 6.6.4.1 Alert Level again but is below the designated Action Level, perform a three-time cleaning and disinfection procedure and retest.
 - 6.6.4.2 Action Level perform the following:
 - 6.6.4.2.1 Retain the affected plate/s.
 - 6.6.4.2.2 Send the affected plate/s (those that exceeded the action level as well as those with any growth) to an appropriately credentialed and licensed laboratory to identify, at least to the genus level, the microorganisms recovered.
 - 6.6.4.2.3 The results of the microbiological examination must be reviewed as it will provide clues as to how the organisms are being introduced, thereby assisting in remediation.
 - 6.6.4.2.4 Any viable air sampling result that either exceeds established Action Levels or exceeds established Alert Levels 2 times in a row, also triggers an immediate re-evaluation of the adequacy of:
 - 6.6.4.2.4.1 personnel work practices including employee hand washing/garbing and aseptic technique procedures;
 - 6.6.4.2.4.2 cleaning procedures,
 - 6.6.4.2.4.3 other operational procedures such as material handling,
 - 6.6.4.2.4.4 air filtration efficiency within the aseptic compounding location, and
 - 6.6.4.2.4.5 other physical plant or work practice controls as determined to be applicable by pharmacy leadership.
 - 6.6.4.2.5 This investigation is documented on the *Facility and Personnel Environmental Sampling Action Report (F-204.b)* and the source of the contamination is sought.
 - 6.6.4.2.6 The affected area will receive a three time cleaning per P-304 and the viable air sampling repeated.
 - 6.6.4.2.7 Should an area continue to fail, it is the responsibility of the Pharmacy Manager to seek guidance appropriate sources to assist in determining additional corrective actions which may include but are not limited to prohibition of compounding activities in the affected area; further sampling, or evaluation and recertification by a qualified vendor/manufacturer to determine root cause of the contamination.
 - 6.7 Each sampling is documented on a new *Viable Air Sampling Log (F-200.a)*.
 - 6.8 Any actions taken are documented on the *Facility and Personnel Environmental Sampling Action Report (F-204.b)*.
 - 6.9 Surface sample data should be reviewed on a routine basis and analyzed for trends or adverse shifts in environmental bioburden if necessary.
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Policy and Procedure Major Change Summary

Date	Section	Description of Change
March 2010	2.6	The volume of air sampled in the ISO Class 5, 7, and 8 areas was changed.
	2.7	Growth media changed to two types (general and other media capable of supporting fungi growth) required regardless of compounding risk level.
	2.8	An Alert Level was added to the Action Level.
	6.3	Incubation period for MEA or suitable fungal media changed from 72 hours to 5-7 days
	6.5	Description of actions to be taken when Alert/Action Levels are triggered. Version changed to 4.
	F-200.a	Form changed to reflect policy.
	F-204.b	Form changed to reflect policy.
March 2012	Policy	Switched policy to template with updated headers/footers and changed minor grammar. Version changed to 5
February 2013	Policy	Reviewed entire policy and forms. No changes made except header dates changed. No change in version.
June 2013	Policy	Header dates and policy version changed. Section 2.6 and 2.8 revised to reflect that suggested sample size is always 1000 liters (corresponds to cubic meter in table 2 of USP Chapter 797) and added requirement to use conversion factor if <1000 liters are used to sample any area based on equivalents in Table 2 of the Chapter.
	F-200.a	Form changed to reflect policy
February 2014	Policy	Made little changes throughout policy to clarify points. Specific or significant changes noted below.
	2.5.2	Entire section rewritten to bring additional detail and clarity to explicitly document requirements versus best practice recommendations.
	2.5.3	Added additional information
	2.5.4	Added additional information
	2.6	Added info and deleted other
	2.7	Added Sabouraud Dextrose Agar as another acceptable fungal-specific media
	2.9	Added more information about rationale of the use of Alert Levels which are discretionary (not required by the Chapter) and making clear they are not required.
	2.13	Deleted the requirement for a "competency" plate and expanded the explanation of positive and negative control plates.
	2.14	Added information about sampling order.

Section Name: Quality Management
Policy/Version #: 200.7

Policy Name: Viable Air Sampling
Last Revision/Review: 02/14/2014

Date	Section	Description of Change
February 2014 (continued)	6.1.7	Changed to label as "negative control" plate.
	6.2	Additions made for clarity
	6.5	Added this section which per USP <797> requires that any viable air sampling plate that demonstrates growth even if less than the Action Level must be sent to lab for speciation to the genus level.
	F-200.a	Form changed to remove competency plate readings, added SDA and added instruction to send any plate with any growth to lab for speciation to the genus level.

Sample Pharmacy

Section Name: Quality Management

Policy Name: Surface Sampling

Policy and Version #: 202.6

Last Revision/Review: 02/14/2014

1.0 Definition and Purpose

To outline the procedures utilized to monitor and quantify viable contaminants on ISO Class 5 work surfaces and other classified surfaces where compounding related activities occur. Surface sampling is integral to monitor and detect any microbial drift from the desired state of control in the sterile compounding environment. Surface sampling is primarily a personnel metric of the Environmental Sampling Plan (ESP). Data from surface sampling are used along with other environmental sampling results to detect adverse shifts in microbiological conditions in a timely manner, allowing for effective corrective action. Surface sampling data are useful for evaluating personnel work practices related to surface cleaning and disinfecting as well as disinfection of components, material handling; vial surface cleaning, and glove resanitization.

2.0 Policy

- 2.1 According to USP <797> surface sampling must be performed in all ISO classified areas on a **“periodic”** basis. Best practice recommendations for the frequency and timing of surface sampling are based on the following:
 - 2.1.1 Compounding risk level (more frequently at high risk level operations)
 - 2.1.2 Environmental sampling results history (more frequently at compounding facilities with no environmental sampling history)
 - 2.1.3 Tenure of compounding staff (more frequently when many compounding staff are new, inexperienced or when staff have not established a sampled history associated with environmental sampling; gloved fingertip sampling or media-fill testing).
 - 2.1.4 Other factors which may impact work practices (i.e., more frequently during periods of short staffing; more frequently if custodial staff are assuming cleaning activities).
- 2.2 It is a best practice recommendation that surface sampling be performed monthly for pharmacies performing low/medium risk level compounding and weekly for those performing high risk level compounding.
- 2.3 Since surface sampling is considered a personnel-related environmental sampling metric, another best practice recommendation is to associate specific with each sample so that results may be tracked back to a person/s that may require retraining.
- 2.4 Consideration may be given to performing surface sampling randomly (i.e., sampling occurring monthly should not take place at the same time of the month and optimally, employees sampled without warning).
 - 2.4.1 Consideration may also be given to noting the name of the compounding personnel working inside of a particular PEC at the time of the sample. By noting the employee’s name on the plate/swab, an opportunity for reteaching that individual is captured should surface sampling exceed designated Alert/Action Levels.
- 2.5 When surface sampling is performed, it must occur at the conclusion of the compounding day or shift to capture worst case scenario and performed according to the locations detailed in the ESP.
- 2.6 Samples are taken in order from the cleanest to the dirtiest and the following locations will be sampled:
 - 2.6.1 ISO Class 5 PECs (suggest 1 sample per 4 linear feet of PEC);

- 2.6.2 ISO Class 7 buffer area/cleanroom locations which are representative of the environment and at greatest risk such as work surfaces near ISO 5 areas, counters near doors, walls, and pass through surfaces; and
- 2.6.3 ISO Class 7/8 Anteroom/area surfaces
- 2.7 Note: If there is more than one distinct buffer room/cleanroom area, complete all sampling in one buffer room prior to beginning. Recommended surface sampling microbial contamination Alert and Action Levels are as follows:

Type of Air	Alert Level	Action Level
ISO Class 5 Air	>1 CFU per sample	>3 CFU per plate
ISO Class 7 Air	>2 CFUs per sample	> 5 CFUs per plate
ISO Class 8 Air	>50 CFUs per plate	> 100 CFUs per plate

- 2.8 USP Chapter 797 requires the use of Action Levels only. Use of Alert Levels is a best practice recommendation only.
- 2.9 Alert and Action Levels may be re-evaluated after significant microbial environmental data has established a baseline for a given ISO classed area at a pharmacy. Limits may not be higher than those set above, but may be lowered (more stringent)
- 2.10 Either the plate method or swab method of collection is acceptable; however plates are still used with the swab method and must be 24-30 cm² in size.
- 2.11 It is a best practice recommendation to use two types of growth media for each sample location regardless of compounding risk level as follows (Chapter 797 requires only the use of general growth medium):
 - 2.11.1 A general microbiological growth medium such as Soybean-Casein Digest medium and
 - 2.11.2 Malt Extract Agar (MEA), Sabouraud Dextrose Agar (SDA) or other media that supports the growth of fungi.
- 2.12 Two types of controls may be performed at each occurrence of surface sampling however USP Chapter <797> does not require either of these controls.
 - 2.12.1 Negative Control Plate/s:
 - 2.12.1.1 One unopened plate from the same manufacturer and lot # (for each media type) is labeled as “negative control” and dated and incubated along with samples to verify that the plates used were free from contamination upon receipt from the vendor.
 - 2.12.1.2 No action is taken on the control plate other than to secure the top in place and label it.
 - 2.12.2 Positive Control Plate/s:
 - 2.12.2.1 All media used for surface sampling must have an accompanying “Certificate of Analysis” or “Certificate of Quality” which demonstrates that this lot of media was exposed to known amounts and types of stock organisms and demonstrated the ability to support the growth of all of them.
 - 2.12.2.2 Plates received from a vendor can be pre-incubated for 24-48 hours prior to use to ensure no microbial contamination of the plates.

- 2.12.2.3 Further investigation and positive control plates are strongly encouraged should sampling during any one occasion return “no growth” results at all locations.
- 2.12.2.4 When multiple volumetric air samples taken from ISO Class 5, 7 and 8 locations universally produce no growth, it should be strongly suspected that the media used might not have been capable of supporting growth.
- 2.12.2.5 At that time, contact your local microbiology vendor to set up positive control testing of the same media type and lot.

3.0 Reference Documents:

- 3.1 *Surface Sampling Log; F-202.a*
- 3.2 *Quality Management and Environmental Monitoring; P-204*
- 3.3 *Sample Environmental Viable Sampling Plan Diagram; F-204.a*
- 3.4 *Facility and Personnel Environmental Sampling Action Report; F-204.b*
- 3.5 Hand Hygiene and Garbing; P-404 and related forms
- 3.6 Cleaning and Disinfecting of the Compounding Area; P-304 and related forms

4.0 Equipment and Materials:

- 4.1 Calibrated incubators (30-35°C if TSApl and 26-30°C for MEA) that have been certified to meet NIST standards
- 4.2 Monitoring device/Thermometer that has been certified to meet NIST standards
- 4.3 Lint-free wipes
- 4.4 Sterile 70% IPA
- 4.5 *Environmental Viable Sampling Plan Diagram; F-204.a*
- 4.6 *Surface Sampling Log; F-202.a*
- 4.7 # of plates (TSA and MEA/SDA) is equal to the number of samples to be taken plus 1 (1 control plate for each media type)
- 4.8 # of swabs (if swab method used) equal to the number of plates
- 4.9 # of tubes of Tween water (if swab method) equal to the number of plates
Note: Plates will be required regardless of the method used. If using the swab method, plates, swabs and Tween water are required.
- 4.10 Template: 24-30 cm² in size (if swab method used)
- 4.11 Sterile gloves
- 4.12 Clean bin to bring supplies into controlled area

5.0 Procedure

- 5.1 Preparation for Sample Collection
 - 5.1.1 Clear counter to be used and clean with IPA.
 - 5.1.2 Gather supplies listed in Section 4 and place on cleaned counter. Note: Refrigerated plates should be removed from the refrigerator approximately 1 hour before sampling is planned to allow them to come to room temperature.
 - 5.1.3 Remove outer packaging of plates and lay out the number of each type of plate needed. Note: if outer packaging is not intact do not use.

- 5.1.4 Replace unused media back into the properly sealed bag and designated storage area.
 - 5.1.5 Inspect each plate carefully.
 - 5.1.5.1 Do not use if any growth is present. Note: if growth is present, manufacturer should be notified.
 - 5.1.5.2 Check expiration date. If expired, do not use. Obtain additional unexpired plates.
 - 5.1.5.3 Plates must be used that do not expire before the required incubation period is completed.
 - 5.1.6 Complete the top portion of the *Surface Air Sampling Log (F-202.a)* noting the following:
 - 5.1.6.1 Test date and type
 - 5.1.6.2 Name of person pulling, labeling and performing sample collection
 - 5.1.6.3 Media types, manufacturer, lot #/s and expiration date/s
 - 5.1.7 Label each control plate (1 of each type of media) as “negative control” along with the date, time and sampler’s initials. Tape the “control” plate closed in at least 2 places and leave on the counter.
 - 5.1.8 Label the back of each plate (and the side of each tube if using swab method) with the following:
 - 5.1.8.1 Sample site (per locations noted on the *Surface Air Sampling Log (F-202.a)*)
 - 5.1.8.2 Date
 - 5.1.8.3 Time
 - 5.1.8.4 Sampler’s initials
 - 5.1.8.5 Note: When sampling a specific ISO Class 5 PEC, consideration may be given to noting the name of the compounding employee who last worked in that PEC (refer to policy 2.4).
 - 5.1.9 Place labeled plates into a clean bin for transport to the ISO Classified area.
- 5.2 Sample Collection
- 5.2.1 At the conclusion of the compounding day/shift, bring the bin with supplies into the ante-area.
 - 5.2.2 Perform hand hygiene and garbing according to Hand Hygiene and Garbing, P-404.
 - 5.2.3 Upon entering the buffer area/cleanroom, place the bin with materials on a stainless steel cart that has been cleaned with sterile 70% IPA.
 - 5.2.4 Begin sampling with the PECs. Note: Be careful to select the labeled plate that corresponds to each location being sampled.
 - 5.2.5 Immediately before starting sampling, spray gloved hands with sterile 70% IPA, rub gloved hands and allow IPA to dry.
 - 5.2.6 When sampling using a contact plate:
 - 5.2.6.1 Remove the cover and hold it being careful not to touch the inside of the cover.

- 5.2.6.2 Gently roll the exposed contact plate over the surface of the selected sampling area so that the entire plate makes contact with the stainless steel ISO Class 5 compounding surface.
- 5.2.6.3 Be careful not to slide the plate along the surface.
- 5.2.6.4 Replace the cover being careful not to touch the surface of the contact plate or the cover.
- 5.2.6.5 Place the plate on the stainless steel cart outside of the clean bin. Hint: Keep the plates not yet used for sampling in the bin. As samples are taken, replace the covers and lay them cover side up on the stainless steel cart where they can all be secured with tape after all the samples for a particular room has been obtained.
- 5.2.7 If using the swab method:
 - 5.2.7.1 Clean the template with sterile IPA and allow to dry.
 - 5.2.7.2 Select the labeled swab that corresponds to the first ISO Class 5 area being sampled.
 - 5.2.7.3 Place the template on the area to be sampled. Do not slide the template.
 - 5.2.7.4 Moisten the swab labeled for the area with Tween water.
 - 5.2.7.5 Run the swab back and forth over the entire surface revealed by the template.
 - 5.2.7.6 Place the swab back into the Tween water and place the sealed swab onto the cart surface.
- 5.2.8 Spray gloved hands with sterile 70% IPA, rub gloved hands and allow to dry before proceeding to the next sample location (if sample location is inside of an ISO Class 5 area).
- 5.2.9 Collect the remainder of the samples in this order: PECs, cart/shelving surfaces, walls, pass thru surfaces, and floors.
- 5.2.10 Carefully place the collected samples into the bin once all of the samples have been taken.
- 5.2.11 Remove from area working from the ISO 7 buffer area/room to the ISO 7/8 anteroom/area.
- 5.2.12 Note: Contact plates leave media residue on the sampled surface therefore it is important to clean and disinfect these areas. Even if daily cleaning is scheduled to occur immediately after sampling, do not assume that sampled areas will be cleaned. For instance, walls are only cleaned during monthly cleaning. The individual collecting the samples must cleanse sampled areas of the room with sterile 70% IPA being careful not to spray IPA inside of the hood. IPA must be applied to a lint free towel first.
- 5.3 Incubation
 - 5.3.1 Return to a work counter that has been cleaned with IPA.
 - 5.3.2 Carefully remove the plates from the bin and secure the top of each plate with tape in at least 2 locations.
 - 5.3.3 If using the swab method, follow these additional steps
 - 5.3.3.1 Each swab sample must be vortexed in its own Tween water.
 - 5.3.3.2 Place 1 mL of the solution from each sample onto the surface of the corresponding plate.

- 5.3.3.3 Spread the solution on the plate and allow to dry. Note: Exercise caution to make certain the solution from the sample corresponds to the plate labeled with the same location.
- 5.3.3.4 Secure all plates with tape in at least 2 locations.
- 5.3.4 Place the plates into an incubator as follows:
 - 5.3.4.1 TSApl plates are incubated inverted (upside down) @ 30-35°C for 48-72 hours.
 - 5.3.4.2 MEA/SDA plates are incubated right side up @ 26-30°C for 5-7 days.
- 5.3.5 Record the time that the plates are placed in the incubator on the *Surface Sampling Log (F-202.a)*.
- 5.3.6 Place the partially completed *Surface Sampling Log (F-202.a)* in the tickler system used to track incubating samples.
- 5.4 Reading and Documenting Results
 - 5.4.1 When incubation is complete for each respective media type, remove the plates from the incubator and obtain the *Surface Sampling Log (F-202.a)* that corresponds to this batch of plates.
 - 5.4.2 Without removing the tape, read the results by counting the number of discrete colony forming units (CFUs) that appear on each plate.
 - 5.4.3 Read the “negative control” plate first. There should be no growth on the plate. If there is growth present, then the entire surface sampling of that lot is invalid and must be repeated. Note: Notify the manufacturer and report contamination to an unexposed plate providing lot number. Return unused plates with that lot # and use a different lot for subsequent testing.
 - 5.4.4 Carefully document the number of CFUs that appear on each plate in the corresponding box for that location on the *Surface Sampling Log*.
 - 5.4.5 Record a “0” in the column corresponding to the # CFU if there is no growth on the plate.
 - 5.4.6 Place a check mark in the column for “pass” or “fail” based on the observed # of CFUs and the documented Alert/Action Level for each location, any comments applicable to each location (such as the name of a compounding employee noted on the sample) and initials of the employee reading the sample of each location.
 - 5.4.7 Note N/A in any used sections of the form.
 - 5.4.8 File the form for review by the Pharmacy Manager.
 - 5.4.9 Discard plates that are within established limits.
 - 5.4.9.1 Consideration must be given to proper disposal of what is now unwanted microbial growth in a manner that will not risk contamination of other areas of the compounding facility, pharmacy, organization or community.
 - 5.4.9.2 Potential ways to discard media with growth include:
 - 5.4.9.2.1 Opening media plates and pouring bleach on the media surface to kill growth.
 - 5.4.9.2.2 Discarding all plates in a bulk sharps disposal unit which will later be incinerated.
 - 5.4.9.2.3 Placing unopened and still secured plates devoid of growth into a plastic zip lock bag and discarding in regular trash.

- 5.5 Actions to take if results exceed Alert or Action Levels
 - 5.5.1 Report any out of limit results to the Pharmacy Manager or designee immediately.
 - 5.5.2 If the results exceed the designated Alert Level (but do not exceed the Action Level), retest the area/s affected.
 - 5.5.3 If subsequent results exceed the designated Alert Level for a second time or exceed the designated Action Level at any time, perform cleaning and disinfection activities per P-304; Cleaning and Disinfecting of the Compounding Area and retest the area/s affected.
 - 5.5.4 If the retested area/s exceeds the:
 - 5.5.4.1 Alert Level again but is below the designated Action Level, perform a three-time cleaning and disinfection procedure and retest.
 - 5.5.4.2 Action Level perform the following:
 - 5.5.4.2.1 Retain the affected plate/s.
 - 5.5.4.2.2 Send the affected plate/s to an appropriately credential laboratory to identify, at least to the genus level, the microorganisms recovered.
 - 5.5.4.2.3 The results of the microbiological examination must be reviewed as it will provide clues as to how the organisms are being introduced, thereby assisting in remediation.
 - 5.5.4.2.4 Any surface sampling result that either exceeds established Action Levels or exceeds established Alert Levels 2 times in a row, also triggers an immediate re-evaluation of the adequacy of:
 - 5.5.4.2.4.1 personnel work practices including employee hand washing/garbing and aseptic technique procedures;
 - 5.5.4.2.4.2 cleaning procedures,
 - 5.5.4.2.4.3 other operational procedures such as material handling,
 - 5.5.4.2.4.4 air filtration efficiency within the aseptic compounding location, and
 - 5.5.4.2.4.5 other physical plant or work practice controls as determined to be applicable by pharmacy leadership.
 - 5.5.4.2.5 This investigation is documented on the *Facility and Personnel Environmental Sampling Action Report (F-204.b)* and the source of the contamination is sought.
 - 5.5.4.2.6 The affected area will receive a three time cleaning per P-304 and the viable air sampling repeated.
 - 5.5.4.2.7 Should an area continue to fail, it is the responsibility of the Pharmacy Manager to seek guidance and use appropriate sources to assist in determining additional corrective actions which may include but are not limited to prohibition of compounding activities in the affected area; further sampling, or evaluation and recertification by a qualified vendor/manufacture to determine root cause of the contamination.

- 5.6 Each sampling is documented on a new *Surface Sampling Log (F-202.a)*.
- 5.7 Any actions taken are documented on the *Facility and Personnel Environmental Sampling Action Report (F-204.b)*.
- 5.8 Surface sample data should be reviewed on a routine basis and analyzed for trends or adverse shifts in environmental bioburden if necessary.

Policy and Procedure Major Change Summary

Date	Section	Description of Change
March 2010	2.7	An Alert Level was added to the Action Level.
	2.10	Growth media changed to two types (general and other media capable of supporting fungi growth) required regardless of compounding risk level.
	5.3	Incubation period for MEA or suitable fungal media changed from 72 hours to 5-7 days
	5.5	Description of actions to be taken when Alert/Action Levels are triggered.
	F-202.a	Form changed to reflect policy.
	F-204.b	Form changed to reflect policy.
March 2012	Policy	Transferred to new header and footer format.
February 2013	Policy	Reviewed entire document. No changes made. No version change. Updated header dates.
June 2013	Policy	Updated header and version number. Added 2.2 which discuss suggested frequency of surface sampling as monthly for low/medium and weekly for high risk. Also added 2.9 which makes clear that use of Action and Alert Levels is a best practice recommendation and that the chapter requires only Action Levels.
February 2014	2.2	Corrected typo and changed “monthly” to “weekly” as a best practice recommendation for the frequency of Surface Sampling in high risk level compounding operations.
	2.11	Added Sabouraud Dextrose Agar as another suitable fungal specific media
	2.12	Added this entire section about positive and negative controls

Sample Pharmacy

Section Name: Quality Management Policy and Version #: 204.5	Policy Name: Quality Management and Environmental Sampling Last Revision/Review: 02/14/2014
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1.0 Definition and Purpose

The Quality Management program for sterile compounding is designed to ensure that the compounding environment and personnel work practices reflect relevant regulatory requirements, current pharmacy practice standards as well as achieve and maintain a state of control in the sterile compounding environment. Compounding staff must receive education related to principles of compounding and trained on specific policies and procedures. Staff knowledge and performance must be verified through testing and competency evaluation. Another component of a comprehensive quality management program includes the creation of an Environmental Sampling Plan (ESP) in which the physical plant and personnel practices are routinely monitored to ensure consistent performance. Data obtained through environmental monitoring ensures objective evaluation and programmatic changes that will ensure and improve performance and quality.

2.0 Policy

- 2.1 Data from an ESP provides information to pharmacy staff and leadership about the effectiveness of engineering controls and personnel work practices in maintaining a compounding area with sufficiently low viable and non-viable particles.
- 2.2 The compounding area consists of:
 - 2.2.1 ISO Class 5 PECs
 - 2.2.2 ISO Class 7 buffer area/cleanroom
 - 2.2.3 ISO Class 7/8 ante-area/room
 - 2.2.4 Segregated compounding areas (if applicable in facility)
- 2.3 Environmental Sampling (ES) is conceptually divided into two distinct but inter-related components:
 - 2.3.1 Facility metrics which measure the function of the primary (LAFWs, BSCs, CAIs, and CACIs) and secondary engineering controls (physical plant ISO 7/8 construction including HVAC, HEPA filtration, etc).
 - 2.3.2 Personnel metrics which measure the effectiveness of cleaning and disinfection; other work practices as well as the staffs' ability to consistently perform in compliance with policy and procedure.
- 2.4 Facility Environmental Sampling Metrics include:
 - 2.4.1 During the semi-annual certification/recertification of ISO classified pharmacy environments:
 - 2.4.1.1 **Non-viable particle counts** obtained at least semi-annually during the course of the certification process of classified compounding environments.
 - 2.4.1.2 **Viable air sampling** obtained at least semi-annually during the course of the certification process of the classified compounding environments however it is a best practice recommendation that viable air sampling be performed monthly for pharmacies performing low/medium risk level compounding and weekly for pharmacies performing high risk level compounding.

Section Name: Quality Management Policy/Version #: P-204.5	Policy Name: Quality Management and Environmental Sampling Last Revision/Review: 02/14/2014
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- 2.4.2 Air Velocities or Pressure Differentials will be verified and documented at least daily.
- 2.4.3 Temperature and Humidity of the buffer area and controlled storage areas will be verified and documented at least daily.
- 2.5 Personnel Environmental Sampling Metrics Frequencies are summarized in the table below and include:
 - 2.5.1 **Gloved Fingertip Sampling (GFS)** which occurs
 - 2.5.1.1 Initially during the initial employee orientation (or at program start for tenured staff) as well as at least annually (semi-annually for high risk operations) at the same time that Hand Hygiene and Garbing Competency is completed and
 - 2.5.1.2 On an ongoing basis, in association with employee media-fill testing and aseptic technique verification which is required annually for pharmacies performing low and medium risk level compounding and semi-annually for pharmacies performing high risk level compounding. It is a best practice recommendation that employee media fill verification be performed monthly by compounding staff working in pharmacies performing low/medium risk level compounding and weekly for compounding staff working in pharmacies performing high risk level compounding. Regardless of the frequency of media fill-testing, gloved fingertip sampling will be performed with each instance of media-fill testing.
 - 2.5.2 **Surface Sampling (SS)** which is required by USP Chapter <797> to occur "periodically"
 - 2.5.2.1 Best practice recommendations include surface sampling at least monthly for low and medium risk operations and weekly for high risk operations.
 - 2.5.2.2 SS reflects effectiveness of cleaning and disinfection procedures as well as employees' actions regarding frequent resanitization of hands and ISO Class 5 critical areas.

Table 1:

Environmental Sampling Test	Required Frequency	Suggested Best Practice Frequency
Non Viable Particle Counts	<ul style="list-style-type: none"> • Initial facility commissioning • Every 6 months during recert of facility and engineering controls in compounding areas 	<ul style="list-style-type: none"> • As required
Volumetric Air Sampling	<ul style="list-style-type: none"> • Every 6 months 	<ul style="list-style-type: none"> • Weekly for high risk • Monthly for low/medium
GFS	<ul style="list-style-type: none"> • Initially during garbing x3 • During Media Fills every 6 months high risk • During Media Fill annually for low medium 	<ul style="list-style-type: none"> • Initially during garbing x3 • During media fills every week for high risk • During media fills monthly for low/medium risk
Surface Sampling	<ul style="list-style-type: none"> • "Periodic" 	<ul style="list-style-type: none"> • Weekly for high risk • Monthly for low/medium risk

- 2.6 Additionally the preparation of personnel media-fill test units and process verification media-testing (if applicable), serve as both personnel and environmental metrics.
- 2.7 The viable particle testing portion of the ESP is reflected by a written diagram which details locations where viable air sampling is to occur within the controlled environments, however it is suggested that the ESP diagram detail locations for viable surface sampling as well.
- 2.8 Action levels are established for all viable testing (viable air sampling, gloved fingertip sampling and surface sampling).
 - 2.8.1 Action levels (required by USP 797) are specific microbial levels measured in colony forming units (CFUs) which when exceeded; require specific action to ensure that the compounding environment and processes are maintaining a state of control.
 - 2.8.2 Initial Action Levels can be found in reference data (USP Chapters <797> and <1116> however these Action levels can be modified depending on historical trends discovered through the environmental sampling plan at the pharmacy.
 - 2.8.3 It is a best practice recommendation to also establish Alert Levels which ensure that a potentially troubling finding or trend is verified after repeat cleaning and sampling prior to the initiation of the more robust and costly activities association with Action Levels.
- 2.9 Pharmacy compounding staff must receive comprehensive education and training in the theoretical principles and practical skills of aseptic manipulations, in achieving and maintaining ISO Class 5 conditions and successfully complete requires tests, competencies, gloved fingertip sampling and media-fill qualification before they begin compounding CSPs for human use.
- 2.10 Pharmacy compounding staff must receive ongoing education and successfully complete selected competencies, gloved fingertip sampling and media-fill testing at least annually (semi-annually in high risk operations).

3.0 Reference Documents for the Components of Quality Management

- 3.1 *Environmental Viable Particle Sampling Plan Diagram; F-204.a*
- 3.2 *Facility and Personnel Environmental Sampling Action Report; F-204.b*
- 3.3 Non-viable Particle Testing; P-206
- 3.4 Viable Air Sampling; P-200 and related forms
- 3.5 Surface Sampling; P-202 and related forms
- 3.6 Airflow Considerations and Pressure Differential Monitoring; P-208 and related forms
- 3.7 Temperature and Humidity Monitoring of Compounding and Controlled Storage Areas; P-210 and related forms
- 3.8 Orientation, Training and Competency Evaluation of Compounding Personnel; P-410 and related forms
- 3.9 Personnel Aseptic Media Fill and Process Qualification; P-402 and related forms

4.0 Procedures

- 4.1 Refer to the policies listed above for specific background on each type of testing as well as information on how to perform, evaluate and document the specific type of environmental monitoring.
- 4.2 Viable air sampling (VAS) may be performed with equipment owned by the pharmacy or alternatively may be performed with equipment owned by the vendor performing routine primary and secondary engineering control certification.

Section Name: Quality Management Policy/Version #: P-204.5	Policy Name: Quality Management and Environmental Sampling Last Revision/Review: 02/14/2014
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- 4.3 In either case, the viable air sampling will be performed according to the procedure outlined in P-200 and the pharmacy will retain the VAS plates and perform the incubation and the reading of the test results.

5.0 Documentation

- 5.1 Non-viable particle testing results are documented by the vendor who performs the semi-annual testing and certification of the primary and secondary engineering controls.
- 5.2 Results of all other testing will be performed on the appropriate log forms specified in the policy and procedure for each type of testing.
- 5.3 Results of testing that falls out of limits, will be documented on the *Facility and Personnel Environmental Sampling Action Report; F-204.b*.
- 5.4 In some cases, as defined in specific policies, further action may be required based on the outcome of repeated environmental sampling or based upon microbiological analysis of the testing itself. Those actions will also be documented on the *Facility and Personnel Environmental Sampling Action Report; F- 204.b*.
- 5.5 The completed *Facility and Personnel Environmental Sampling Action Report; F-204.b* must be retained in either:
- 5.5.1 The compounding employee's personnel records (if the actions and follow up concern MFUs or GFS)
 - 5.5.2 Appropriate files kept in reverse chronological order to document facility environmental metrics.

Date	Section	Description of Change
May 2012	F-204.a	Fixed several typos on the Environmental Sampling Plan
March 2013	Policy	Reviewed policy and forms. Updated header dates. Minor grammar and spacing changes. No content changes. No version change.
June 2013	Policy	Added 2.4.1.2 viable air sampling best practice recommendations; added 2.5.2 surface sampling best practice recommendations; 2.8 changed to reflect use of required Action Levels and optional Alert Levels.
February 2013	2.5	No changes made but information is stated in a more detailed and explicit fashion to decrease confusion and added Table 1

Sample Pharmacy

Section Name: Quality Management	Policy Name: Non Viable Particle Testing
Policy and Version #: 206.4	Last Revision/Review: 02/14/2014

1.0 Definition and Purpose

A non-viable particle is a particle that has no detectable organisms associated with it. In other words these particles do not contain living organisms. Reducing the number of non-viable particles however is critical to reducing bioburden in ISO classified compounding areas since non-viable particles can act as a means of transport for microorganisms. Bacteria and other living organisms attach themselves to non-viable particles and can be carried by available air currents, therefore it is important to minimize their occurrence. Non-viable particle testing must be performed at least twice annually during routine certification as a means to verify the proper function of primary engineering controls.

2.0 Applicable Documents

- 2.1 Controlled Environment Testing Association. CETA Certification Guide for Sterile Compounding Facilities. CAG-003-2006-11. Revised January 31, 2012.
- 2.2 Documentation of semi-annual certification provided by vendor after testing.
- 2.3 Hand Hygiene and Garbing; P-404
- 2.4 Conduct of Personnel in Controlled Areas and Overview of Aseptic Technique; P-412

3.0 Policy

- 3.1 Non-viable particle testing is primarily considered a facility related metric component of a comprehensive environmental sampling plan.
- 3.2 Non-viable particle testing occurs in the following areas:
 - 3.2.1 Primary Engineering Controls (LAFWs, BSCs, CAIs and CACIs)
 - 3.2.2 ISO Class 7 buffer area/clean rooms
 - 3.2.3 ISO Class 7/8 ante-area/rooms
- 3.3 Poor work practices can adversely impact non-viable particle counts therefore employees must comply with Hand Hygiene and Garbing (P-404) and Conduct of Personnel in Controlled Areas and Overview of Aseptic Technique (P-412).
- 3.4 Procedures followed by vendors performing certification must comply with CETA guidelines and manufacturer's recommendations for the specific equipment being used and tested.
- 3.5 Specifically, particle testing must be performed during dynamic operating conditions, that is while compounding or compounding related activities are occurring in the area being sampled.
- 3.6 Non-viable particle testing is required each time and on such occasions that a primary or secondary engineering control certification/recertification is completed.
- 3.7 The Pharmacy Manager or designee must review in detail the findings of non-viable particle counts as part of the review of the certification findings.
- 3.8 Should the Pharmacy Manager or designee determine that non-viable particle counts in a particular area or PEC demonstrate an undesirable trend, it is the responsibility of the Pharmacy Manager to evaluate the need for additional follow up activities such as:
 - 3.8.1 Further investigation of, maintenance or repair of the primary engineering control or secondary engineering control (i.e., particular HEPA filter is damaged).
 - 3.8.2 Evaluation of cleaning and disinfection.

3.8.3 Evaluation of staff work practices.

3.8.4 Retesting.

4.0 Documentation

4.1 Documentation of non-viable particle counts is found in the certification report compiled at each certification/recertification by the vendor.

4.2 Documentation of any concerns and follow up actions regarding non-viable particle counts is required.

Policy and Procedure Major Change Summary

Date	Section	Description of Change
March 2012	Policy	Switched policy to template with updated headers/footers and changed minor grammar.
February 2013	Policy	Reviewed entire document. Revised 2.1 to update CETA certification guide citation.
February 2014	3.5	Though the previous statement about following the CETA application guide covers it, added the requirement for particle testing during dynamic operating conditions to highlight this information to pharmacies who must hold their certification professional responsible.

Sample Pharmacy

Section Name: Quality Management Policy and Version #: 208.4	Policy Name: Airflow Considerations and Pressure Differential Monitoring Last Revision/Review: 02/14/2014
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1.0 Definition and Purpose:

The purpose of this policy is to ensure that the controlled environments in the compounding complex are used in a manner that ensures minimum disruption of intended airflows and that pressure differentials monitored daily to determine that their performance is consistent with facility design requirements and ensures prompt actions in the event of malfunction.

2.0 Policy

- 2.1 Controlled compounding environments that are constructed with physical walls between the buffer/cleanrooms and the anteroom must maintain a *minimum* differential positive pressure of 0.02 inches water column (w.c.) between the buffer/cleanroom to the anteroom and the anteroom to the unclassified general pharmacy area.
- 2.2 Displacement airflow controlled compounding environments that are constructed without actual wall separation between the buffer/cleanrooms and the ante-area must maintain air velocity of 40 feet per minute from the buffer area across the line of demarcation in the ante-area and may only be used in low and medium risk level.
- 2.3 Controlled environments that are constructed to accommodate the storage and compounding of hazardous drugs (HDs) must be physically separated from an ISO Class 7 anteroom and maintain a negative pressure differential of not less than 0.01 inches w.c. to the adjacent anteroom space.
- 2.4 A pressure gauge (or velocity meter if segregation is achieved by displacement airflow) must be installed that measures the pressure differential (or airflow) between the:
 - 2.4.1 Cleanroom and the anteroom (ante-area for displaced airflow environments)
 - 2.4.2 Anteroom (ante-area) and the unclassified general pharmacy area.
- 2.5 Pressure differentials (or air velocities) will be verified and documented at least daily at the beginning of each work day.
- 2.6 The Pharmacy Manager will modify the Daily Pressure Differential Log (F-208.a) to incorporate actual pressure differentials/velocity values that reflect the desired/engineered function of the physical plan and will modify the log as needed subsequent to modifications made to the plan.
- 2.7 Placement of Primary Engineering Controls (PECs), room furniture and work practices of compounding staff can have an adverse effect on airflow.

3.0 Reference Documents

- 3.1 *Pressure Differential Log (F-208.a)*

4.0 Equipment and Materials:

- 4.1 Manometers (pressure differentials) or
- 4.2 Air Velocity Meters (air displacement environments)

5.0 Procedures

- 5.1 Furniture/Equipment placement
 - 5.1.1 PECs must be placed in the cleanroom in locations that are away from traffic flow (i.e., doorways and constant personal traffic) since these can create disruptions in the unidirectional air flow of these devices.

- 5.1.2 PECs and furniture must also be placed in locations that do not negatively affect the room HVAC system or its ability to deliver required air changes per hour (ACPH).
- 5.1.3 Whenever possible, furniture and PECs should not be placed directly in front of air returns which should be located low on the wall.
- 5.1.4 PECs should be placed at 4-6 inches in front of the wall to permit function of wall return (if alternative location can be found) and to facilitate cleaning of the wall and back of the PEC.
- 5.1.5 If wire shelving or furniture must be placed near a return, it should be positioned at least 6 inches away from the return.
- 5.2 Work practices that facilitate maintenance of desired airflow and pressure differentials
 - 5.2.1 Limit activities in the controlled environments to those which can only be accomplished in the clean and anterooms. Non essential activities may best be accomplished outside of the controlled environments.
 - 5.2.2 Doors to the anteroom and various compounding rooms are not propped open and are kept closed whenever possible.
 - 5.2.3 The inside and outside doors to any pass-throughs will not be opened at the same time.
 - 5.2.4 The door from the prep area to anteroom and the door from the anteroom to a compounding room/buffer room will not be opened at the same time.
 - 5.2.5 PECs will remain on at all times.
 - 5.2.6 Compounding staff will be alert and report any obvious changes in the controlled environments to the Pharmacy Manager immediately (i.e., doors not closing completely).
- 5.3 Documentation of Pressure Differentials/Airflows
 - 5.3.1 Air pressure differentials will be checked at least daily at the beginning of every work day.
 - 5.3.2 Before taking manometer readings, ensure that all doors are closed.
 - 5.3.3 Manometer or Air Velocity meter readings are documented on the *Daily Pressure Differential Log (F-208.a)*.
 - 5.3.4 Readings for an entire month are recorded on the *Daily Pressure Differential Log (F-208.a)*. At the end of each month the Pharmacy Manager or designee will review the completed log and sign where indicated.
 - 5.3.5 The Pharmacy Manager will follow up on occasions of failures to document or discrepancies (if any) after log review.
 - 5.3.6 The completed log for a particular month must be filed with other facility monitoring forms in a readily recoverable location within the pharmacy.
- 5.4 Trouble shooting
 - 5.4.1 Should the minimum pressure differential (or velocity requirement) not meet the established standard for the facility, the individual making and documenting the daily readings must notify the Pharmacy Manager immediately.
 - 5.4.2 Reduction in normal pressure differentials are multiple and can include factors such as external dampers being blown open due to wind and therefore require subsequent adjustment.

Section Name: Quality Management	Policy Name: Airflow Considerations and Pressure Differential Monitoring
Policy/Version #: 208.4	Last Revision/Review: 02/14/2014

- 5.4.3 The Pharmacy Manager will check the readings verifying that all doors are in closed and that the system is operating normally.
- 5.4.4 If the pressure differential/velocity readings continue to remain unacceptable, the pharmacy manager will contact their contracted cleanroom vendor or HVAC vendor.
 - 5.4.4.1 The cleanroom vendor may be able to assist to troubleshoot the system.
 - 5.4.4.2 The local HVAC contractor however is likely to be the person best suited to assist on site.
- 5.4.5 As long as the pressure is positive (in non hazardous applications) or negative (in hazardous applications), compounding can continue.
- 5.4.6 Depending on the situation, the Pharmacy Manager may initiate increased environmental monitoring until the issue is resolved to gather data about the quality of the room environment.

Policy and Procedure Major Change Summary

Date	Section	Description of Change
March 2012	Policy	Switched policy to template with updated headers/footers and changed minor grammar.
February 2013	Policy	Entire document reviewed and no changes made at this time other than updating header dates.
February 2014	5.1.4.	Add item on PEC placement
	5.4.5.	Added clarification about non hazardous and hazardous compounding.

Sample Pharmacy

Section Name: Quality Management Policy and Version #: 210.3	Policy Name: Temperature and Humidity Monitoring in Compounding and Controlled Storage Areas Last Revision/Review: 02/14/2014
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1.0 Definition and Purpose:

The purpose of this policy is to ensure that cleanroom and controlled areas are monitored regularly to determine that their performance is consistent with facility design requirements and as well as regulatory requirements and ensures prompt actions in the event of malfunction.

2.0 Policy

- 2.1 Ideally, cleanrooms/buffer rooms must be maintained at delineated temperature and humidity levels that have been determined to facilitate comfortable conditions for heavily garbed and gloved compounders thereby increasing the likelihood they will perform flawlessly. These conditions also increase safety and minimize particle shed.
 - 2.1.1 Ideal temperature of 18-20° Celsius (64 - 68° Fahrenheit) should be achieved during dynamic operating conditions though an acceptable range for cleanroom temperatures is 18 - 21°C (64 - 70° F) depending on operator comfort.
 - 2.1.2 Relative Humidity should be maintained within a range of 25-65% though this is not a requirement of USP <797>.
 - 2.1.2.1 Very low humidity ranges tend to cause excess static electricity and humidity ranges above the range can result in moisture on the floor which may increase the risk of slip and fall injuries.
 - 2.1.2.2 High humidity environment are also are more conducive to microbial growth and therefore should be avoided.
- 2.2 To ensure product potency is retained through the manufacturer's labeled expiration date, drug storage areas within the facility will be monitored at least daily for conformity with these storage conditions:
 - 2.2.1 Controlled Cold Temperature: 2° to 8° Celsius (36° to 46° Fahrenheit)
 - 2.2.2 Controlled Frozen Temperature: -30° to -10° Celsius (-13° to 14° Fahrenheit)
 - 2.2.3 Controlled Room Temperature: 20° to 25° Celsius (68° to 77° Fahrenheit) allowing excursions from 15° to 30° Celsius (59° to 86° Fahrenheit)
- 2.3 To insure accurate results of incubation from operator or process media-fill testing as well as incubation of gloved fingertip samples and active air sampling, incubators will be maintained at *30° to 35° Celsius (85° to 95° Fahrenheit)*.
- 2.4 Suitable temperature and humidity recording devices will be placed in all environments where temperature and/or humidity must be monitored.
- 2.5 Temperature-sensing mechanisms will be placed in a location in the storage space, incubator or cleanroom to reflect accurately its true temperature (i.e., not immediately adjacent to a door or directly beneath a cooling duct).
- 2.6 Compounding personnel will adhere to appropriate procedures in all controlled storage spaces, incubators and cleanrooms to ensure that they are not subject to significantly prolonged temperature fluctuations as may occur by leaving doors open too long or making manual adjustments to temperature settings.

Section Name: Quality Management	Policy Name: Temperature and Humidity Monitoring in Compounding and Controlled Storage Areas
Policy/Version #: 210.3	Last Revision/Review: 02/14/2014

3.0 Reference Documents

- 3.1 *Temperature and Humidity Monitoring Log; F-210.a*
- 3.2 *Temperature and Humidity Corrective Action Log; F-210.b*

4.0 Equipment and Materials:

- 4.1 NIST calibrated thermometers
- 4.2 Calibrated continuous recording devices for temperature and/or humidity

5.0 Procedures

- 5.1 Temperature recording of controlled storage areas:
 - 5.1.1 Drugs and CSPs will be stored under the following conditions in accordance with manufacturer's product labeling, information gleaned from appropriate literature sources, or from direct testing.
 - 5.1.2 Continuous recording devices are preferred over thermometers because the individual taking the daily reading can review the past 24 hour period to ascertain any deviations from expected.
 - 5.1.3 Placement of thermometers calibrated according to NIST requirements is acceptable provided they have adequate accuracy and sensitivity to measure the environment in which they are being placed.
 - 5.1.4 Compounding personnel must be trained to note the temperature in a particular storage area each time they enter to remove or place products into the area thereby facilitating identification of aberrations.
 - 5.1.5 Daily temperature readings will occur at the same time each day, preferably at the start of the compounding day or shift.
- 5.2 Temperature and Humidity Readings of Cleanrooms
 - 5.2.1 Wireless continuous temperature and humidity monitors that are inexpensive and easy to install provide both temperature and humidity readings.
 - 5.2.2 These devices can be set to take readings at specified intervals (every 2 hours, every 4 hours, etc.). These data can be helpful in determining trends when the room is in use or at rest and provide the basis for changes in the HVAC settings.
 - 5.2.3 These devices can easily download the information to a file which can be used in reporting.
 - 5.2.4 Regardless of whether or not a continuous recording device is used, the temperature and humidity must still be read manually and recorded at least once daily on the *Temperature and Humidity Monitoring Log (F-210.a)*.
- 5.3 Calibration and Service of Monitoring Equipment
 - 5.3.1 Devices must be calibrated according to manufacturer's instructions.
 - 5.3.2 The frequency of calibration will depend on the type of device.
 - 5.3.3 Incubators, refrigerators and freezers must be serviced and certified as meeting NIST standards by a qualified vendor annually.
 - 5.3.4 Documentation of calibration, servicing, and certification (as appropriate) must be retained in the pharmacy.

Section Name: Quality Management	Policy Name: Temperature and Humidity Monitoring in Compounding and Controlled Storage Areas
Policy/Version #: 210.3	Last Revision/Review: 02/14/2014

- 5.4 Documentation of Temperature and Humidity
 - 5.4.1 Daily temperature readings will be recorded on the *Temperature and Humidity Monitoring Log (F-210.1)*.
 - 5.4.2 The log will be used regardless of whether or not continuous recording devices are used.
 - 5.4.3 Each log has space for an entire month of readings. At the end of each month the Pharmacy Manager or designee will review the completed log and sign where indicated.
 - 5.4.4 The Pharmacy Manager will follow up on occasions of failures to document or discrepancies (if any) after log review.
 - 5.4.5 The completed log for a particular month must be filed with other facility monitoring forms in a readily recoverable location within the pharmacy.
- 5.5 Trouble shooting
 - 5.5.1 Should a temperature reading for any given area fall outside of established parameters, the individual making and documenting the daily readings must notify the Pharmacy Manager immediately.
 - 5.5.2 Record the out-of-limits conditions on the *Temperature and Humidity Monitoring Log (F-210.a)*
 - 5.5.3 Document all out-of-limits condition activities and final resolution actions on the *Temperature Corrective Action Log (F-502.b)*.
 - 5.5.4 The Pharmacy Manager will verify the reading and the proper function of the temperature recording device and will contact appropriate vendors for repair of affected HVAC, refrigerator, freezer or incubator units.
 - 5.5.5 Recheck the environment in 4 hours to verify that proper conditions have been restored.
 - 5.5.6 If proper conditions have not been restored, determine course of action regarding product or drug that have been exposed to out-of-limit conditions.
 - 5.5.7 The Pharmacy Manager (or designee) will ensure that stored drug or CSPs are maintained at the correct storage temperature by
 - 5.5.7.1 shifting units in question to other equipment that is functioning correctly and currently supports recommended storage conditions;
 - 5.5.7.2 placing drugs or CSPs in delivery totes with the appropriate amount of cold blocks (consistent with established product delivery guidelines);
 - 5.5.7.3 taking other appropriate steps for storage.
 - 5.5.8 Should the Pharmacy Manager suspect that drugs or compounded units have been outside of planned storage for a period of time, assigned beyond use dating will be changed accordingly (e.g., if refrigerator fails and refrigerated CSPs are found at a temperature warmer than controlled cold temperature, the BUD for the CSPs will be changed to what would have been assigned to those CSP types at room temperature).
 - 5.5.9 The Pharmacy Manager will ensure that incursions are reported, documented and followed up in a manner consistent with the organizational variance reporting mechanisms.

Section Name: Quality Management	Policy Name: Temperature and Humidity Monitoring in Compounding and Controlled Storage Areas
Policy/Version #: 210.3	Last Revision/Review: 02/14/2014

Policy and Procedure Major Change Summary

Date	Section	Description of Change
March 2012	Policy	Switched policy to template with updated headers/footers and changed minor grammar.
February 2013	2.1.2	Ideal humidity range modified slightly and added additional information.
February 2014	2.1.1	Ideal temperature range modified