STANDARD OPERATING PROCEDURES

DIVISION OF COMPARATIVE MEDICINE
UNIVERSITY OF SOUTH FLORIDA

TITLE:	**Active-Closed Vaporized Hydrogen Peroxide Exposure for Ventilated Rack Systems, Air Handling Units and Hosing Components**
SCOPE:	Animal Care Personnel
RESPONSIBILITY:	Facility Manager, Supervisor and Technical Staff
PURPOSE:	To Outline the Proper Procedures for Routine Decontamination of Animal Housing Equipment and Associated Components.

I. PURPOSE

1. This SOP outlines the proper procedures to be followed for high level decontamination of animal facility housing rooms, individual ventilated cage (IVC) rack systems, air handling units (AHUs), and connecting hosing using vaporized hydrogen peroxide (VHP).

II. RESPONSIBILITY

1. It is the responsibility of the Facility Manager and/or Supervisor to ensure that all technical staff performing decontamination are adequately trained in the following procedures and these procedures are adhered to.

2. It is the responsibility of the technical staff assigned to decontamination procedures to read, understand, and follow the procedures outlined below.

3. It is the responsibility of the technical staff assigned to decontamination procedures to read and understand the information provided in the Bioquell Hydrogen Peroxide Sterilant SDS.

III. GENERAL SAFETY PROCEDURES

1. High-level disinfection of facilities/animal housing is accomplished using a high quality 35% w/w hydrogen peroxide (e.g., medical or food grade) and a Bioquell Z-2 VHP Generator System in accordance with **SOP #1016 entitled *Hydrogen Peroxide Vapor Decontamination.***

2. Hydrogen peroxide (HP) is a strong oxidizer and is irritating to the eyes, skin, and mucous membranes. It is imperative that all personnel using HP wear the appropriate personal protection equipment in accordance with **SOP #1016 and SOP #1162 *Bioquell Z-2 Hydrogen Peroxide Vapor (VHP) Generator System.***

IV. ACTIVE-CLOSED VHP BIO-DECONTAMINATION PROCEDURES

1. On a set biannual schedule, housing equipment inventory (i.e., IVC racks, AHUs, hosing, caps and connectors) will be decontaminated using the active closed VHP exposure system. The following are required prior to initiation:
    a. An empty room to be used as a “flex room” to temporarily house clean inventory to be bio-decontaminated and to house murine inventory as resident housing room is bio-decontaminated.
    b. Sufficient mechanically washed Tecniplast IVC racks with caps and connectors, manually washed AHUs and connecting hoses to replace the upcoming housing rooms current equipment inventory
    c. Bioquell Z-2 VHP Generator and R-30 Aeration System in accordance with **SOP #1162**
    d. Proper handling and use of HP in accordance with **SOP #1016**
    e. Appropriate Signage using SC #236 which indicates that “this room is scheduled for VHP decontamination”.

2. Predetermined housing rooms scheduled for decontamination will require the following prior to decontamination:
    a. Facility Manager/Supervisor assigned to research facility must notify animal care personnel and researchers of scheduled activities to occur in housing room in advance.
        1. PIs are notified in advance by email that VHP decontamination and housing room equipment change-outs are scheduled, for example, as follows. "Principal Investigators housing animals in room XXXX: Please know that on Thursday March ZZth housing room XXXX and all of its secondary housing support equipment will be decontaminated in accordance with SOPs 1016 and 1018. During this interval, animals will be temporarily available in housing room YYYY for approximately 36 hours. Please let me know if you have any concerns regarding these procedures, which contribute to the microbial security of animals housed on your behalf. Thank you for your understanding."
        2. Animal care personnel must be assigned a husbandry partner to assist with transferring cages onto new racks.
    b. A temporary housing “flex” room to store current rodent inventory must be cleaned and decontaminated prior to placement. Relocated murine inventories may be left static for up to 36 hours, but rat inventories should be temporarily connected to clean AHUs in the flex room.

3. Thoroughly read and understand all manufacturers’ instructions and observe all “Cautions” and “Warnings” prior to using any equipment or solutions. **See SOP #1162 *Bioquell Z-2 Hydrogen Peroxide Vapor Generator System***.

4. Prior to beginning, ensure all connections to the IVC rack are in place and the AHU is set to the “H_20_2 cycle” within the “flex room”. Place a chemical indicator (CI) or biological indicator (BI) in various locations in the IVC rack system (i.e., supply, exhaust plenum or hosing) and AHUs (i.e., prefilter) and within the room (i.e., wall, countertop, BSC). **Do not connect the main exhaust hose to the house exhaust thimble. Racks must be empty and not be docked with cages during “active-closed” exposure.**

5. If involving a WiFlow AHU connected to the Guardian System, note its housing room and IT jack location so that it will return to the same IT connection after VHP decontamination. If using an AHU without an available H_20_2 cycle, leave the unit static and turned off.

6. Shut off HVAC to area to be decontaminated when possible. If HVAC cannot be shut off then all HVAC supplies, returns, dampers, and thimbles, where present, must be sealed to ensure no vapor leaves the area.

7. Remove the Temptrak sensor from the wall.

8. Remove any materials that may be incompatible with HP (e.g., open chemicals and medicines).

9. Remove the Interceptor filters from the Air Handling Units, bag them, label them according to rack number, and remove from the animal room.

10. Place the Z-2 generator in the center of most rooms for even VHP distribution. Other positioning may be required for alcoves or side rooms that are connected to the main room.

11. The Bioquell R-30 unit is used to aid in the distribution of VHP and for aeration of the room to remove VHP after decontamination.
    a. When using the unit for aeration only, place unit so that air can flow, unimpeded into all six filters. Blocking filters will prolong the aeration process.
    b. When using the unit to aid in VHP distribution, the front of the unit is positioned so that the fans are directed toward side rooms, alcoves or areas not in the line of sight of the VHP generator.

12. Changing stations, Class A2A laminar flow hoods, and **equipment that recirculates air can be left "ON" during the cycle to obtain a more thorough decontamination** of the equipment. However, if equipment contains internal filtration, aeration may need to be extended to counteract absorption into the filters.

13. Separate electrical circuits should be utilized for the Z2, R30, and other equipment (e.g., BSC) whenever possible.

14. Check the area for people, ensure all doors are shut and secured, that all possible openings where significant amounts of gas could escape are sealed, and the ventilation is off or the ductwork/thimbles are sealed.

15. Check that the hand-held low level H_2O_2 sensor (stored in the lectern) is fully charged.

16. Follow the procedures described in **SOP #1016 and 1162** to start VHP decontamination and aeration. Place appropriate signage on sealed door.

17. When aeration begins hard ducted biosafety cabinets can be started at the breaker to speed-up the process.

18. After the appropriate aeration time, the screen will display **"Aeration Target Achieved Check Concentration <1ppm Before Ending Cycle."** Use the hand-held low HP sensor to check the area's actual HP concentration.

19. Place the handheld sensor inside the door for a few minutes, then retrieve the sensor.

20. If the displayed level is <1ppm it is safe to end the cycle and enter the room.

21. If the handheld HP reads >1ppm the sensor will give both audible and visual alarms. Let the unit continue to aerate and repeat testing until <1ppm is achieved.

22. When 1ppm is reached, stop the cycle by pressing **"END CYCLE**" button (password required).

23. Enter room adhering to appropriate practices to prevent re-contamination of the area (e.g., appropriate PPE, essential personnel and work flow).

24. Remove any HVAC plenum and thimble covers.

25. Wearing gloves retrieve all CIs, and BIs when used, from the room.

26. Set the AHU to the standard 70-75 ACH cycle and if available, connect the main exhaust hose from the unit to the house exhaust to increase aeration within the "active-closed" unit(s). In housing rooms with limited exhaust circulation, remove the Z-2 from room and leave the R-30 aerator set "on" within the room overnight to facilitate aeration of the "active-closed" system and housing room.

27. The following morning, using the hand-held low level H_2O_2 sensor, verify that levels within the hosing are <1ppm.

28. Prior to movement of murine inventory onto racks, perform a post-VHP sample collection using sterile flocked swabs in the exhaust hose plenum of the IVC rack or in the AHU exhaust connector as needed.

29. Place Temptrak sensor back on wall.

30. Place the Interceptor filters into the AHU according to rack.

31. Schedule movement of mice from housing room to be decontaminated into the temporary flex room and follow instructions in accordance with **SOP #016** ***Animal Room Preparation,*** **SOP #1127** ***Biological Safety Cabinets*** and **SOP #1129** ***Nuaire Small Animal Changing Station.***

32. Sanitation and validation procedures must be performed in accordance with **SOP #1016** and **SOP #1010** ***Microbiological Monitoring of Sanitation Procedures***

33. On the AHU record tag, record the date of bio-decontamination and initial.

VII. REFERENCES

1. **SOP #016:** ***Animal Room Preparation***
2. **SOP #1010:** ***Microbiological Monitoring of Sanitation Procedures***
3. **SOP #1016:** ***Hydrogen Peroxide Decontamination***
4. **SOP # 1127:** ***Biological Safety Cabinets***
5. **SOP #1129:** ***Nuaire ® Small Animal Changing Station***
6. **SOP# 1162:** ***Bioquell Z-2 Hydrogen Peroxide Vapor Generator System***
7. For additional information contact Bioquell Technical Support at (215) 682-0225 or review manuals located on Comparative Medicine Servers.

Approved: **Date:**