Title: **Chemical Fume Hoods and Biological Safety Cabinets**			
EH&S – 4-6	Revision: 7/8/08	Date 10/91	Pages 11

PURPOSE: To establish procedures for the safe use of chemical fume hoods and biological safety cabinets.

SCOPE: Hospital, Ambulatory Surgery Center, and Ambulatory Care Pavilion

DEFINITIONS:

Face Velocity: Average air velocity into the chemical fume hood measured at the opening into the hood.

PROCEDURES:

I. Chemical Fume Hoods

Hazardous chemicals, radioactive materials and biohazardous material must be controlled to protect the health and safety of the Hospital community. In order to prevent inhalation of vapors, gases, and aerosols, the contaminants must be captured, contained and removed by the use of hoods, enclosures, or local exhaust ventilation.

A. Fume Hood Design and Construction:

In general, all fume hoods should be constructed and contain materials that will permit their planned use to be carried out safely. Fume hood design and construction should consider the following current standards: OSHA Part 1910.1450, ANSI/ASHRAE 110, ANSI/AIHA Z9.5, NFPA 45, and SEFA 1.2.

B. Fume Hood Performance Testing:

1. Environmental Health & Safety (EH&S) shall perform chemical fume hood testing in the Hospital biannually.

2. The sash is placed at the “Maximum Shield Height” indicated on the label. Measurements are taken at 6 quadrants and recorded on the field data sheet.

3. To determine highest sash height, the sash is placed in its lowest workable position, usually between twelve and sixteen inches. The sash shall be lowered until the average face velocity is 100 fpm. The sash is then raised to the maximum shield height attained maintaining the design specification. The shield height is then marked with a label indicating "Maximum Shield Height for Use with Toxic Substances". The tester will

initial and record the test date on the label.

C. Interpreting the Fume Hood Ratings:

The Fume Hoods shall be considered to be:

Satisfactory: Fume hood face velocity has been tested to measure an average of between 80 and 150 fpm with sash open to "Maximum Shield Height".

Restricted: Fume hood face velocity has been determined to operate between 60 and 80 fpm or greater than 165 fpm with sash heights between 12 to 18 inches.

Inoperative: Fume hood face velocity does not achieve an average of between 60 fpm and 165 fpm with sash heights between 16 to 18 inches. This hood will be posted as "Do Not Use with Toxic Substances". Appropriate corrective action will be implemented.

D. Flow Measuring Devices

New and remodeled hoods shall be equipped with a flow measuring device.

E. Fume Hood Work Practices

The user should follow work practices that minimize emissions and employee exposure to hazardous materials:

1. The worker shall not lean into the hood so that their head is inside the plane of the hood face without adequate respiratory and personal protection, except for setup work or hood maintenance.

2. Equipment in the hood should not block airflow to slots in the baffle. Slots in baffle are typically located in the bottom rear of the hood.

3. Equipment that might be a source of emission should not be placed closer than 6 inches from the plane of the hood face.

4. Flammable liquids should not be stored permanently in the cabinet under the hood unless that cabinet meets the requirements of ANSI and NFPA 30 and 45 for flammable liquid storage. Storage of flammable or otherwise hazardous materials including compressed gas cylinders in the active work areas of the laboratory should be kept to a minimum. Normally, a one or two day supply should be sufficient.

5. The hood sash or panels should be closed to the maximum position possible while still allowing comfortable working conditions.

6. Each hood shall be posted with a notice giving the date of the last field test. If the hood failed the performance test, it shall be taken out of service until repaired, or posted with a restricted use notice. The notice shall state the partially closed sash position necessary and any other requisite precautions concerning the type of work and materials permitted or prohibited.

II. Biological Safety Cabinets (BSC) and Laminar Flow Hoods

A. Types of Cabinets

Biological safety cabinets, or laminar flow hoods, can be separated into three categories: Class I, Class II, and Class III hoods.

1. **Class I** provides staff and environmental protection but no product protection. Can be used to enclose equipment that may generate aerosols.

2. **Class II** provides staff, environmental and product protection. Class II cabinets are designed for work involving microorganisms assigned to Biosafety levels 1, 2 and 3.

3. **Class III** provides maximum protection for staff and the environment. Designed for Biosafety Level 4 work.

4. **Laminar Flow Hoods** are not biological safety cabinets. These hoods only provide product protection and should not be used in biomedical laboratories.

B. BSC Installation

1. BSC shall be used only after certification has been completed by a qualified outside contractor.

2. BSC shall be recertified at least annually or as deemed necessary by the hazards involved.

3. All BSC must also be recertified if relocated, repaired or HEPA filters are changed. If filters are to be changed, it will require appropriate decontamination of the cabinet before use.

4. All BSC shall be posted with a "Certificate of Certification" on the unit displaying required certification dates.

C. BSC Safety Devices

1. Any new or remodeled BSC shall be equipped with a flow monitor to determine if the day-to-day use of the equipment. This can be used to

determine if the unit and/or the fume exhaust system is functional.

2. Ultraviolet (UV) lamps are not required in BSCs. If installed, UV lamps must be cleaned weekly to remove any dust and dirt that may block the germicidal effectiveness of the ultraviolet light. The lamps should be checked periodically with a meter to ensure that the appropriate intensity of UV light is being emitted. UV lamps must be turned off when the room is occupied to protect eyes and skin from UV exposure, which can burn the cornea and cause skin cancer.

III. Responsibilities

A. Laboratory Staff

1. If it is noted by the users that their chemical fume hood or biological safety cabinet is not working properly, they should immediately stop all work and report the problem to their Supervisor. Laboratory BSCs are serviced by an outside contractor hired by the Laboratories.

2. Notify others in the area and on additional shifts that the chemical fume hood or BSC is not operating and cannot be used, and also post a "Do Not Use" sign.

3. Seal off any opened/exposed containers of chemical or radioactive materials currently under the hood, and remove any supplies/equipment to allow access to the hood for repair.

4. Work with the supervisor and other departments to either arrange for the use of another chemical fume hoods or BSC which are operating properly or postpone work until repairs are made.

5. The chemical fume hood must not be returned to use until retested and approved for use by EH&S.

6. Ensure that chemical fume hoods and BSC are appropriately inspected and certified.

7. Ensure that proper work practices are followed when using chemical fume hoods or BSC.

8. Select new chemical fume hoods that meet current standards: ACGIH Industrial Ventilation: A Manual of Recommended Practice, OSHA Part 1910.1450, ANSI/ASHRAE 110, ANSI/AIHA Z9.5, NFPA 45, and SEFA 1.2. In general, all fume hoods should be constructed and contain materials that will permit their planned use to be carried out safely.

B. HVAC

1. Responsible for maintaining and servicing the chemical fume hood fans.

2. Notify user departments and EH&S as to the planned outage of their fume hood via the email "Service Interruption Notice" system.

3. Tag the affected fume hoods with a "Do Not Use" sign.

C. Environmental Health and Safety

1. Perform chemical fume hood air flow testing in the Hospital biannually.

2. Retest chemical fume hoods after any repairs.

3. Provide assistance on the selection and use of chemical fume hoods and BSC.

INQUIRIES/REQUESTS:

Environmental Health and Safety
L1-059 HSC
Zip 8017
Main Office: 444-6783
Fax: 444-6845

RELATED FORMS:

Chemical Fume Hood Locations (Appendix A)
Chemical Fume Hood Field Data Sheet (Appendix B)
Biological Safety Cabinet Locations (Appendix C)

RELATED DOCUMENTS:

ANSI/AIHA Z9.5-1992 American National Standard for Laboratory Ventilation
ACGIH Industrial Ventilation: A Manual of Recommended Practice
ANSI/ASHRAE 110-1995 Method of Testing Performance of Laboratory Fume Hoods
ANSI/NFPA 30 Flammable and Combustible Liquids 1993
ANSI/NFPA 45 Fire Protection for Laboratories Using Chemicals, 1991
U.S. Department of Health and Human Services. *Primary Containment of Biohazards: Selection, Installation and Use of Biological Safety Cabinets.* (Washington: GPO, 1995)
National Sanitation Foundation Standard 49. 1983. Class II (Laminar Flow) Biohazard Cabinetry.
CDC/NIH Primary Containment for Biohazards: Selection, Installation and Use of Biological Safety Cabinets, 2000.

APPENDIX A

Environmental Health and Safety
University Hospital - Chemical Fume Hood Locations
(revised 4/07)

Room	Department	Contact	Phone	# Hoods	Fan #	Comments
2-665	Surgical Pathology Frozen Section	Kathy DaSilva	4-8249	1	56	
2-666	Histology	Kathy DaSilva/ Camille Kutcher	4-8249	1	56	
2-666	Histology	Kathy DaSilva/ Camille Kutcher	4-8249	2	56	
2-666	Histology	Kathy DaSilva/ Camille Kutcher	4-8249	3	56	
2-667	Special Histology	Kathy DaSilva	4-8249	1	56	
2-708	Electron Microscopy	Kathy DaSilva	4-8249	1	60	
2-714	Cytology	Kathy DaSilva	4-8249	1	60	
2-714	Cytology	Kathy DaSilva	4-8249	2	60	
2-730	Pathology/Molecular	Kathy DaSilva	4-8249	1	53	
2-731	Pathology/Tissue Bank	Kathy DaSilva	4-8249	1		
3-505	Special Chem Toxicology	Michele Byrne	4-2615	1	57	
3-506	Toxicology	Michele Byrne	4-2615	1	57	
3-518	Automated Chemistry	Michele Byrne	4-2615	1	58	
3-524	Cytogenetics	Terry Mercado	4-2749	1	58	
3-653*	Developmental Lab	Chris Munz	4-2607	1	53	Glass cracked in corner
3-701	Immunology	Ken O'Sullivan	4-2373	1	53	
3-725	Cellular Immunology	Ken.O'Sullivan	4-2373	1	53	
HSC-9-067	Andrology	Susan Bronson	4-3473	1	15	
HSC-19-052	Histocompatability	Larry Usher	4-1789	1	23	

APPENDIX A (Continued)

Environmental Health and Safety
University Hospital – Radiation Fume Hood Locations

Room	Department	Contact	Phone	# Hoods	Fan #	Comments
2-629*	Radiation Oncology	Jeffrey Weiss	4-3949	1	56	Rad. Only
2-663*	Medical Physics	Zhigang Xu	4-3617	1	60	Rad. Only
2-633*	Medical Physics	Zhigang Xu	4-3617	2	60	Rad. Only
2-713*	Molecular Genetics	Terry Mercado	4-2749	1	53	Rad. Only
2-713*	Molecular Genetics	Terry Mercado	4-2749	1	53	Decommissioned
3-522*	Locker Room	Mary Dropela	4-2365	1	58	Not in Use

(revised 11/06)

*Inspected by Radiation Safety Group

APPENDIX B
Laboratory Chemical Fume Hood Annual Inspection and Testing

Room	Hood ID	FHE#	Face Velocity (fpm) Record 6 Quadrants						Avg Face Velocity (fpm)	Visual Inspection P/F	Smoke Test P/F/N	Sash Height (in)	Hood P/F	Comments

Date: _____ Building: _____ Inspected by: _____

Hood ID – Bldg#:Rm#:Hood#; Each hood in the lab will be labeled as 1, 2, 3, etc.
FHE# - Fume Hood Exhaust Fan number
Visual Inspection – liner condition and cleanliness, baffle and sash operation and condition, counter balance cables, light operation and condition and service fixture functions, and a hood alarm test, if applicable. P= all in good working order; F= a component needs repair (note in Comments field)
Smoke Test – Was a smoke test performed? P= Test Performed successfully; F= Test performed & problem observed (note in Comments field); N= Test not performed
Sash Height – Record height from bench for working sash height needed to obtain a minimum of 100 fpm face velocity (typically between 16-18").
Hood P/F – "P" if average face velocity is 80 – 150 fpm; "F" if any quadrant is less than 80 fpm or average is greater than 150 fpm.
Comments – Note if there is a hood alarm, if the hood is labeled for radioactive material or any other special conditions.

APPENDIX C

Environmental Health and Safety
University Hospital – Biological Safety Cabinet Locations

Room #	Type	Model #	Serial #	Filter	Biological/ Chemical/ Both	Department	Contact	Last Inspection	Comments
UH-2-665	Type 2, Nuaire Class II	Class I Type A2 NU-425-400	Serial # 91989071304	HEPA	Biological	Histology	Kathy DaSilva		
UH-2-714 (1)	Type 2, Nuaire Class II	NU425 FM 600	Serial # 11855RR	HEPA	Biological	Cytology	Kathy DaSilva Elann Quattrone		
UH-2-714 (2)	Type 2, Envirco Class II	Type A/B 3 10448	Serial #9602015	HEPA	Biological	Molecular Genetics	James Kelly		
UH-3-525 (1)	Type 2, Baker BioGard, Class II	B40-112	Serial # SP11987V	HEPA	Biological	Cytogenetics	Terry Mercado		
UH-3-525 (2)	Baker BioGard, Class II	00014	Serial #SP119894	HEPA	Biological	Cytogenetics	Terry Mercado		
UH-2-731	TypeA2, Nuaire Class II	NU425400	Serial #882710108	HEPA	Biological	Tissue Bank	Kathy DaSilva		
UH-3-714	Forma Scientific Class II	1202	Serial # 15776-136	HEPA	Biological	Microbiology	Dennis Sheppard		
UH-3-718	Contamination Control, Class II	CCI-250	Serial # 10265B	HEPA	Biological	Microbiology	Dennis Sheppard		
UH-3-721	Nuaire Class II	425FM400	Serial # 11854RR	HEPA	Biological	Microbiology	Dennis Sheppard		
UH-3-722	Contamination Control, Class II	CCI-560	Serial # 10270B	HEPA	Biological	Microbiology	Dennis Sheppard		
UH-3-723	Contamination Control, Class II	CCI-560	Serial # 10270A	HEPA	Biological	TB Lab	Dennis Sheppard		

UH-3-724	Contamination Control, Class II	CCI-250	Serial # 17737	HEPA	Biological	Virology	Dennis Sheppard		
UH-3-725	Type 2, Baker BioGard, Laminar Flow, No Class	B40-112	Serial # SP13017V	HEPA	Biological	Cellular Immunology	Ken O'Sullivan		
UH-5-703	Type 2, Baker	VBM-400	Serial# SG12860V						
HSC-9T-067 (1)	Nuaire, Laminar Flow, No Class	201-324	Serial# 14902SV	HEPA	Biological	Andrology	Susan Bronson		
HSC-9T 067 (2)	Nuaire, Class II	CETA 0056	Serial # 11892RS	HEPA	Biological	Andrology	Susan Bronson		
UH L1-832	Sterilchem Gard 111 Advance, Class II	BSC II SG603 TX	Serial #85703	HEPA	Chemical	Pharmacy	Jeannene Strianse		

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