Appendix D Practical Biosafety Guidelines

MU Laboratory Containment Levels for Biological Research Involving Potential Biohazards				
BIOSAFETY LEVELS (BSL)	BSL-1	BSL-2	BSL-3 Practice in BSL-2 Facilities	BSL-3
A. HAZARD LEVELS				
Degree of hazard	Low Risk: E coli K-12	Low to Moderate; Influenza viruses, Mycobacterium sp., Herpes viruses	Moderate to High: specific experiments w/BSL-3 agents which the IBC authorize in BSL-2 facilities	High (serious or potentially lethal consequences): M. tuberculosis, HTLV, HIV, Brucella sp.
B. STANDARD MICROBIOLOGICAL PRACTICES				
1. Public access while experiments are in process	Not recommended	Access to the lab is limited when BSL-2 work is being conducted	Restricted	Not permitted
2. Daily decontamination	Daily and upon spills	Daily and upon spills	Daily, upon finished work with biohazardous materials and spills	Daily, upon finished work and spills
3. Biohazardous waste decontamination	Before disposal or pickup	Before disposal or pickup	Before disposal or pickup (Note 1)	Before removal from building
4. Pipetting	Mechanical device	Mechanical device	Mechanical device	Mechanical device
5. Eating, drinking, application of cosmetics or contact lenses	Permitted only in designated clean areas	Permitted only in designated clean areas	Not permitted at any time	Not permitted at any time
6. Handwashing facilities	Required	Required	Required (foot/elbow/electronic operation recommended)	Required (foot/elbow/electronic operation)
7. Aerosol minimization procedures	Required	Required	Required	Required
8. Laboratory coats	Recommended (front button coats)	Required (front button coats)	Wrap around disposable clothing required for all workers with potential exposure to biohazardous materials	Required (wrap around disposable clothing)
C. SPECIAL PRACTICES				
1. Autoclave	Not Required	Must be available	Must be available (Note 1)	Required, preferably in laboratory
2. Insect/rodent control program	Required	Required	Required	Required
3. Transport of biohazardous waste material for processing (decontamination) away from lab	Red bags in durable, closed, specially marked, leak-proof containers	Red bags in durable, closed, specially marked, leak-proof containers	Double red bags in durable, closed, specially marked, leak-proof containers	Double red bags in durable, closed, specially marked, leak-proof containers
Note 1: All biohazardous unwanted material storage must be placed in labeled, marked, closed, and leak-proof containers which are under the direct control of responsible laboratory worker(s) until placed in a locked disposal area or autoclaved. All putrescible materials must be refrigerated or picked up within twenty-four (24) hours.				

D. CONTAINMENT EQUIPMENT				
1. Biological Safety Cabinet (BSC)	Not required	Required for all aerosol generating processes	Required for all work with biohazardous agents	Required for all work
2. Other physical containment	Equipment must be decontaminated immediately after use	Physical containment devices are used when procedures with a high potential for creating aerosols are being conducted with biohazardous materials. (Note 2) If high concentrations or large volumes of biohazardous materials are used, some types of material may be centrifuged in the open laboratory if sealed heads or centrifuge safety cups are used, and if the containers are opened only in a biological safety cabinet. Equipment must be decontaminated immediately after use.	Physical containment devices, such as centrifuge safety cups, sealed centrifuge rotors, and containment caging for animals are used for all activities with biohazardous materials that pose a threat of aerosol exposure. (Note 3) Equipment must be decontaminated immediately after use.	Physical containment devices, such as centrifuge safety cups, sealed centrifuge rotors, and containment caging for animals are used for all activities with biohazardous materials that pose a threat of aerosol exposure. (Note 3) Equipment must be decontaminated immediately after use.
3. Freezers/ refrigerators	No biohazard sign required	Biohazard sign must be posted	Biohazard sign must be posted and containers must be labeled	Biohazard sign must be posted and containers must be labeled
4. BSC Certification	Certified annually	Certified annually	Certified annually	Certified annually
5. HEPA-filtered vacuum lines	Recommended	Required	Required	Required
6. BSC work surface decontamination	Daily and following spills	Required after each use	Required	Required
7. Personal Protective Equipment (PPE) when working within primary containment (e.g., BSC)	Required - gloves should be worn when handling infected animals & when skin contact with biohazardous materials is unavoidable	Required - appropriate combinations of special protective clothing, gloves, etc., are used for all activities with biohazardous materials. (Note 4)	Required - appropriate combinations of special protective clothing, gloves, etc., are used for all activities with biohazardous materials. (Note 4)	Required - appropriate combinations of special protective clothing plus NIOSH N95 respirators or better must be worn in rooms containing infected animals.
8. Personal Protective Equipment (PPE) when working outside of primary containment	Required - gloves should be worn when handling infected animals and when skin contact with biohazardous	Required - appropriate combinations of special protective clothing plus NIOSH N95 respirators or better must be worn in rooms containing	Required - appropriate combinations of special protective clothing plus NIOSH N95 respirators or better must be worn in rooms containing infected animals.	Required - appropriate combinations of special protective clothing plus NIOSH N95 respirators or better must be worn in rooms containing infected animals.

	materials is unavoidable	infected animals.		
Note 2: These procedures include centrifuging, grinding, blending, vigorous shaking or mixing, sonic disruption, opening containers of biohazardous materials whose internal pressures may be different from ambient pressures, inoculating animals intra-nasally, and harvesting infected tissues from animals or eggs.				
Note 3: These procedures include manipulation of cultures and clinical or environmental material that may be a source of aerosols containing biohazardous materials; the aerosol challenge of experimental animals; harvesting of tissues from infected animals and embryonic eggs; and necropsies of infected animals.				
Note 4: Required with aerosol generating equipment; manipulation of high concentrations or large volumes of biohazardous materials; activity involving all clinical specimens; body fluids and tissues from humans or from infected animals or eggs; human cell culture; and necropsies of infected animals.				
E. LABORATORY FACILITIES				
1. Ventilation	Negative pressure; no recirculation of air to other areas of the building	Negative pressure; no recirculation of air to other areas of the building	Air flows from low hazard to higher hazard areas; no recirculation of air is permitted	Negative pressure; no recirculation of air to other areas of the building.
2. Posted biohazardous material/biosafety level signs	Not required	Required on lab doors in areas where BSL-2 materials are stored and where work is done	Required on lab doors in areas where BSL-3 materials are stored and where work is done	Required on lab doors in areas where BSL-3 materials are stored and where work is done
3. Bench top work	Permitted	Permitted only for low-risk procedures	Not permitted for biohazardous materials	Not permitted
4. Openable windows	Permitted with fly screens	Permitted with fly screens	Not permitted	Not permitted
5. Laboratory separated from the general public	No	No	Yes. Doors must be closed and locked when biohazard work in progress.	Yes. Doors must be closed at all times.
F. OTHER REQUIREMENTS				
1. Laboratory Specific Technical training	Required with documentation	Biannual lab training with documentation required	Monthly lab training with documentation required	Monthly lab training with documentation required
2. Medical Surveillance (baseline serology)	Required only when appropriate	Required only when appropriate	Required	Required
3. Release/spill/accident	Report to lab director right away; medical evaluation, surveillance and treatment as appropriate; maintain written records	Report immediately to lab director; medical evaluation, surveillance, and treatment are provided as appropriate; maintain written records	Report immediately to lab director; medical evaluation, surveillance and treatment are provided as appropriate; maintain written records	Report immediately to lab director; medical evaluation, surveillance and treatment are provided as appropriate; maintain written records
4. Laboratory Specific Exposure Control Plan	Plan prepared w/ Manual adopted; personnel required to be familiar with policies and procedures	Plan prepared w/ Manual adopted; personnel required to be familiar with policies and procedures	Plan prepared w/ Manual adopted; personnel required to be familiar with policies and procedures	Plan prepared w/ Manual adopted; personnel required to be familiar with policies and procedures