GENERAL:

1. The following guidelines constitute the minimum requirements for Biocontainment Laboratory and Animal Biocontainment facility design.

2. For new or renovated laboratories at the University of Missouri where biological research or clinical assessment (hospital laboratories) is being conducted, the minimum standard is that described for BSL-2 laboratories. Since research laboratories are regularly reassigned, this minimum level allows the vast majority of research to be done within a level of acceptable risk to faculty, staff, and the general public. This level also provides flexibility for research from biocontainment to chemical within the same basic design, thus reducing the cost of modifying labs when research needs change. Where flammable or toxic chemicals are used, consult Section 230001 Chemistry Laboratory Design Criteria.

3. The first step in any laboratory design is to assess the risk by determining the type of research that is to be accomplished. This standard is a minimum and the risks attributed to some research is not addressed. It is the responsibility of the A/E to gather information, assess the risk, and design accordingly.

4. The requirements below are general. For specific requirements on materials, finishes, or systems, consult the technical sections within the Consultant Procedures and Design Guidelines on that material or system.

APPLICABLE STANDARDS:

In addition to the codes and standards listed in Section 2, the following specifically apply to biocontainment laboratories:

1. Facilities standards contained in the current edition of the **Biosafety in Microbiological and Biomedical Laboratories** (BMBL) except where this guideline is more stringent.
2. Current edition of the **ASHRAE Laboratory Design Guide.**
3. Current edition of the **ASHRAE HVAC Applications Handbook.**
4. **The Guide for the Care and Use of Laboratory Animals** as published by Association for Assessment and Accreditation of Laboratory Animal Care AALAC).

DESIGN GUIDELINES:

A. General Design

1. Biosafety Level 1 (BSL-1) Laboratories

1.1. Definitions and General

1.1.1. Definition (BMBL): The basic level of protection appropriate for agents that

are not known to cause disease in normal, healthy humans.

1.1.2. Definition (ARS): Used with agents of no known or minimal potential hazard to facility personnel, animals or the environment. They present no potential economic loss to the agricultural industries.

1.2. No standards are required for BSL-1 spaces. The minimum design standard for new construction and renovations at the University of Missouri is Biosafety Level 2.

2. Biosafety Level 2 (BSL-2) Laboratories

2.1. Definitions and General

2.1.1. Definition (BMBL): appropriate for handling moderate-risk agents that cause human disease of varying severity by ingestion or through percutaneous or mucous membrane exposure.

2.1.2. Definition (ARS): Used with agents of moderate potential hazard to personnel, animals, and the environment, with minimal economic loss to the animal industries. Most research and diagnostics laboratories are at this level. It is the policy of ARS that any laboratory where research is being conducted on infectious agents will be designed, built and operated at a BSL-2 standard at a minimum.

2.2. Architectural Requirements

2.2.1. Each laboratory shall have a sink for hand washing located near the exit door. The sink may be manual, hands-free, or automatically operated.

2.2.2. Biosafety Cabinets and Hoods

2.2.2.1. Space layout to allow for at least one biosafety cabinet (BSC) per laboratory. New BSC's must be Class II. If chemical or radionuclides are to be used the BSC must be Class II B2 unless approved otherwise byAHJ. BSC's shall be placed out of the direct traffic pattern and shall be located away from supply diffusers or exhaust intakes.

2.2.2.2. Class III biosafety cabinets are not used in BSL-2 spaces.

2.2.3. Careful consideration of the volume of materials to be used in the lab should be done to determine equipment types such as centrifuges (sealed rotor or open).

2.2.4. Laboratory doors shall self close and latch.

2.2.5. Floors shall be VCT or rubber tile with the minimum number of joints. Chemically resistant sheet type flooring with integral cove up the wall is encouraged where the budget allows. Base shall be vinyl or rubber and shall be easily cleaned.

2.2.6. Walls must be sheetrock, or other impervious material and must be smooth finish. Walls shall go to deck so that each room can be sealed. All penetrations of the walls shall be sealed (this includes walls above lay-in ceilings).

2.2.7. Ceilings must be may be lay-in tiles or sheetrock. If sheetrock is used, the finish shall be the same as for walls. If a lay-in ceiling is used, all penetrations through the floor above shall be sealed.

2.2.8. Windows shall meet the requirements noted elsewhere in the Consultant Procedures and Design Guidelines. Windows in BSL-2 labs shall not be operable. Windows shall be sealed and caulked to prevent leakage.

2.2.9. Doors are to be a minimum of 36" wide and shall meet the minimum heights required elsewhere in this standard. 7'-0" heights are encouraged. All doors shall be undercut by ½".

2.2.10. There are no unique standards for door hardware at this biosafety level. Labs must be key lockable from the outside. Card Access to some laboratories may also be required.

2.2.11. Bench tops must be smooth surface, impervious to water and resistant to heat, organic solvents, acid, alkalis and other chemicals.

2.2.12. Structural Considerations: Due to the nature of the research and the sensitive instrumentation used, the structure shall be designed to minimize the transmission of vibration. The design shall be stiffened and use enough mass that any vibration that is transmitted is high frequency.

2.2.13. Lab design shall provide for an autoclave within the space or near enough for the occupants to use. The consultant shall verify through the PM if an existing autoclave can be used by the client group.

2.3. Fire Protection Requirements

2.3.1. Fire protection systems are as required per other sections of the Consultant Procedures and Design Guidelines. Variances to this standard can only be approved by the Authority Having Jurisdiction (AHJ).

2.3.2. In the case of special needs, systems other than water based may be used with the approval of the AHJ.

2.4. HVAC Requirements

2.4.1. Air handlers serving BSL-2 spaces shall be 100% outside air and 100% exhaust. Provide MERV 8 prefilters and MERV 15 final filters.

2.4.2. Heat recovery shall be used where physically possible and economically justified. Heat recovery systems (wheels) shall be allowed for laboratory general exhaust devices only.

2.4.3. Canopy Hoods shall be interlocked with the equipment they serve. A time delay may be added to the canopy hood to allow it to run for a specified time after the equipment shuts off to exhaust heat until the equipment cools.

2.4.4. Use VAV systems utilizing laboratory air valves for all supply and exhaust systems (see Section 230910). Valves shall have a maximum error of no more that 5% of full range. Do not mix laboratory air valves and standard VAV boxes in the lab areas. VAV boxes may be used outside the lab areas in general office or other uses. All spaces and devices shall be hard ducted both supply and exhaust. Lined duct may be used between the exhaust diffuser and the exhaust valve.

2.4.5. Occupancy Sensors shall be used in all laboratories to control both lighting and the supply air valves. Minimum air changes per hour for occupied laboratories is six (6) and for unoccupied laboratories it is three (3) ACH. If required by the Project Manager, the consultant will evaluate the use of lab air monitoring systems (such as Aircuity) to reduce the total ventilation required with the potential of lowering the minimum ACH for occupied and unoccupied laboratories. The consultant must provide a design sufficient to allow a laboratory to increase ventilation upon the detection of higher concentrations of identified chemicals to flush out the room (e.g. due to a spill). Ventilation rates may be adjusted over time by comparing measured concentrations with desired thresholds but never lower than four (4) ACH for occupied laboratories and two (2) ACH for unoccupied laboratories, or thermal load requirements.

2.4.6. Air flow shall be from low hazard spaces to high hazard spaces. Corridor shall be provided with adequate supply flow for make-up to labs connected to the corridor. Generally, this will require the corridors to be a separate supply zone.

2.4.7. Each lab shall have a supply air valve and an exhaust air valve as a minimum in order to maintain correct flow and pressure relationships. Manual systems are not allowed in laboratories. Within a lab suite additional pairs of valves may be needed where pressure relationships or directional flow between spaces is required.

2.4.8. Supply and Exhaust Diffuser shall be located in laboratory aisle ways (not above benches or equipment) and not in front of biosafety cabinets. Diffusers shall be 2' x 2' and have a maximum of 400 CFM.

2.4.9. Equipment loads shall be carefully determined. Use actual equipment loads with diversity if available. If not, the maximum allowed allowance for equipment loads is 8.0 w/sq ft.

2.4.10. Supply and Exhaust Quantities

2.4.10.1. Calculation of supply and exhaust airflows requires care and reiterative checking to see what parameter determines each value.

2.4.10.2. Offset is defined as the required difference between the exhaust and supply flows to a space. In BSL labs the offset is negative, i.e. exhaust flow exceeds supply flow. Offset to be 150 CFM for the first door or operable opening (main door to the lab) and 100 CFM for each additional door or operable opening. Where an opening has more than one leaf the offset shall be multiplied times the number of leaves. Doors or operable openings shall be counted only if air flows through that opening **into** the space. Maximum offset for a standard door shall be 200 CFM.

2.4.10.3. Supply shall be sized for heat loads or make-up requirements, whichever is higher. *(Example: If there is one door into a lab and the calculated supply is 1,000 CFM and the required exhaust is 1,600 CFM, the supply shall be raised to 1,400 CFM to reduce the offset to the allowed maximum.)*

2.4.10.4. Exhaust shall be sized for a minimum of 6 air changes or high enough to achieve the required offset, whichever is greater. *(Example: The lab has one door with a required exhaust rate of 1,000 CFM. The calculated load requires a flow of 1,000 CFM. The exhaust shall be increased to 1,150 CFM to meet the minimum required offset.)*

2.4.11. Biosafety Cabinets and Hoods

2.4.11.1. Class II B1, Class II B2 Biosafety Cabinets and fume hoods (where required) exhaust may be manifolded together.

2.4.11.2. Class II A1 and Class II A2 may be manifolded to the exhaust via an approved thimble connection. Where chemical or radionuclide work is being done, the BSC must be Class II B2.

2.5. Plumbing Requirements

2.5.1. Floor penetrations in laboratories are to be avoided. Feed pressurized services from above. Where penetrations must be made, they must be thoroughly caulked and sealed.

2.5.2. Provide emergency shower and eyewash facilities per ANSI standards. Tempered water systems are not required if the system is designed such that the water temperature in the system is equal to or greater than the ambient temperature and has enough volume to sustain warm water flow to the eye wash or shower head. This feature must be approved by the AHJ on a case-by-case basis.

2.5.3. STANDARD ON VACUUM AND FILTRATION – BMBL 5TH EDITION P 49 "Vacuum lines should be protected with High Efficiency Particulate Air (HEPA) filters, or their equivalent. Filters must be replaced as needed. Liquid disinfectant traps may be required."

2.5.4. Central lab pure water systems should be provided in the form of a circulating reverse osmosis (RO) system. Higher grade pure water should be provided by polishing units within each lab as required.

2.6. Electrical

2.6.1. Preliminary power loads should be calculated as follows:

Load	**W/Sq Ft.**
Lighting	2.7 – 3.8
Receptacles	4.8 – 21.5
HVAC	9.7 – 10.8
Lab Equipment	4.3 – 8.6
Elevators	1.1 – 1.6
Miscellaneous	1.1 – 2.2
Total	23.7 – 48.5

2.6.2. As the design progresses, these values should be refined and in some cases replaced. Lab equipment should continue to be an allowance but all other values should be re-calculated based on the diversified loads contained in the design.

2.6.3. Electrical panels for labs should not be located in the laboratory, but should be located in a secure space that is accessible by laboratory personnel.

2.6.4. Emergency power should be accommodated in the building wiring even if a generator is not installed. Provide normal and emergency distribution systems that can be separated in the electrical equipment spaces. Leave

specific room for transfer switches. This power is primarily for freezers and other laboratory equipment and is not intended to meet life safety requirements. Life safety systems must have their own back-up which shall be a generator or battery per applicable codes.

2.6.5. Lighting is to conform to the general lighting criteria in the Consultant Procedures and Design Guidelines.

3. Biosafety Level 3 (BSL-3) Laboratories

3.1. Definitions and General

3.1.1. Definition (BMBL): Appropriate for agents with a known potential for aerosol transmission, for agents that may cause serious and potentially lethal infections and that are indigenous or exotic in origin.

3.1.2. Definition (ARS): Used with agents which may be indigenous or exotic to the United States that can be contracted by the respiratory route, and may cause serious or lethal diseases to man, animals, or cause moderate economic loss to the animal industries.

3.1.3. All requirements for BSL-2 shall apply except as modified in this section below.

3.1.4. All BSL-3 and BSL-3Ag facilities and support equipment, even if part of a larger facility, must be fully commissioned. Commissioning shall begin at design and shall include a commissioning agent contracted to the University.

3.2. Architectural Requirements

3.2.1. BSL-3 spaces must be completely separate from spaces accessible to the public or personnel who do not work in the BSL-3 space. Space layout shall be designed to meet the CDC Select Agent rules for security of select agents.

3.2.2. Personnel change rooms for entering and leaving the space should be included. These spaces are on a lab-by-lab basis and shall not be gang spaces for the entire facility. Shower-in/shower-out should be considered for each laboratory or at least for a percentage of the laboratories in a facility.

3.2.3. Laboratory sink must be hands-free or automatically operated.

3.2.4. Biosafety Cabinets and Hoods

3.2.4.1. Class III biosafety may be used in BSL-3 spaces if the facility is design appropriately to handle the special requirements of a Class

III BSC. Fume hoods are not to be used at BSL-3 level without approval from the AHJ and Environmental Health and Safety.

3.2.5. The designer must keep in mind the space must be leak free (air and water) and must be capable of gaseous decontamination. Space must be capable of maintaining .05" w.g. pressure difference to adjacent space at offsets required in HVAC section. Each space shall be designed with tight, gasketed doors and adjustable air ports above the doors adjust the differential pressure.

3.2.6. Differential pressure gauges with alarms shall be located at the entrance to each space where a differential pressure must be maintained. The range of the equipment must be selected to work in the zero to negative 0.1" w.g. range. Phoenix Active Pressure Monitors are preferred, but Magnehelic gauges with alarms may be acceptable for small facilities.

3.2.7. Laboratories shall be separated from any corridor or common area by means of an anteroom. The anteroom may include a clothing change space or shower space to serve the lab.

3.2.8. Floors shall be seamless or poured floors. Integral base shall be part of the floor and extend 4" up the wall.

3.2.9. Walls shall be smooth, epoxy coated to provide tight air seal.

3.2.10. Doors shall be equipped with hardware locks compatible with the electronic security system provided. Magnetic locks may not be used unless they fail without power is indicated here. Main access doors shall fail locked from the outside of the lab and shall open from the inside for egress. Doors within lab suites may fail open, however, security risk issues shall be evaluated to determine actual lock action.

3.2.11. Doors to anterooms or common rooms shall be interlocked to prevent simultaneous opening of more than one door. The interlock system may use magnetic locks. All interlocks shall be connected to the fire alarm system which will release all interlocks in the case of fire. The fire alarm system will not release the hardware locks.

3.2.12. Each lab suite shall have a double door autoclave with bio-seal to sterilize materials leaving the lab. A suite shall be a contiguous set of labs sharing one entrance vestibule or airlock.

3.2.13. Blinds or window treatments that cannot be easily disinfected shall not be used.

3.3. Fire Protection Requirements

3.3.1. Fire protection systems are as required per other sections of the Consultant Procedures and Design Guidelines. Variances to this standard can only be approved by the Authority Having Jurisdiction (AHJ).

3.3.2. In the case of special needs, systems other than water based may be used with the approval of the AHJ.

3.4. HVAC Requirements

3.4.1. BSL-3 labs shall use separate HVAC systems from other spaces, but BSL-3 spaces may share systems.

3.4.2. BSL-3 labs shall be constant volume.

3.4.3. Where systems are shared, each lab must be capable of being isolated by means of bubble tight dampers in the ducts.

3.4.4. Exhaust systems shall be HEPA filtered with bag in/bag out systems. HEPA shall be redundant and the enclosures shall be capable of isolation with bubble tight dampers. Each enclosure shall be fitted with valved connections for VHP decontamination and shall be fitted with a scanning system that allows full in-sittu filter scan without the operator opening the enclosure.

3.4.5. Exhaust duct work shall be welded from the lab through the HEPA filter enclosure.

3.4.6. Supply duct work must be welded from the lab or animal room up to where the duct passes through a bubble tight damper.

3.4.7. All welded duct work is to be separately pressure tested. Method shall be in accordance with working pressure of duct.

3.4.8. A visual method of verifying laboratory pressure/air flow shall be provided. The indicators shall confirm laboratory pressure (thus direction air flow) at the entrance to each space where a pressure difference must exist for directional air flow. Audible and visual alarms shall be provided in the laboratory space to warn the occupants if the pressure falls below a pre-set value. Digital equipment is preferred.

3.4.9. Exhaust discharge shall be designed with a minimum upward discharge velocity of 3000 feet per minute (FPM). The designer must show the discharge clears all nearby structures and intakes using approved ASHRAE methodology or a University Approved modeling process.

3.4.10. Supply and Exhaust Quantities

3.4.10.1. Offset to be at least twice the error rate of the air valves multiplied times the sum of the supply and exhaust air flow plus 50 CFM. Once the offset is calculated, it should be added to the design supply flow to determine the **minimum** exhaust flow. If the exhaust flow is higher than the value used to determine offset, the offset shall be recalculated using the revised exhaust rates.

3.4.10.1.1. Example (assume 5% valve error, Room 40' x 37' 6"x 10' high) Supply air flow is calculated based on load at 1,400 CFM. Exhaust is calculated based on 15,000 cubic feet and 6 ACH or 1,500 CFM minimum. Minimum calculated offset is rounded to nearest 10 CFM.

Calc Run	Supply CFM	Exhaust CFM	Min. Calc Offset	Min. Req'd Exh.
1	1,400	1500	340	1,740
2	1,400	1,740	360	1,760
3	1,400	1,760	370	1,770
4	1,400	1,770	370	1,770

3.5. Plumbing Requirements

3.5.1. Vacuum lines **shall** be equipped with HEPA filtration. Vacuum system shall be designed so it can be decontaminated.

3.5.2. All plumbing traps to be deep seal with the seal depth calculated to prevent lab to ambient air pressure differences from "blowing out" the trap.

3.6. Electrical Requirements

3.6.1. Back-up power must be provided for freezers, biosafety cabinets, air handling, exhaust systems, pumps, and other devices required to maintain the safety of the facility in the case of a power failure. Back-up power shall be sized to run this equipment long enough for the facility to be safely shut down and all materials contained but in no case less than 8 hours. Freezers containing agents or contaminated materials shall have a means provided to maintain super cold conditions for at least 48 hours.

4. Biosafety Level 3Ag (BSL-3Ag) Laboratories

4.1. Definitions and General

4.1.1. (ARS): Used with pathogens that present a risk of causing infections of animals and plants and causing a great economic harm. (Foot and Mouth Disease is the premier example.)

4.1.2. Careful consideration should be given to the U.S. Department of Agriculture's Agricultural Research Service' (USDA ARS) Facilities Design Standards in terms of input.

4.1.3. As a minimum, the Biosafety in Microbiological and Biomedical Laboratories (BMBL), Fifth Edition, Appendix D shall apply, except where noted otherwise in this standard.

4.1.4. Requirements of BSL-3 spaces above shall apply except where the BMBL or this standard is more stringent.

4.2. Architectural Requirements

4.2.1. Keep in mind the facility's barriers serve as primary containment, not secondary containment.

4.2.2. Provide separate security from other spaces including BSL-3 spaces such that the BSL-3 Ag spaces can be isolated and secured.

4.2.3. Necropsy rooms shall be designed to accommodate the animal size programmed for the space with space size for large farm animals preferred.

4.2.4. Entry to containment shall be through a clean change/shower/dirty change area. The clean change space shall be designed to store PPE and clothing for personnel to change into before entering the shower and then containment. The dirty change space shall have room to store PPE and "dirty" clothing before entering the shower.

4.2.5. Design of spaces must be capable of withstanding the pressure decay tests specified by ARS in Appendix 9B of their Design Standard. Commissioning MUST include testing of all applicable spaces.

4.3. Fire Protection Requirements

4.3.1. No additional or special requirements under this section.

4.4. HVAC Requirements

4.4.1. Supply to the space shall be HEPA filtered.

4.4.2. No additional or special requirements under this section.

4.5. Plumbing Requirements

4.5.1. Sanitary drainage system is to be separated from all other waste systems.

4.5.2. Effluent must be collected and decontaminated in a central liquid waste sterilization system. Equipment must be provided to process, heat and hold the contaminated liquid effluents to temperatures, pressures and times sufficient to inactivate all biohazardous materials that reasonably can be expected to be studied at the facility in the future. Double containment piping systems with leak alarms and annular space decontaminating capability should be considered for these wastes. Effluents from laboratory sinks, cabinets, floors and autoclave chambers are sterilized by heat treatment. Under certain conditions, liquid wastes from shower rooms and toilets may be decontaminated by chemicals.

4.5.3. Facilities must be constructed with appropriate basements or piping tunnels to allow for inspection of plumbing systems.

4.5.4. HEPA filters must be installed on all atmospheric vents serving plumbing traps, as near as possible to the point of use.

4.6. Electrical Requirements

4.6.1. No additional or special requirements under this section.

5. Biosafety Level 4 (BSL-4) Laboratories

5.1. Definitions and General

5.1.1. Definition (BMBL): Exotic agents that pose a high individual risk of life threatening disease by infectious aerosols and for which no treatment is available.

5.2. There are no standards for BSL-4 at this time since none are anticipated to be constructed in the near future.

6. Animal Biosafety Level 2 (ABSL-2)

6.1. Definitions and General

6.1.1. ABSL-2 is suitable for work involving laboratory animals infected with agents associated with human disease and pose moderate hazards to personnel and the environment. It also addresses hazards from ingestion as well as from percutaneous and mucous membrane exposure.

6.1.2. All University of Missouri spaces designed for housing lab animals shall be designed to meet ABSL-2 standards as a minimum.

6.1.3. All requirements of BSL-2 are applicable **except** where specifically modified or altered in this section.

6.2. Architectural Requirements

6.2.1. Access to the animal room is limited. Only those persons required for program or support purposes are authorized to enter the animal facility and the areas where infectious materials and/or animals are housed or are manipulated. A card access system is generally required.

6.2.2. Doors to areas where infectious materials and/or animals are housed shall open inward.

6.2.3. A hand washing sink is located at the exit of the areas where infectious materials and/or animals are housed or are manipulated. Additional sinks for hand washing should be located in other appropriate locations within the facility. Sink traps are to be of appropriate level to prevent the entry of vermin or gases. Sink traps to be glass drum type or of such construction that allow visual inspection trap contents.

6.2.4. Penetrations around floors, walls and ceiling surfaces are to be tightly sealed (air tight) to prevent the entrance of vermin and pests. This includes all joints such as door frames to walls, etc.

6.2.5. Approved seamless floors or monolithic floors may be used. Monolithic floors are preferred.

6.2.6. Windows must not be installed in animal spaces unless approved by the Director of the campus animal operations.

6.2.7. Filled and epoxy coated block walls are preferred.

6.2.8. Walls, floors, and ceilings are designed for regular cleaning, disinfection, and decontamination. This process may include the use of high-pressure, high-temperature water as well as abrasives, caustic cleaners and chlorine compounds.

6.2.9. Cantilevered bench tops with rolling metal cabinets are preferred because they allow for ease of cleaning. Fixed casework and countertops shall be sealed to walls and floors during installation to minimize harborage of pests and provide a cleanable joint. Countertop materials will vary depending on usage. Traditional materials such as chemical-resistant plastic laminates may be appropriate for some applications. Epoxy resin will apply for most applications where corrosive chemicals are used.

6.2.10. Space for autoclave capacity should be provided on the “dirty” side of the facility for decontamination of cages, waste materials, and other

contaminated equipment. The autoclave provided may be double-door/pass-through. The doors should be interlocked to prevent the possibility of contamination of the "clean" side. Space should be provided for autoclave maintenance. Space should also be considered for "clean" autoclaves (for sterilization of microbiological media and clean instruments, etc.) when required by animal facility personnel.

6.3. Fire Protection Requirements

6.3.1. Follow requirements in sections above and elsewhere in CPDG.

6.4. HVAC Requirements

6.4.1. Ventilation systems shall be designed in the median of the range required within AALAC. For most animal spaces at the University of Missouri that is 13 air changers per hour (ACH). If requested by the PM, the consultant will evaluate the use of lab air monitoring systems (such as Aircuity) to reduce the total ventilation required with the potential of lowering the minimum ACH for occupied and unoccupied laboratories. As stated in 2.4.5 of this section, the design must be sufficient to allow a laboratory to increase ventilation upon the detection of higher concentrations of identified chemicals to flush out the room (e.g. due to a spill). Ventilation rates may be adjusted over time by comparing measured concentrations with desired thresholds but never lower than twelve (12) ACH for occupied laboratories and six (6) ACH for unoccupied laboratories.

6.5. Plumbing Requirements

6.5.1. Install hose bibb in animal rooms per direction from PM in consultation with campus animal resource personnel. This hose bibb must be on non-potable water system.

6.6. Electrical Requirements

6.6.1. All light fixtures in animal rooms and cage wash areas must be rated as water tight.

6.6.2. All outlets in animal rooms and cage wash areas shall be water proof.

7. Animal Biosafety Level 3 (ABSL-3)

7.1. Definitions and General

7.1.1. Animal Biosafety Level 3 involves practices suitable for work with

laboratory animals infected with indigenous or exotic agents, agents that present a potential for aerosol transmission and agents causing serious or potentially lethal disease.

7.1.2. ABSL-3 facilities shall meet all requirements of ABSL-2 facilities unless modified or added to by this section.

7.1.3. ABSL-3 facilities shall meet all requirements of BSL-3 facilities unless modified or added in this section.

7.2. Architectural Requirements

7.2.1. Walls, floors, and ceilings are designed for regular cleaning, disinfection, and decontamination.

7.2.2. Interior surfaces and joints are to be gas tight to maintain space pressures (capable of gaseous decontamination).

7.2.3. Spaces must be capable of maintaining .05" w.g. compared to adjacent space with offset outlined in HVAC sections for BSL-3.

7.3. Fire Protection Requirements (no change)

7.4. HVAC Requirements (no change)

7.5. Plumbing Requirements (no change)

7.6. Electrical Requirements (no change)

Biosafety Levels:	BSL-1	BSL-2	BSL-3	BSL-3 Ag	BSL-4
Facility Features:					
1. Personnel Entry/Exit through Clothing Change & Shower Rooms	n/a	n/a	recommended	required	required
2. Materials, Supplies, & Equipment enter/leave through Double-Door Autoclave, Fumigation Chamber, or Airlock	n/a	n/a	required	required	required
3. Work Conducted in Primary Containment Equipment.	open bench tops	as required	required	required (If the space is a lab.)	required
4. Hand Washing Station *****(Foot, elbow or automatically operated)	required	recommended*	required*****	required*	required* (not where a suit would be worn)
5. Laboratory and Animal Room Wastes from the Containment Area Decontaminated or Sterilized	n/a	recommended	recommended	required	required
6. Lab Clothing Decontaminated Before Being Washed	n/a	n/a; to be disposed of in the lab or washed by the facility	required	required	required
7. Animal Cages Autoclaved or Thoroughly Decontaminated Before Cleaning	cages washed, then rinsed at 180 degrees.	cages washed, then rinsed at 180 degrees.	cages washed, then rinsed at 180 degrees.	required	required
8. Appropriate Cautionary Signs	n/a	required	required	required	required