1. Purpose:
Specimens received in the University of Minnesota Veterinary Diagnostic Lab (UMVDL) Necropsy Section may pose an infectious disease risk to staff, students and visitors to the lab. This SOP establishes procedures for determining the risk of exposure and managing it by specimen handling procedures and use of protective equipment and facility design. This SOP deals primarily with BSL-2 suspect cases. The procedures in this SOP are performed in either the BSL-2 Necropsy Lab (BSL-2 NL) or the BSL-3 Necropsy Lab (BSL-3 NL) when it is not hot. For procedures that relate to Biosafety Level 3 suspect cases, see “NEC.SOP.017, Facility, BSL-3 Necropsy Lab Specimen Handling”, “NEC.SOP.018, Facility, BSL-3 Necropsy Lab Personnel Entry and Exit Procedures”, “NEC.SOP.053, BSL-3 Sharps Safety”, “NEC.SOP.057, BSL-3 Specimen Receiving: Identification and Communication”, “NEC.SOP.058, Specimen Handling, BSL-3 Suspect Receiving, Containment, Transport and Decontamination” and “NEC.SOP.033, Facility, BSL-3 Necropsy Lab Decontamination”.

2. Responsibility:
It is the responsibility of the VDL Section Head to ensure training for staff that will perform this SOP. It is the responsibility of laboratory personnel using this procedure to read, understand, receive training for, and agree to follow the procedure described in this SOP.

3. Definitions:
3.1. "Biosafety Level 2 [BSL-2]: Practices, equipment and facility design and construction [that] are applicable to clinical, diagnostic, teaching and other laboratories in which work is done with the broad spectrum of indigenous moderate-risk agents that are present in the community and associated with human diseases of varying severity. With good microbiological techniques, these agents can be used safely in activities conducted on the open bench, provided the potential for producing splashes or aerosols is low. The salmonellae and Toxoplasmosis spp. are representative of microorganisms assigned to this containment level. Primary Hazards to personnel working with these agents relate to accidental percutaneous or mucous membrane exposures, or ingestion of infectious materials. Extreme caution should be taken with contaminated needles or sharp instruments. Even though organisms routinely manipulated at Biosafety Level 2 are not known to be transmissible by the aerosol route, procedures with aerosol or high splash potential that may increase the risk of such personnel exposure must be conducted in primary containment equipment, or in devices such as a BSC or safety centrifuge cups. Other primary barriers should be used as appropriate, such as splash shields, face protection, gowns and gloves.”
Biosafety in Microbiological and Biomedical Laboratories, 5th Edition

3.2. "Biosafety Level 3” [BSL-3]: Practices, equipment and facility design and construction [that] are applicable to clinical, diagnostic, teaching, research or production facilities in which work is done with indigenous or exotic agents with a potential for respiratory transmission, and which may cause serious and potentially lethal infection. Mycobacterium tuberculosis, St. Louis encephalitis virus, and Coxiella burnetii are representative of the microorganisms assigned to this level. Primary hazards to personnel working with these agents relate to autoinoculation, ingestion and exposure to infectious aerosols.”
Biosafety in Microbiological and Biomedical Laboratories, 5th Edition
3.2.1. BSL-3 Necropsy Lab ‘not hot’ status: This indicates that the lab is decontaminated and not operating under BSL-3 procedures.

3.2.2. BSL-3 Necropsy Lab ‘hot’ status: This indicates that the lab is certified for BSL-3 use and is operating with BSL-3 procedures.

3.3. Biohazard levels in the BSL-2 Necropsy Lab:

3.3.1. Biohazard level green stipulates the requirements for personal protective equipment (PPE) when the lab is clean and no animal or potentially infectious materials are exposed. Laboratory dedicated boots or disposable shoe covers are required to enter the lab at this level.

3.3.2. Biohazard level yellow stipulates the requirements for PPE when the lab contains exposed animal or potentially infectious materials that necessitate wearing lab dedicated boots/shoe covers, uniform (optional apron), eye protection and nitrile exam gloves (optional cut-resistant gloves).

3.3.3. Biohazard level red stipulates the requirements for PPE when the lab contains airborne infectious agents or when procedures are creating aerosols (e.g. using power saws or high pressure water hoses). PPE requirements at red level are all of those for yellow level plus respiratory protection with N95 filtering face-piece respirators.

3.4. High risk specimens: Among the infectious agents defined above, there are some that pose a greater than normal risk for transmission to humans in the laboratory. Human diagnostic samples will not be tested. Confer with the section head, pathologist assigned the case, and/or the laboratory director if a human diagnostic sample is received in the Necropsy section. When handling specimens suspected of infection with these agents, a greater degree of care and additional PPE may be indicated whether in the BSL-2 NL or in the BSL-3 NL when operating at “not hot” status. All BSL-3 specimens are handled with full precautions and full BSL-3 PPE as described in the BSL-3 SOPs (see “1. Purpose” above.). In the BSL-2 Necropsy Lab or BSL-3 Lab “not hot,” the additional PPE would often include respiratory protection, cut resistant gloves and/or the use of a biosafety cabinet. Additional care will be taken to avoid cuts or percutaneous injection and to reduce aerosolization of infectious material. Additional communication of the known or suspected hazard will be made to those within the necropsy lab and to those who will be in contact with specimens in outside labs.

4. Equipment and Material:

4.1. Exhaust hood (Room 173)

4.2. Chemicals: Disinfectants including but not limited to Synergize (quaternary ammonia/glutaraldehyde), Spartan TBcide or other disinfectant specifically effective against Mycobacterium bovis, 10% bleach, 70% ethanol, Environ LpH for prions, Quat 64 or Vedco P128 (quaternary ammonia disinfectants for eye glasses/goggles), general purpose detergents and other cleaning agents. (Note: Determination of disinfectant suitability must be done in consultation with the BSL-3 Facilities Manager and the U of M Biosafety Officer.) The pathologist or BSL-3 NL Manager will determine the appropriate disinfectant based on the suspected agents present in the lab and communicate this to staff responsible for lab cleaning and decontamination. All disinfectants will used at the dilution and contact time recommended by the manufacturer. If contact time is not specified, then a minimum of 30 minutes will be standard.
5. Safety:
5.1. Training for this procedure includes review of hazards and accident prevention, personal protective equipment (PPE) and other safety requirements based on potential risks associated with the methods, reagents and/or equipment used. Specific requirements may be found in the body of this document. University of Minnesota safety information and safety policies are available from the U of M Department of Environmental Health and Safety (DEHS) on their website www.dehs.umn.edu. Material Safety Data Sheets (MSDS) &/or Safety Data Sheets (SDS) are available in the MSDS/SDS binder in VDL Room #167. All biological, chemical and radioactive waste is disposed according to state, federal and U of M requirements as found at www.dehs.umn.edu “Hazardous Waste.” See NEC.SOP.038 “Disposal.”

5.2. Personal Protective Equipment (PPE): See below 7.1.2, 7.1.3 and 7.1.4.

6. Training:
Laboratory personnel will receive training and will follow appropriate document review schedule. Training status is maintained within the sections and the SOP revision records are archived in the VDL Q-Pulse Document module.

7. Procedure:
7.1. Risk assessment of specimens and associated PPE
7.1.1. Before specimens are processed or necropsies performed on cases submitted to the BSL-2 or BSL-3 Necropsy Lab, a risk assessment will be performed by the responsible individual (i.e. pathologist, senior resident or authorized parapathologist/scientist) who has been assigned responsibility for managing the case. In cases where the risk is difficult to determine, the VDL director will decide the appropriate course of action. (For BSL-3 suspects see “NEC.SOP.057, BSL-3 Specimen Receiving: Identification and Communication”.) Based on this assessment, a biosafety level will be assigned and appropriate health and safety measures determined for safe handling of the specimen. The following risk factors will be considered: potential infectious agents (e.g. select agents, higher risk zoonotic agents such as \textit{Coxiella burnetti}, \textit{Brucella}, \textit{tuberculosis}, \textit{herpes B virus} or rabies), potential procedures that aerosolize pathogens, categories of species and their increased likelihood for serious or unpredictable zoonoses such as wildlife, nonhuman primates (NHP) or other exotic species.

7.1.2. Normally BSL-2 cases involving food/production species and companion animals will be processed in the BSL-2 Necropsy Lab. The standard PPE to be used while working on cases includes: lab uniform (cloth or Tyvek-type coveralls, lab shirt and pants or lab coat over street clothes), exam gloves, safety glasses and/or face shield and dedicated boots, reusable or disposable. Impermeable (plastic, rubber, etc.) aprons and cut-resistant gloves are optional depending on the need. For visitors to the lab who will only be observing at a safe distance from animals/infectious materials, the impermeable plastic apron may serve as their uniform worn over street clothes. If respiratory hazards will be likely, then disposable N95 filtering face-piece respirators will be required of everyone in the lab while those procedures or specimens are in process.

7.1.3. Higher risk specimens: Potentially serious or highly contagious zoonoses suspected in wildlife, non-human primates (NHP) and other exotic species that are determined not to be BSL-3 suspects will normally be processed in the BSL-3 Lab operating at “not hot” status, if available, or in the BSL-2 NL by trained, knowledgeable personnel, not students. The same PPE as above (7.1.2.) with the following will always be required: respiratory protection, double gloves with a cut resistant glove between layers of exam gloves on the
7.1.4. BSL-3 suspect specimens will always be handled in the BSL-3 Lab when it is certified and operational at “hot” status. PPE requirements and specimen handling procedures in the BSL-3 Necropsy Lab (NL) are stipulated in “NEC.SOP.017” and “NEC.SOP.018”. Conversion from BSL-2 procedures to BSL-3 procedures in the BSL-3 NL is outlined in “NEC.SOP.034”.

7.2. Communication of risk

7.2.1. Before procedures are begun, the responsible individual (see 7.1.1.) will communicate the risk assessment and safety requirements to all individuals who will occupy the same space (BSL-2 Necropsy Lab, Room 165, or associated lab spaces such as the photo lab, Room 167, necropsy office, etc.) while the procedures are being performed. The responsible individual will also ensure that signs at the entrances indicate the current required biohazard protection (green, yellow or red level).

7.2.2. During the procedures, the responsible individuals will monitor the lab occupants to make sure that all are observing the necessary procedures and using the required PPE. Other authorized staff or students seeking admittance to the lab during such times will be notified of PPE requirements. Authorized visitors will be logged in at the lab entrances, escorted by authorized staff, notified of risks and safety requirements. They will be provided with and required to use appropriate PPE while in the lab. When leaving the lab, they will be instructed in removal and handling of PPE and hand sanitizing.

7.2.3. High risk specimens being transported for testing within the Necropsy Section or to other labs within or outside the VDL, will be labeled with a red or orange biohazard sticker indicating the known or suspected infectious agent.

7.3. Airborne hazards and aerosol containment. Excessive production of bioaerosols results in greater potential for exposure risk to personnel and potential cross contamination of specimens for sensitive tests such as PCR. When airborne hazards are present, the BSL-2 NL will operate at red hazard level. Aerosol production will be contained and exposure potential will be mitigated by the following.

7.3.1. Electric saws – Use small saws in a biosafety cabinet (BSC) if available. When larger hand-held saws are used, all individuals in the lab will wear eye/face protection and a respirator in addition to the minimum PPE.

7.3.2. Suspect high risk specimens – If specimen size permits, use a BSC for containment of aerosols from these specimens.

7.3.3. High pressure hoses -- Make sure that all personnel in the area have respiratory and eye/face protection when hoses are used to clean contaminated floors, tables or equipment. Be aware that aerosols may be a source of cross contamination of specimens for sensitive tests such as PCR.

7.4. Sharps hazards -- See “NEC.SOP.040, Necropsy Sharps Safety”

7.5. Reporting of injuries or potential exposures:

The U of M Workers Compensation (U of M Office of Risk Management and Insurance, 612-625-0062, orm@umn.edu) injury reporting system is used for documenting and reporting suspected or known exposures or injuries. Employees fill out the Employee Incident Report, supervisors fill out the First Report of Injury and the Supervisor Incident Investigation. In case of serious incidents, the following will be notified: the Director of the Veterinary Diagnostic Lab, the College of Veterinary Medicine Dean’s Office using the CVM Serious
Incident Report Form and Policy, the U of M AHC Emergency Response Team (www.ahc.umn.edu/about/admin/oer, director: 612-625-3958), the Department of Environmental Health and Safety (612-626-6002) and the Office of Occupational Health and Safety (612-626-5008, uohs@umn.edu). The VDL Director or authorized designee will be responsible for ensuring that this notification occurs. The notification will include a description of the incident, individuals directly involved or reliable witnesses, and the nature of actual or potential harm, injury, exposure, liability or risk of negative publicity.

8. Acceptance Criteria:
   N/A

9. Interpretation of Results:
   N/A

10. References:
10.2. NEC.SOP.017, Facility, BSL-3 Necropsy Lab Specimen Handling
10.3. NEC.SOP.018, Facility, BSL-3 Necropsy Lab Personnel Entry and Exit Procedures
10.4. NEC.SOP.033, Facility, BSL-3 Necropsy Lab Decontamination
10.5. NEC.SOP.034 Facility, BSL-3 Necropsy Lab Conversion from BSL-2 Procedures to BSL-3 Procedures
10.6. NEC.SOP.038 Disposal
10.7. NEC.SOP.040, Necropsy Sharps Safety
10.8. NEC.SOP.053, BSL-3 Sharps Safety
10.9. NEC.SOP.057, BSL-3 Specimen Receiving: Identification and Communication
10.10. NEC.SOP.058, Specimen Handling, BSL-3 Suspect Receiving, Containment, Transport and Decontamination
10.12. Worker’s Compensation Reporting Procedures and Forms (U of M Office of Risk Management) http://www.policy.umn.edu/Policies/hr/Benefits/WORKERSCOMP.html
BSL-2 Necropsy Lab Safety Requirements

Anyone seeking access to the Necropsy Lab will be required to observe the following rules.

Visitors

Anyone other than UMVDL Necropsy, Pathology and Receiving Staff will be required to be escorted by authorized staff members in order to enter the Necropsy Lab. This will include VMC and other U of M staff and students, animal owners, U of M Facilities Management staff, researchers and all non-university visitors and contract workers. All visitors will need to log in at one of the two entrances.

Hazard Levels

Colored signs at the entrances to the Necropsy Lab will indicate the hazard level and minimum personal protective equipment (PPE) which will be provided by the VDL unless visitors are adequately attired. The required PPE for the three hazard levels are detailed below.

**Green Level:** necropsy boots (all other footwear must be covered with a minimum of disposable plastic boots)

**Yellow Level:** necropsy boots or disposable plastic boots over other footwear, eye protection, uniform or impermeable plastic apron, and exam gloves

**Red Level:** necropsy boots or disposable plastic boots over other footwear, eye protection, uniform or impermeable plastic apron, exam gloves, and a minimum of an N95 respirator

Note: Respirator use may be contraindicated with certain medical conditions. If not able to wear a respirator, you may be prevented from accessing the lab during red level.

The hazard level may change while you are in the lab. You will be notified of the change and required to adjust to the new PPE requirements in effect.

See NEC.SOP.041 for additional information about these safety procedures.