

**University of North Dakota**

**Plant Biosafety Level** **X  Laboratory Manual**

**Lab PI NAME**

**This lab-specific manual applies to the following BL-XP agents:**

1. Name of Transgenic Plant or Plant pathogen

2. Name of Transgenic Plant or Plant pathogen

3. Name of Transgenic Plant or Plant pathogen

**January 2016**

Prepared by the University of North Dakota Office of Safety

**Laboratory of Dr. (PI's Last Name****)**

**Department:**

**Building(s):**

**Room Number(s):**

According to federal guidelines, all laboratories designated as Biosafety Level 2 (BL-2P) and above must have a ***lab-specific biosafety manual.*** This manual must be adopted as policy and be accessible to all laboratory personnel. To assist Principal Investigators (PIs) in complying with these requirements, the Office of Safety at University of North Dakota (UND) has developed this template. The ***PI is responsible*** to develop a ***Laboratory Specific Biosafety Manual*** with instructions to safely handle and manipulate a particular plant/regulated material under Biosafety Level 1 or 2 (BL-1P or BL-2P) laboratory conditions. Developing and maintaining this Manual is ***required for all BL-1P and BL-2P labs at UND***.This Lab Specific Biosafety Manual will become part of the ***annual laboratory safety audit*** process at UND and a copy (electronic is preferred) needs to be sent to the Biological Safety Officer (Sumit.Ghosh@UND.edu; Room 202, 3851 Campus Rd Stop 9031, Safety Office Building).

The ***PI is responsible*** for performing a risk assessment, including basic background information for each regulated material, writing an environment release risk, detailing surface decontamination, and writing standard operating procedures (SOPs) for experiments where safety is of an important concern. Similarly, please provide ***lab-specific*** information where you see ***highlighted text fields*** throughout this template. This template has been provided as a starting point. Additions/changes to this template that will render the final manual more useful for the laboratory’s safety needs are strongly encouraged.

In addition to this manual, whenever working with recombinant or synthetic DNA, the UND Institutional Biosafety Committee (IBC) requires all labs to adhere to the National Institutes of Health (NIH) Guidelines for Research Involving Recombinant DNA Molecules, which can be found here: (<http://oba.od.nih.gov/oba/rac/Guidelines/NIH_Guidelines.htm>). It is also strongly encouraged that you use and follow the guidelines provided in the CDC’s Biosafety in Microbiological and Biomedical Laboratories (BMBL), 5th Edition (<http://www.cdc.gov/biosafety/publications/bmbl5/>). Many of the requirements provided in these two documents will be utilized in the annual laboratory safety audits. You can also find a copy of these handbooks on the Office of Safety website under the section Policies and Procedures (Subheading: Handbooks and Manuals). (<http://und.edu/finance-operations/office-of-safety/policies-and-procedures/index.cfm>)

This template was originally developed and adopted by the Oregon Health and Science University, Duke University, Northern Arizona University, Arizona, State University, and Michigan State University. However, the original template has been modified/edited to meet the requirements of UND researchers.

The Biosafety Procedures and Safety section of the manual has been adapted from a number of resources including: National Institutes of Health (NIH) Guidelines for Research Involving Recombinant DNA Molecules, BMBL 5th edition, World Health Organization Laboratory Biosafety Manual, and Canadian Biosafety Standards and Guidelines.

It is recommended the PIs use a ***loose-leaf binder*** for maintaining and organizing this ***Laboratory Specific Biosafety Manual.*** This will render the PIs to accommodate any changes or add new materials when required.

It is important that **all lab personnel’s** read the contents of this manual. This manual must be updated and reviewed by laboratory personnel annually. By signing this page, lab personnel agree to abide by the safety precautions and procedures discussed herein.

*I have read, understand, and agree to adhere to the biosafety procedures contained within:*

**Principal Investigator:**

|  |  |  |  |
| --- | --- | --- | --- |
| Typed Name | Title | Signature | Date |
| First, Last | Principal Investigator |  |  |

**Laboratory Staff:**

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Job/Title | Signature | Date |
| First, Last | Enter info |  |  |
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# **LAB CONTACTS AND TRAINING**

|  |  |
| --- | --- |
| **Principal Investigator:** | First, Last |
| **Lab Location:** | Enter Room Number/Building |
| **Office Phone:** | Enter number |
| **24/7 contact (Cell Phone):** | Enter number |
| **IBC Protocol #(s):** | Enter number(s) |

**Training Courses.** Courses required of ***all laboratory researchers*** should be listed below. Other courses may be added if they relate to the work conducted in your specific lab, for example ***Laboratory Safety Training.*** Copies of completed training certificates should be included in **Appendix IV.**

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| --- |
| **Lab Personnel** |
| **Name** | **Bloodborne Pathogens****Training (Annual)** | **Laboratory Safety****Training** | **Animal Care and Use Training** | **(Other Trainings)** |
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***Hazardous Agent(s)*-specific Training.** Laboratory personnel are not allowed to work with hazardous agent(s) until they have been trained by the PI who supervises their work, or other designated laboratory personnel with technical expertise. The worker should demonstrate good microbiological skills and an understanding of this manual prior to being permitted to work with hazardous agent(s).

# **STANDARD OPERATING PROCEDURES FOR TRANSGENIC PLANTS AND/OR PLANT HAZARDS**

**Permit Holder Name and Department: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Approval Holder Phone Number(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Location of field/facility including (address)**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**List of Approved Rooms (including Building name)****for transgenic plants and/or plant pathogens**

**TRANSGENIC PLANTS AND/OR PLANT PATHOGENS**

|  |  |
| --- | --- |
| **Name of transgenic plant or plant pathogen** | **Species of Host/Transgenic** |
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**PHYSICAL CONTAINMENT STANDARDS:**

***[Describe the field, include a schematic of field/facility, and any safeguards taken to contain plant pest i.e fence, buffer area, gates, locks, warning signs, etc.]***

**GENERAL OPERATIONAL STANDARDS**

**Laboratory Procedures:**

*[Include techniques and safety issues.]*

**Biocontainment:**

*[Include techniques and safety issues.]*

**Transportation:**

**All transgenic plants must be transported with secondary containment (i.e. double bagged and in a leak proof container)**

*[Include how any plant material is transported and describe if plants are seeding. Include any information on if and how you will ship with a commercial shipping company. Describe any foreign source materials and how you will handle safely. Additionally, include information about permits (if required for research work).]*

**Persistence in the Environment**

*[Describe reproductive controls and separation distances that will be employed.]*

*[Describe any special circumstances that may increase the likelihood that regulated GMO or offspring could persist in the environment, including but not limited to proximity to sexually compatible wild or weedy relatives, whether the location is prone to flooding, high winds, animal incursion, or public access.]*

**Plant or Agent Decontamination**

|  |  |  |
| --- | --- | --- |
| **Type of Disinfectant** | **Concentration** | **Contact Time** |
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**Autoclave:**

*[If autoclave is used to deactivate: explain when it is used, what information is in the logbook, when each monthly biological indicator was performed, and where the autoclave is located.*

**Volunteer Plants**

*[Describe how volunteers will be managed to prevent persistence in subsequent seasons (e.g. frequency, timing, and areas of monitoring, methods of removal, other crops to be planted in the field in subsequent seasons that can be readily differentiated from the regulated material)]*

**Waste Disposal**

*[Explain the procedure for waste disposal. Include disposal methods for recombinant waste as solids, liquids, and sharps. Ensure explanation of how waste is transported from the lab to any waste disposal area. Record room number of your Risk Management collection site if applicable.]*

**Visitor Information**

All visitors to this laboratory have read and understand what the agents are and what their route of exposure is.

**Spill kit location: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**First Aid Kit Location:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# **SIGNATURE AND ACKNOWLEDGEMENT PAGE FOR LAB WORKERS**

**Authorization**

 Anyone working under this approval who has signed the list below is permitted to enter authorized rooms under this approvalwhile work with recombinant plant material or plant-related organisms, transgenic whole plants, plant pathogens or any regulated plant material is in progress.

**Disclaimer**

 We, the undersigned, understand that the above mentioned agents may be hazardous to the environment. Further, we agree that we have received, read, understood and had an opportunity to ask questions about the UND Plant Biosafety Level XP Manual and received appropriate training prior to handling samples. Any additional questions should be directed to the Approval Holder or the Institutional Biosafety Committee. I hereby agree to inform the University of North Dakota and Office of Safety of any possible occupational exposure or near miss while working under this Approval Holder.

Anyone who works under this approval must sign the disclaimer below.

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| **Name/Company/University** | **Date** | **Signature** |
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# **SIGNATURE AND ACKNOWLEDGEMENT PAGE FOR VISITORS TO LAB**

**Visitors must read, fill out and sign the below table. A visitor is an individual that comes into the lab and does not directly work with the recombinant plant material or plant-related organisms, transgenic whole plants, plant pathogens or any regulated plant material, but may come in contact with contaminated objects.**

**Disclaimer**

 We, the undersigned, understand that the above mentioned agents may be hazardous to the environment. Further, we agree that we have received, read, understood and had an opportunity to ask questions about the appropriate parts of the Standard Operating Procedures. I hereby agree to inform the University of North Dakota Institutional Biosafety Committee and Office of Safety of any possible occupational exposure or near miss while working at the University of North Dakota.

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# **VALIDATION FOR LAB SPECIFIC SAFETY MANUAL**

**Approval Holder’s Certification**

I hereby certify that I have reviewed the contents of the Standard Operating Procedures mentioned in this manual and it reflects my current operating policy for work with recombinant plant material or plant-related organisms, transgenic whole plants, plant pathogens or any regulated plant material.

[Approval Holders*’s Name*]

[Approval Holder*’s Title*]

**Signature** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Annual Review Date** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# **BIOSAFETY REQUIREMENTS AND PROCEDURES**

1. **Physical Containment.** All work with regulated material/plant must be performed in a properly maintained BL-XP laboratory. Appropriate signage must be posted at the entrance to the laboratory. This sign must include the biosafety level (BL-1P/BL-2P), the name of the plant/regulated material in use, the name and phone number of the PI or lab supervisor, and required procedures for entering and exiting the lab. A sign that meets these requirements is available on the Office of Safety website.

<http://und.edu/finance-operations/office-of-safety/_files/docs/biosafety-level-1.pdf>

<http://und.edu/finance-operations/office-of-safety/_files/docs/biosafety-level-2.pdf>

Laboratory windows that open to the outdoors must be fitted with fly screens

1. **Safety Equipment.**
2. **Biosafety Cabinet:** ***All BSCs must be certified annually.*** ***Note that HEPA filtered exhaust air from a Class II BSC can be safely re-circulated back into the laboratory.*** The BSC exhaust can also be fed to the laboratory room exhaust via canopy or direct connection. If the blower on the BSC is not left on continuously, it should be turned on and allowed to run for 5 minutes to facilitate several complete exchanges of air before work begins. At the beginning of the work session, plastic-backed absorbent paper can be placed on the work surface (optional), but must not obstruct air flow. The work area should be segregated into clean and contaminated sections, with contaminated material being located at the rear of the cabinet workspace. Discarded material should be added to a small bag within the cabinet. Work with all materials 4-6 inches inside the sash. Keep containers of liquids capped when not in use. At the end of the work session, all items to be removed from the BSC must be decontaminated. The surface of the BSC must be wiped down with 70% EtOH, and the sash lowered.
3. **Vacuum lines:** Vacuum lines to be used for aspiration must be equipped with an in-line HEPA filter and a vacuum flask ***(two flasks connected in series are recommended, but not required),*** containing an appropriate disinfectant in a volume sufficient to provide the recommended final concentration for that disinfectant when the flask is full. All the flasks should be kept in a secondary enclosure.
4. **Centrifuges:** If hazardous agent(s) will be concentrated in an ultracentrifuge, rotors must be equipped with features (e.g., sealing o-rings) to minimize the risk of aerosol generation when necessary. Low-speed swinging-bucket centrifuge buckets must be equipped with aerosol-tight safety covers when necessary. Microcentrifuges must have aerosol-tight rotors capable of being removed while sealed so that the rotor can be unloaded in the BSC when necessary.
5. **Personal Protective Equipment (PPE).** The following PPE must be worn when working with plant/regulated material:

Please check appropriate boxes by clicking and selecting “checked.”

 [ ]  Gloves [ ]  Safety glasses [ ]  N95 Respirator [ ]  Shoe covers

 [ ]  Face shield [ ]  Surgical mask [ ]  Medical scrubs [ ]  Lab coat [ ]  Hair net

***List other required PPE not mentioned above, optional PPE, and other helpful suggestions to achieve the highest level of personal protection from this agent(s)*** (**Examples:** use of double gloves, tucking cuffs of lab coat into sleeves, etc.). Add separate sections as necessary if PPE requirements differ for each plant/regulated material. When working, be cognizant to remove potentially contaminated gloves and replace them with new gloves before touching anything such as the refrigerator, centrifuge, incubator, etc. to prevent contamination or lab work surfaces.

Certain procedures may require additional PPE. Contact the Biological Safety Officer (701-777-2444; Sumit.Ghosh@UND.edu) if you would like to discuss PPE requirements.

1. **Spill Kit.** The lab must have a spill kit readily accessible in the event of a spill ***(Plastic Pails for the spill kit can be purchased from ULINE [Model Number: S-7914, S-20541]).*** The spill kit should have:
* an easy-to-read outline of the spill response SOP
* gloves
* surgical masks
* safety glasses or goggles
* clean lab coat or disposable gown
* paper towels to absorb contaminated liquids
* disinfectant appropriate for agents used in the lab (e.g. bleach)
* tongs or forceps to pick up broken glass
* a waste container large enough to handle wet, contaminated paper towels

**NOTE:** It is a good idea during the Annual Review of this Manual to take the extra time to practice the spill procedure.

1. **General Procedures for working with regulated material/plant.** Standard safe microbiological practices should be employed, conforming to the ***NIH GUIDELINES FOR RESEARCH INVOLVING***

***RECOMBINANT OR SYNTHETIC NUCLEIC ACID MOLECULES***, including a prohibition of eating, drinking, food storage, handling of contact lenses, applying lipstick, cosmetics or lip balm, mouth pipetting, and a requirement of appropriate PPE.

**Additional practices include the following recommendations:**

1. Whenever possible, work with regulated material(s) during normal working hours, to enable adequate response to a severe adverse incident. If the laboratory PI/supervisor determines that it is safe for you to do work outside of normal working hours, employ the buddy system, or schedule a call-in time with someone to ensure safety.
2. **Sharps** should be avoided whenever possible in a BL-1P, BL-2P laboratory. ***Plastic aspirating pipettes (e.g., Corning cat. # 4975; Fisher Cat # 13-675-123)*** should be substituted for glass Pasteur pipettes if possible. Needles with safety devices are recommended wherever possible. If conventional needles are required, they must never be re-capped, and must be disposed of in a rigid, red sharps waste container located near the workspace. Never reach into a sharps container to retrieve discarded items. Do not allow a sharps container to become more than ¾ full.
3. **Centrifugation:** Centrifuging is a procedure that can create aerosols. When concerned about aerosols, use rotors with aerosol tight lids or buckets, and open rotors or buckets in the BSC. At the end of any procedure that involves centrifuging regulated material(s), it is good practice to decontaminate all rotors and/or buckets.
4. **Storage:** Regulated Material(s)/Plant stocks must be in closed in secondary containers with appropriate labels.
5. **Accidents:** Accidents include the release of regulated material(s) due to equipment failure (e.g. tube failure in the centrifuge), needle-sticks, or other injuries concomitant with a breach of containment of agent(s).
	1. ***Centrifugation.*** If tube failure is suspected (sudden clunking or automatic shut-down due to imbalance), leave the centrifuge lid closed for 30 min. to allow aerosols to settle. During this time, notify the PI. Open the lid cautiously to check the integrity of the rotor/tubes. If the rotor looks intact, spray the rotor with 70% EtOH, and transport it into the BSC before unloading centrifuge tubes. If a tube has cracked or collapsed within a swinging bucket (e.g., SW28), decontaminate the tube and bucket inside the BSC. (Use your own judgment regarding recovery of agent(s)). If there appears to be a leak or spill inside the centrifuge, decontaminate the centrifuge chamber by cautiously opening the centrifuge, adding paper towels to soak up any contaminated liquids, then liberally spraying disinfectant onto the walls and inside the lid of the centrifuge, so that disinfectant pools at the bottom of the chamber. (e.g., about 0.5-1 liter). Close the centrifuge for 30 min. Clean up the soaked paper towels as for a major spill outside the BSC. In the event of a catastrophic failure in the centrifuge (e.g., swinging bucket coming off the rotor at 22,000 rpm, damaging the centrifuge, and releasing agent(s) into the centrifuge chamber), keep the centrifuge lid closed for 30 min. During this time, notify the PI and if the contamination is too extensive to manage alone, ask the Biological Safety Officer for assistance (701-777-2444). Decontamination is similar to a major spill outside the BSC. Lay paper towels inside the centrifuge chamber, and soak with 10% bleach (or other appropriate disinfectant). Spray the inside of the centrifuge jacket with 70% EtOH. Close the lid for 30 min. Clean up following the same procedure as for a major spill outside the BSC.
	2. ***Sharps*** should be avoided whenever possible for work with plant/regulated material production, manipulation, and delivery. However, if there is a needle-stick, briefly bleed the wound (squeeze it to produce a couple of drops of blood), then wash thoroughly with soap and water for 15 min. Report the incident to the PI and the Biological Safety Officer (701-777-2444).
	3. Other accidents might include slips, falls, or collisions with other personnel, leading to spills of agent(s). Additional help may be required in the event of personal injury, in which case assisting personnel must be made aware of the presence of hazardous agent(s) so that they can respond appropriately. In the event of a major spill involving serious personal injury or requiring rescue, call Office of Safety (701-777-3341), and contact the PI. You may always dial 911 for Emergency Assistance\*

**NOTE:** The incident reporting form can be found on the Office of Safety website:

<http://und.edu/finance-operations/office-of-safety/_files/docs/incident-reporting-form.pdf>

# **APPENDIX I: IMPORTANT CONTACT INFORMATION**

 **FOR EMERGENCY SERVICES**

 **You may always dial 911 for Emergency Assistance\***

UND Police 701-777-3491

Operations Call Center 701-777-2591

 **OFFICE OF SAFTEY**

Associate Director of Safety 701-777-3759

 Biological Safety Officer

Biological spills 701-777-2444

 Environmental Health & Safety Manager

Hazardous Chemical/Substance Spill 701-777-5931

 Environmental Health & Safety Technician

Fire Safety 701-777-6044

 Radiation Safety Officer

Radioisotope spills 701-777-5931

 **PUBLIC HEALTH AND SAFETY**

Chief of Police701-777-3391

 **FACILITIES MANAGEMENT**

Facilities Main Desk 701-777-4137

 **MEDICAL SERVICES**

Occupational Health - Altru 701-780-1546

# **APPENDIX II: SPILL RESPONSE CUE CARDS**

***(Cut out cue cards and post in a highly visible work area)***



**SPILLS OUTSIDE THE BIOSAFETY CABINET**

**Small Spill (<10 mL, localized to small area)**

 1. Alert personnel in the vicinity.

 2. Check for contaminated clothing, including shoes. Decontaminate if necessary.

 3. Evacuate the room. Close door. Discard potentially contaminated PPE, remove and decon any contaminated clothing. The contaminated PPE goes in the biohazard bag. Wash hands.

 4. Notify PI. Wait for 30 minutes to allow for aerosols to settle.

 5**.** If assistance is needed, notify the Biological Safety Officer (777-2444).

 6. After 30 min don fresh PPE: lab coat or gown, gloves, mask, eye protection.

 7. Pick up sharps with tongs & place in biohazard sharps container then cover spill with paper towels.

 8. Soak paper towels with the appropriate disinfectant, from perimeter toward the center.

 9. Allow 30 min. of contact time to inactivate the agent.

 10. Discarded towels go in biohazard bags.

 11. Wipe down spill area one final time with appropriate disinfectant.

 12. Wash hands thoroughly.

**SPILLS OUTSIDE THE BSC**

**Major Spill (>10 mL, localized to small area)**

 1. Alert personnel in the vicinity.

 2. Check for contaminated clothing, including shoes. Decontaminate if necessary.

 3. Evacuate the room. Close door. Discard potentially contaminated PPE and remove any contaminated clothing. The contaminated PPE goes in the biohazard bag. Wash hands thoroughly.

 4. Post warning sign: **“DO NOT ENTER: Biological spill!”**

 5. Wait 30 min. Meanwhile, notify PI.

 6**.** If assistance is needed, notify the Biological Safety Officer (777-2444).

 7. Don fresh PPE: lab coat or gown, gloves, mask, eye protection.

 8. Re-enter the room, pick up sharps with tongs & place in sharps biohazard

 container, cover spill with paper towels.

 9. Soak paper towels with appropriate disinfectant, from perimeter toward the center.

 10. Allow 30 min. of contact time. (Use a contact time that is appropriate for the disinfectant and the organism).

 11. Discarded towels go in biohazard bags.

 12. Wipe down spill area one final time with appropriate disinfectant.

 13. Wash hands thoroughly.

 14. With PI, write up a report and submit to the Biological Safety Officer. Or, alternative, schedule a meeting to discuss the events with the BSO.

**SPILLS INSIDE AN INCUBATOR**

 Decontaminate water pan via autoclave.

 1. Alert personnel in the vicinity.

 2. Evacuate the room for at least 30 min. Close door. Discard potentially contaminated PPE and remove any contaminated clothing. Wash hands thoroughly.

 3. Notify PI.

 4. Don fresh PPE: lab coat or gown, gloves, mask, eye protection.

 5. Pick up sharps with tongs & place in biohazard sharps container.

 6. Cover spill with paper towels.

 7. Soak paper towels with appropriate disinfectant, from perimeter toward the center.

 8. Allow 30 min. of contact time (use a contact time that is appropriate for the disinfectant and the organism).

 9. Discarded towels go in biohazard bags.

 10. Wipe down spill area one final time with appropriate disinfectant.

 11. Wash hands thoroughly.

**SPILLS INSIDE A CENTRIFUGE**

 1. Close centrifuge immediately. Assume an aerosol has been generated. The incident must be treated as a potential exposure.

 2. Alert personnel in the vicinity. Evacuate room.

 3. Wait 30 min. Meanwhile, notify PI.

 4. After 30 min. open lid of centrifuge slowly.

 5. If there has been no breach of containment, spray rotor with 70% EtOH.

 6. If inside of rotor is contaminated, decontaminate in the BSC. As a precautionary measure, decontaminate the centrifuge chamber.

 7. If rotor buckets are damaged, open lid slowly and add paper towels. If assistance is needed, notify the Biological Safety Officer (777-2444).

 8. Spray walls of chamber and rotor with 70% EtOH.

 9. Close centrifuge lid for 30 min. contact time.

 10. Finish centrifuge clean-up as for major spill outside the BSC. Transport rotor to BSC.

 11. Open and decontaminate rotor/buckets in the BSC.

 12. Wash hands thoroughly.

 13. For a major spill inside a centrifuge with PI, write up a report and submit to Biological Safety Officer.

**SPILLS DURING TRANSPORT**

**If a spill occurs in a public area:**

1. Don’t attempt cleanup without proper supplies.

2. Contact Office of Safety (701-777-3341) for assistance during office hours M-F 8.00 am to 4.30 pm.

**If a spill occurs in a vehicle:**

1. Leave the vehicle with closed windows and locked doors.

2. Contact Office of Safety (701-777-3341) for assistance.

After hours, contact the UND Police & Office of Safety (701-777-2591) for assistance.

# **APPENDIX III: DOOR SIGNAGE**

***Please go to this website:*** [***http://und.edu/finance-operations/office-of-safety/forms.cfm***](http://und.edu/finance-operations/office-of-safety/forms.cfm) ***and find/download/fill-out the appropriate sign for your lab. Display a copy of the sign on the main entrance(s) to the lab.***

# **APPENDIX IV: TRAINING CERTIFICATES**

***Following this page, please insert copies of training certificates for each person who has completed a training course listed in the table on page 5.***

# **APPENDIX V: IBC PROTOCOL AND APPROVAL**

***Following this page, please insert a copy of the lab’s IBC-approved protocol(s) and a copy of the IBC Approval Letter(s).***

Please note: All work with your BL-1P and BL-2P material must be pre-approved by the UND IBC before experiments can begin.

# **APPENDIX VI: DISINFECTANTS**

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| **SUMMARY OF PRACTICAL DISINFECTANTS FOR USE IN BIOLOGICAL RESEARCH** |
| **DISINFECTANTS** | **PRACTICAL REQUIREMENTS** | **INACTIVATES** |
|  | **Contact Time****(Minutes)** |  |  |
| **TYPE** | **CATEGORY** | **USE DILUTION** | **LIPO-VIRUS** | **BROAD SPECTRUM** | **TEMP.****(°C)** | **RELATIVE HUMIDITY (%)** | **VEGETATIVE BACTERIA** | **LIPOVIRUSES** | **NON-LIPID VIRUSES** | **BACTERIAL SPORES** | **TB** | **HIV** | **HBV** |
| LIQUID | Quaternary Ammonium Compounds | 0.1-2.0% | 10-30 | - |  |  | **+** | **+** | **-** | **-** | **-** | **+** | **-** |
| Phenolics, Amphyl | 1.0-5.0% | 10-30 | - |  |  | **+** | **+** | **\*** | **-** | **+** | **+** | **\*** |
| Chlorine Bleach | 5% | 10-30 | 30 |  |  | **+** | **+** | **+** | **+** | **+** | **+** | **+** |
| Iodophor, Wescodyne | 0.5-10% | 10-30 | 30 |  |  | **+** | **-** | **+** | **+** | **+** | **+** | **\*** |
| Alcohol, Ethyl | 70-85% | 10-30 | - |  |  | **+** | **-** | **\*** | **-** | **-** | **+** | **\*** |
| Alcohol, Isopropyl | 70-85% | 10-30 | - |  |  | **+** | **+** | **\*** | **-** | **-** | **+** | **\*** |
| Formaldehyde | 0.2-8.0% | 10-30 | 30 |  |  | **+** | **+** | **+** | **+** | **+** | **+** | **+** |
| Gluteraldehyde | 2.0% | 10-30 | 30 |  |  | **+** | **+** | **+** | **+** | **+** | **+** | **+** |
| GAS | **Ethylene Oxide** | 8-23g/ft3 | 60-240 | 60 | 37 | 30 | **+** | **+** | **+** | **+** | **+** | **+** | **+** |
| Paraformaldehyde | 0.3g/ft3 | 60-180 | 60 | >23 | >60 | **+** | **+** | **+** | **+** | **+** | **+** | **+** |

**+ Positive Effect; - No Effect; \* Variable Effect** **Main Reference: NIH Safety Monograph, 1979; BMBL 5th Edition, 2009; WHO Laboratory Safety Manual, 2004**

# **APPENDIX VII. CATALOG OF ORGANISMS LOG/REGULATED MATERIAL/PLANT (INVENTORY)**

***Consider using this form for -80°C Freezers, Liquid Nitrogen Containers, and Refrigerators***

**Researcher: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Emergency Contact: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

 **Building: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Room: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Contact on call: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**IBC Registration #:**

**Freezer or Liquid Nitrogen Container Description: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Date Inventory Performed**: **Notes: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |  |
| --- | --- | --- |
| **Type of Biological Material** | **Name of Material****(Please include Genus and Species where applicable)** | **OPTIONAL** |
| **Type of Containers** | **Quantity of Containers** |
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**TYPE OF BIOLOGICAL MATERIAL:** Bacteria, bacterial toxins, viruses, fungi, rickettsia, prions, protozoans, parasites, genetically-modified organisms, recombinant or synthetic nucleic acid molecules, human blood or materials of human origin, regulated plant material etc.

**TYPE OF CONTAINERS:** Conical tubes, centrifuge tubes, vials, Petri dishes, -80°C freezer, -20°C freezer, Liquid N2 Dewar, etc.

# **APPENDIX VIII. CHEMICAL AND TOXIN INVENTORY**

**Researcher: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Emergency Contact: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

 **Building: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Room: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Contact on call: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Date Inventory Performed:**   **Notes:**  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Item ID** | **Chemical Name** | **Manufacturer** | **Concentration** | **Quantity** | **Unit (L, kg, cyl, lb.)** | **CAS#** | **Storage Location** |
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* Please use the chemical inventory template available on the Office of Safety website (<http://und.edu/finance-operations/office-of-safety/biological-safety.cfm>)