

Virginia Tech Recombinant DNA and Biohazard Research Policy

developed and approved by the

Virginia Tech Institutional Biosafety Committee (IBC)

1.0 Purpose

2.0 Policy

3.0 Procedure

4.0 Definitions

5.0 Policy Implementation

6.0 References

Appendix A - Organizational Diagram – Research Compliance Office

1.0 Purpose

This policy establishes requirements for the safe, secure, and compliant use of recombinant or synthetic nucleic acid molecules and/or biohazardous materials. These requirements are intended to protect university personnel, the public, as well as the environment.

2.0 Policy and Principles

Virginia Tech is actively committed to preserving the health and safety of its students, staff, and faculty, and also to protecting the environment and the community. It is recognized that use of potentially biohazardous materials and organisms containing recombinant DNA or synthetic nucleic acid molecules is necessary in many Virginia Tech research and teaching laboratories. To ensure the safe handling of these organisms, Virginia Tech requires that all research and instruction involving recombinant or synthetic nucleic acid molecules and/or biohazardous materials is conducted at Virginia Tech shall be conducted in accordance with federal and state laws.

To ensure compliance with the *NIH Guidelines*, Virginia Tech has established an Institutional Biosafety Committee (IBC) tasked with: (i) developing and implementing policies for the safe conduct of recombinant or synthetic nucleic acid molecule research, and safe handling and use of biohazardous materials; (ii) reviewing PI-submitted protocols, lab biosafety manuals, and other documentation regarding the handling, use, and storage of regulated materials; (iii) reviewing the results of periodic lab biosafety inspections by the Biosafety Officer [BSO]; (iv) ensuring that appropriate training is provided and documented for the IBC Chair and members, BSO and other containment experts (when applicable), Principal Investigators, laboratory staff, and students regarding laboratory safety and implementation of the *NIH Guidelines*; and, (v) reviewing incidents and/or policy violations.

2.1 Scope

This policy, its amendments and additions, applies to all university personnel (faculty, staff, and students), as well as visitors, engaged in instructional activities and/or research involving

recombinant or synthetic nucleic acid molecules, biohazardous agents, materials and toxins that are:

- University- or externally-funded and/or sponsored.
- Conducted by University personnel and/or visitors.
- Conducted using the University's property, equipment, and facilities.
- Received, stored, used, transferred or disposed of at any of the University facilities.

2.2 Oversight

2.2.1 Vice President for Research – “Institutional Official”

The Vice President for Research is the university official with final responsibility for ensuring that all research and instructional activities involving the handling and use of recombinant or synthetic nucleic acid molecules and/or potentially biohazardous materials is in compliance with all applicable laws, regulations, guidelines, and policies. The Vice President for Research assists the University President in maintaining continuing relationships with state and federal regulatory agencies which deal with regulated activities included in this policy.

The Vice President for Research will appoint members to the IBC, and will appoint the Chair of the IBC.

2.2.2 Office of Research Compliance (ORC)

The Office of Research Compliance is the functional administrative unit that is charged with supporting the IBC in fulfilling its responsibility for ensuring both institutional and individual researcher compliance with federal and state laws, regulations, policies, and guidelines for research involving recombinant DNA or synthetic nucleic acid molecules, infectious biological or synthetic agents, biologically derived materials and toxins at Virginia Tech.

The Office of Research Compliance is an administrative unit under the supervision of the Associate Vice President for Research Compliance, who reports to the Vice President for Research, the designated Institutional Official for regulatory compliance. The Office of Research Compliance has executive responsibility for the implementation of all Virginia Tech policies involving the use, in research and instruction, of recombinant DNA or synthetic nucleic acid molecules, infectious biological or synthetic agents, biologically derived materials and toxins.

2.2.2.1 Associate Vice President for Research Compliance

The AVP for Research Compliance reports to the Vice President for Research and oversees the operation and management of the Office of Research Compliance, including the administrative support provided to the IBC. The Associate Vice President for Research Compliance is an *ex officio* member of the IBC.

2.2.2.2 IBC Administrator

The IBC Administrator ensures that IBC policies and practices are followed, and works with the BSO to ensure compliance with NIH Guidelines, the BMBL, Select Agents and Toxins regulations, OSHA regulations, and best practices to ensure institutional compliance with applicable federal laws, regulations, and policies [listed in the References section below]. This individual has frequent and varied contacts inside and outside of the organization as required to establish parameters/metrics for program success, e.g., developing procedures, coordinating

service delivery, promoting program(s) goals and objectives in addition to providing technical advice.

2.2.2.3 IBC Administrative Specialist

The IBC Administrative Specialist provides secretarial and database management support services to the IBC Administrator, including but not limited to assisting in coordinating IBC compliance activities, database and file management, correspondence management, communicating and interfacing with individuals within and outside of the University, and assisting with scheduling meetings and activities associated with compliance committee functions/operations. The IBC Administrative Specialist has direct accountability for service delivery, and may answer complex questions, referring unusual problems to higher levels (e.g., the IBC Administrator, the IBC Chair, the BSO/Responsible Official [RO], or the Associate Vice President for Research Compliance). The IBC Administrative Specialist interprets and applies policies, procedures and guidelines, exercising independent judgment.

2.2.3 Environmental Health and Safety (EHS)

EHS is the administrative unit in which the BSO/RO resides. EHS promotes a positive, integrated safety culture for the university community, advocates safe and healthy living, learning, and working environments, and helps departments comply with regulations and mandates. The BSO and the Associate BSOs are under the supervision of the Director of EHS, who reports to the Vice President for Administrative Services

The BSO and the Director of EHS are *ex officio* members of the IBC. In addition to BSO oversight, other EHS program areas associated with lab and personnel safety include, but are not limited to: bloodborne pathogens, chemical safety, radiation safety, respiratory protection, and the Occupational Health Assurance Program.

2.2.3.1 Director for Environmental Health and Safety

The Director for EHS reports directly to the Vice President for Administration and oversees all operation and management of EHS programs. The Director is an *ex officio* member of the IBC.

2.2.3.2 University Biosafety Officer/Responsible Official (BSO/RO)

The BSO/RO directs and manages the University Biosafety Program which includes general biosafety as well as the Select Agent and Toxin program. The BSO/RO develops, implements, and coordinates program requirements to enhance the university's biosafety-related objectives and ensure compliance with all applicable regulations, guidelines, policies, and directives.

Specific to the IBC, the BSO/RO has the following duties and responsibilities:

- conducting periodic inspections to ensure that laboratory standards are rigorously followed;
- reporting to the IBC and the institution any significant problems, violations of the *NIH Guidelines*, and any significant research-related accidents or illnesses of which the BSO/RO becomes aware unless the BSO/RO determines that a report has already been filed by the Principal Investigator;
- developing emergency plans for handling accidental spills and personnel contamination and investigating laboratory accidents involving recombinant or synthetic nucleic acid

- molecule research or biohazardous materials; providing advice on laboratory security; and,
- providing technical advice to Principal Investigators (PIs) and the IBC Committee on safety procedures.

To meet objectives of the IBC and general university biosafety requirements, the BSO/RO works closely with the ORC and the IBC Administrator as well as many other university units.

2.2.4 Institutional Biosafety Committee (IBC) - NIH Guidelines Section IV-B-2]

On behalf of Virginia Tech, the Institutional Biosafety Committee is responsible for:

- reviewing use of recombinant or synthetic nucleic acid molecules and/or potentially biohazardous material work conducted at the institution for compliance with, among other requirements, the *NIH Guidelines*, the review includes: –
 - independent assessment of the biosafety containment levels required by the *NIH Guidelines* and BMBL for the proposed research;
 - assessment of the facilities, procedures, practices, and training and expertise of personnel involved with use of these materials; and
 - ensuring compliance with all surveillance, data reporting, and adverse event reporting requirements required by the *NIH Guidelines*.
- notifying the Principal Investigator of the results of the IBC's review and the protocol's approval status
- lowering containment levels for certain experiments as specified in the NIH Guidelines
- setting containment levels for *Experiments Involving Whole Animals*, and *Experiments Involving Whole Plants*
- periodically reviewing applicable work conducted at the institution to ensure compliance with the *NIH Guidelines*
- adopting emergency plans covering accidental spills and personnel contamination reporting any significant problems with or violations of the *NIH Guidelines* and any significant research-related accidents or illnesses to the appropriate institutional official and National Institutes of Health Office of Biotechnology Activities (NIH/OBA) within 30 days
- performing such other functions as may be delegated to the IBC under the *NIH Guidelines*.

2.2.4.1 The IBC's Authority

The IBC has the authority to approve, require modifications in, disapprove, or halt all research activities that fall within its jurisdiction as specified by federal regulations, state law, and institutional policy. The IBC has the authority to require appropriate training of PIs, lab staff, and students, and to prohibit individuals who have not completed training from working under an approved protocol. The IBC acts as a surrogate for the federal government in ensuring local regulatory compliance.

2.2.4.2 IBC Meetings

IBC meetings to review protocols and amendments are generally held monthly, on the 2nd Tuesday of each month, with additional meetings scheduled as needed.

2.2.5 Researchers and Instructors

2.2.5.1 Protocol Submission for IBC Review and Approval

IBC protocol submissions, whether they are new IBC protocol submissions, modifications or renewals, must be submitted to the ORC IBC Administrator by the Principal Investigator for review and approval by the IBC. IBC review and approval is required, before study initiation, for studies which fall under *NIH Guidelines* Sections III-A, III-B, III-C, and III-D. For experiments/activities which fall under *NIH Guidelines* Section III-E, protocol submission to the IBC may be simultaneous with project initiation. For experiments/activities which are classified as Exempt, as defined in *NIH Guidelines* Section III-F, the IBC Chair or designee will confirm the PI's assertion that the activities are Exempt.

2.2.5.1.1 Confidentiality

Protocol submission forms will be considered confidential, to the extent permitted by Commonwealth of Virginia law, except insofar as the dissemination of information regarding research projects or activities and IBC deliberations, decisions, and recommendations to appropriate Institutional officials is required to effectuate or support the policies or interests of the Institution. The *NIH Guidelines* require that most IBC meetings where protocols involving rDNA are reviewed be open to the public, and thus discussions that occur during meetings cannot be considered as confidential.

2.2.5.2 Responsibilities of Researchers and Instructors

The responsibilities of Virginia Tech researchers/Pis/instructors when using recombinant or synthetic nucleic acid molecules and/or potentially biohazardous materials includes, but is not limited to, the following:

- ensuring that activities are not initiated or subsequently modified prior to IBC review and approval
- reporting any significant problems, violations of the *NIH Guidelines*, or any significant research-related accidents and illnesses to the BSO/RO (where applicable), Greenhouse/Animal Facility Director (where applicable), IBC, and other appropriate authorities (if applicable) within 30 days, to facilitate prompt reporting to NIH/OBA by the BSO/RO
- ensuring that she/he is adequately trained in good microbiological techniques, and that she/he has appropriately trained research staff and students in those techniques
- ensuring adherence to IBC approved emergency plans for handling accidental spills and personnel contamination
- complying with shipping requirements for recombinant or synthetic nucleic acid molecules and/or potentially biohazardous materials
- acquiring proper permits for obtaining/transporting exotic or regulated plants or pathogenic organisms and Select Agents
- making an initial determination of the required levels of physical and biological containment in accordance with the *NIH Guidelines* and BMBL
- selecting appropriate microbiological practices and laboratory techniques to be used for the research
- communicating any proposed changes, or any problem encountered, to the IBC

- supervising the safety performance of staff to ensure that the required safety practices and techniques are employed
- investigating and reporting any significant problems pertaining to the operation and implementation of containment practices and procedures in writing to the UBO/RO (where applicable), Greenhouse/Animal Facility Director (where applicable), IBC, NIH/OBA, and other appropriate authorities
- correcting work errors and conditions that may result in the release of recombinant or synthetic nucleic acid molecule materials, or exposure of lab personnel to biohazardous agents or toxins
- ensuring the integrity of the physical containment (e.g., biological safety cabinets) and the biological containment, ensuring that biosafety cabinets have been certified annually
- being ultimately responsible for compliance with all IBC approved protocols/modifications.

3.0 Procedure

3.1 Initial IBC Review

Principal Investigators (PIs) and instructors seeking initial IBC approval must send a completed Protocol Application to the IBC in accordance with the IBC policy on protocol submission. A Protocol Application consists of several forms that capture information about the specific research/teaching activities. In addition to documentation, facility inspections, documentation review, training and applicable occupational health requirements must be completed prior to IBC approval of the protocol.

3.1.1 Pre-interview (Optional)

Any PI or instructor planning to submit a Protocol Application and is not sure which forms are needed may contact the IBC Administrator. The IBC administrator will assist the person with the process.

3.1.2 Select Agents and Toxins

In addition to required IBC documentation, specific documentation for the use of select agents and toxins is required. This information is gathered by the BSO/RO. The IBC Administrator will alert the BSO/RO of any anticipated use of select agents or toxins. Select Agents and biological toxins cannot be obtained/procured or used without BSO review and approval.

3.2 Amending Protocols

An amendment to an approved protocol includes, but is not limited to, changes to staff, location of experiment, gene of interest, nature of the inserted DNA, host cells, animals used, vectors, cell lines, and cultures.

Protocols may be amended in accordance with the IBC policy on protocol submission.

3.3 Annual Review

All protocols that have been previously approved by the IBC require an annual review to assess any changes that have been made during the previous year. This review also verifies that all work has been conducted in accordance with the approved protocol. The IBC contacts the

Principal Investigator or instructor prior to the anniversary date of initial protocol approval with instructions.

3.4 Protocol Renewal

A new Protocol Application must be submitted every three years.

4.0 Definitions

NIH Guidelines – The “*NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules (NIH Guidelines)*” specify the practices for constructing and handling of: (i) recombinant nucleic acid molecules, (ii) synthetic nucleic acid molecules, including those that are chemically or otherwise modified but can base pair with naturally occurring nucleic acid molecules, and (iii) cells, organisms, and viruses containing such molecules. The guidelines are applicable to all recombinant or synthetic nucleic acid research within the United States (U.S.) or its territories, regardless of the source of funding for the research.

Institutional Biosafety Committee (IBC) – The compliance oversight committee required by the *NIH Guidelines*. The expertise and membership of the IBC must be reflective of the research conducted at an institution, e.g., including plant or animal experts, a Biological Safety Officer (BSO), or other expertise as appropriate, and must also include at least two unaffiliated members who can represent the interests of the community surrounding the registered institution.

IBC Research or Teaching Protocol (Protocol) – Information provided by the Principal Investigator (PI) in defined submission forms that describes: (i) the use of recombinant DNA or synthetic nucleic acid molecules and the cells, organisms, and viruses containing such molecules; (ii) the applicable NIH Guidelines; (iii) the training, experience, and expertise of the PI in handling and use the specified agents under specified containment criteria; (iv) the training of staff included in the protocol; (v) a description and floorplan of facilities and equipment to assess whether containment practices are appropriate; (vi) lab Biosafety Manual.

Biohazardous Materials – Infectious biological or synthetic agents, biologically derived materials and toxins that present a risk or potential risk to the health of humans, animals, or plants either directly through exposure or infection or indirectly through damage to the environment. Categories of potentially infectious biological materials may include the following:

- human, animal, and plant pathogens (bacteria, parasites, fungi, viruses, prions)
- toxins of biological origin
- human and non-human primate cells and unfixed tissues
- animal or plant pathogens and products, specifically genetically engineered organisms and veterinary biologics
- select agents and toxins
- infected animals and animal tissues and infected plants.

Biological Safety Officer (BSO) – This individual is required by the *NIH Guidelines*, and has the following duties and responsibilities: to conduct periodic inspections to ensure that laboratory biosafety standards are rigorously followed; to report to the IBC and the institution any significant problems, violations of the NIH Guidelines, and any significant research related accidents or illnesses; to develop emergency plans for handling accidental spills and/or personnel contamination, and for investigating lab accidents involving rDNA research; to provide advice

on laboratory security; to provide technical advice to PIs and the IBC on research safety procedures.

BMBL – The CDC/NIH handbook, “*Biosafety in Microbiological and Biomedical Laboratories (BMBL) 5th Edition*”, provides a code of practice for biosafety, addressing the safe handling and containment of infectious microorganisms and hazardous biological materials. The BSO and the IBC use the BMBL to assess containment practices and personal protective equipment (PPE) required for activities proposed in a PI’s IBC protocol.

Office of Biotechnology Activities (OBA) – The NIH Office of Biotechnology Activities promotes science, safety, and ethics in biotechnology through advancement of knowledge, enhancement of public understanding, and development of sound public policies. OBA accomplishes its mission through analysis, deliberation, and communication of scientific, medical, ethical, legal, and social issues. An institution that is conducting research subject to the *NIH Guidelines* must have an IBC, and that IBC must be registered with and approved by OBA, demonstrating that the IBC has knowledge of local institutional characteristics, e.g., adequate investigator training, laboratory conditions, and operating procedures.

Responsible Official (RO) – The RO is the designated individual at the institution with the authority and responsibility to act on behalf of the institution to ensure compliance with the requirements of APHIS and HHS regulations governing the possession and use of Select Agents and Select Agent Toxins. The RO ensures that annual inspections are conducted and that deficiencies are corrected. Currently, the BSO is the RO at Virginia Tech

USDA APHIS – The United States Department of Agriculture Animal and Plant Health Inspection Service (USDA-APHIS) regulates genetically engineered (GE) organisms and certain GE organisms that may pose a risk to plant or animal health. APHIS uses the term biotechnology to mean the use of recombinant or synthetic nucleic acid molecules technology, or genetic engineering to modify living organisms. Permits are required for the importation, transit, domestic interstate movement and environmental release of organisms that impact plants and animals.

HHS CDC – The Department of Health and Human Services (HHS) *Centers for Disease Control and Prevention* is the agency dedicated to protecting health and promoting quality of life through the prevention and control of disease, injury, and disability. The CDC is also the enforcement agency for HHS-regulated select agents and toxins.

Select Agents and Toxins – Specific biological agents and toxins identified by the Department of Health and Human Services (HHS) and the United States Department of Agriculture (USDA) as having the potential to pose a severe threat to the public, animal or plant health, or to animal or plant products. Regulated material also includes:

- Nucleic acids that can produce infectious forms of any of the select agent viruses
- Recombinant and/or synthetic nucleic acids that encode for the functional form(s) of any of the toxins if the nucleic acids:
 - Can be expressed in vivo or in vitro, or
 - Are in a vector or recombinant host genome and can be expressed in vivo or in vitro.
- Genetically modified select agents and toxins

5.0 References

Biosafety in Microbiological and Biomedical Laboratories (BMBL) 5th Edition

<http://www.cdc.gov/biosafety/publications/bmbl5/BMBL.pdf>

NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules:

http://oba.od.nih.gov/oba/rac/Guidelines/NIH_Guidelines.htm

5.1 Regulations

| Federal Authority | Agency | Reference |
|--|--|--|
| Department of Health and Human Services | Centers for Disease Control and Prevention (CDC) | 42 CFR Part 73: Possession, Use and Transfer of Select Agents and Toxins; Interim Final Rule |
| Department of Agriculture | Animal and Plant Health Inspection Service (APHIS) | 7 CFR Part 331 and 9 CFR Part 121: Agricultural Bioterrorism Protection Act of 2002; Possession, Use and Transfer of Biological Agents and Toxins; Interim Final Rule |
| Department of Health and Human Services | Centers for Disease Control and Prevention (CDC) | USPHS 42 CFR - Part 71 Foreign Quarantine. Part 71.54 Etiologic agents, hosts, and vectors. |
| Department of Agriculture | Animal and Plant Health Inspection Service (APHIS) | <ul style="list-style-type: none"> • 9 CFR 122: Importation of Etiologic Agents of Livestock, Poultry, and Other Animal Diseases and Other Materials Derived from Livestock, Poultry, or Other Animals. Organisms or Vectors • 7 CFR 330: Federal Plant Rest Regulations • 5 CFR Parts 730-799: Export of Etiologic Agents of Humans, Animals, Plants and Related Materials. • 7 CFR 340.4: Introduction of Organisms and Products Altered or Produced Through Genetic Engineering Which are Plant Pests or Where There is Reason to Believe are Plant Pests |
| Department of State | Directorate of Defense Trade Controls (DDTC) | International Traffic in Arms Regulations (22 CFR 120-130) |
| Department of Commerce | Bureau of Industry Security (BIS) | 15 CFR 774, Supplement 1, also known as the Department of Commerce's Commodity Classification List: Export Administration Regulations (EAR) |
| Department of Treasury | Office of Foreign Assets Control | |
| Commonwealth of Virginia | Department of Health | 12 VAC 5-90: Regulations for Disease Reporting and Control |
| Department of Labor | Occupational Safety and Health Administration (OSHA) | 29 CFR 1910.1030: Bloodborne Pathogens Standard |
| Department of Transportation | Research and Special Programs Administration: Office of Hazardous Materials Safety | 49 CFR Parts 100-185: Hazardous Materials Regulations |
| Environmental Protection Agency via Virginia Department of Environmental Quality | Waste Management | 9 VAC 20-120: Regulated Medical Waste Regulations |

5.2 Standards of Practice/University Requirements

| Oversight Authority | Agency | Reference |
|---|--|---|
| Department of Health and Human Services | CDC and National Institutes of Health | <i>Biosafety in Microbiological and Biomedical Laboratories</i> |
| World Health Organization | | <i>Laboratory Biosafety Manual</i> |
| Committee on Occupational Safety and Health in Research Animal Facilities | National Research Council | <i>Occupational Health and Safety in the Care and Use of Research Animals</i> |
| Department of Health and Human Services | National Institutes of Health | <i>Guidelines for Research Involving Recombinant DNA Molecules (NIH Guidelines)</i> |
| European Committee for Standardization (CEN) | CEN Workshop 31 – Laboratory biosafety and biosecurity | CWA 15793:2008 Laboratory Biorisk Management Standard |
| Department of Health and Human Services | Centers for Disease Control and Prevention (CDC) and the Association of Public Health Laboratories | Guidelines for Biosafety Laboratory Competency: MMWR 2011; 60 (Suppl): 1-24 |
| Virginia Tech | Environmental Health and Safety | Biosafety for Researchers/Instructors |
| Virginia Tech | Environmental Health and Safety | Exposure Control Plan |
| Virginia Tech | Environmental Health and Safety | <i>Occupational Health Assurance Program</i> |
| Virginia Tech | Office for Export and Secure Research Compliance | <i>Export and Sanctions Compliance Policy</i> |

6.0 Approval and Revisions

1/28-2014 - Initial approval by IBC

1/29/2014 – Accepted by the Vice President for Research

Appendix A – Organizational Interactions Related to the IBC

