Virginia Tech Recombinant and Synthetic Nucleic Acid and Biohazard Research Policy

No. 13030

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1/28/2014

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Policy Owner:
Dan Sui

Policy Author: *(Contact Person)*
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Affected Parties:
Undergraduate
Graduate
Faculty
Staff
Other

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 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 Senior Vice President for Research and Innovation – "Institutional Official"

The Senior Vice President for Research and Innovation 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 Senior Vice President for Research and Innovation assists the University President in maintaining continuing relationships with state and federal regulatory agencies which deal with regulated activities included in this policy.

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

2.2.2 Division of Scholarly Integrity and Research Compliance (SIRC)

The Division of Scholarly Integrity and 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 or synthetic nucleic acid molecules, infectious biological or synthetic agents, biologically derived materials and toxins at Virginia Tech.

The Division of Scholarly Integrity and Research Compliance (SIRC) is an administrative unit under the supervision of the Associate Vice President for SIRC, who reports to the Senior Vice President for Research and Innovation, the designated Institutional Official for regulatory compliance. The Division of Scholarly Integrity and Research Compliance has executive responsibility for the implementation of all Virginia Tech policies involving the use, in research and instruction, of recombinant or synthetic nucleic acid molecules, infectious biological or synthetic agents, biologically derived materials and toxins. The IBC Program is an administrative unit within the Division of Scholarly Integrity and Research Compliance, responsible for the administrative support of the IBC.

2.2.2.1 Associate Vice President for Scholarly Integrity and Research Compliance

The AVP for Scholarly Integrity and Research Compliance reports to the Senior Vice President for Research and Innovation and oversees the operation and management of the Division of Scholarly Integrity and Research Compliance, including the administrative support provided to the IBC. The Associate Vice President for Scholarly Integrity and Research Compliance acts as a non-voting consultant for the IBC, when needed.

2.2.2.2 IBC Program

The IBC Program includes the administrative staff responsible for ensuring that IBC policies and practices are followed, and working 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]. The IBC Program consists of the IBC Program Director and IBC Administrator, a Senior IBC Program Coordinator, and IBC Program Coordinators, as needed. These individuals have 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.

The IBC Program Director attends IBC meetings and acts as a liaison for the IBC, with support from the AVP for Scholarly Integrity and Research Compliance and the IO.

IBC Program staff review all protocols that are submitted to the IBC Program to ensure that the submissions are complete, and that the information provided by the researchers is consistent with the IBC requirements, *NIH Guidelines* requirements and Virginia Tech regulations. They are also responsible for guiding researchers through the IBC process, assisting researchers with federal and Virginia Tech requirements, reviewing annual review submissions, conducting in-person annual review meetings, providing guidance to researchers and personnel related to IBC protocols, and providing guidance related to other areas involving biosafety compliance and training.

2.2.3 Environmental Health and Safety (EHS)

EHS is the administrative unit in which the University Biosafety Officer (BSO)/Responsible Official (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 University BSO and the Associate BSOs are under the supervision of the Assistant Vice President for EHS, who reports to the Associate Vice President for Safety and Security.

The BSO and the AVP for 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 Assistant Vice President for Environmental Health and Safety

The AVP for EHS reports directly to the Associate Vice President for Safety and Security and oversees all operation and management of EHS programs. The AVP for EHS 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 SIRC 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 Procedures

3.1 Initial IBC Review

Principal Investigators (PIs) and instructors seeking initial IBC approval must send a completed Protocol Application to the IBC Program 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 may contact the IBC Program Director for assistance with the protocol submission and IBC processes.

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 Program staff 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 nucleic acids, 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

All full committee protocols must be renewed by the PI 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 Science Policy (OSP) – The NIH Office of Science Policy 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 OSP, 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
https://www.cdc.gov/labs/BMBL.html

NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules:
https://osp.od.nih.gov/buitechnology/nih-Guidelines

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)	• 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	*Biosafety in Microbiological and Biomedical Laboratories*
World Health Organization		*Laboratory Biosafety Manual*
Committee on Occupational Safety and Health in Research Animal Facilities	National Research Council	*Occupational Health and Safety in the Care and Use of Research Animals*
Department of Health and Human Services	National Institutes of Health	*Guidelines for Research Involving Recombinant DNA Molecules (NIH Guidelines)*
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	*Occupational Health Assurance Program*
Virginia Tech	Office for Export and Secure Research Compliance	*Export and Sanctions Compliance Policy*

6.0 Approval and Revisions

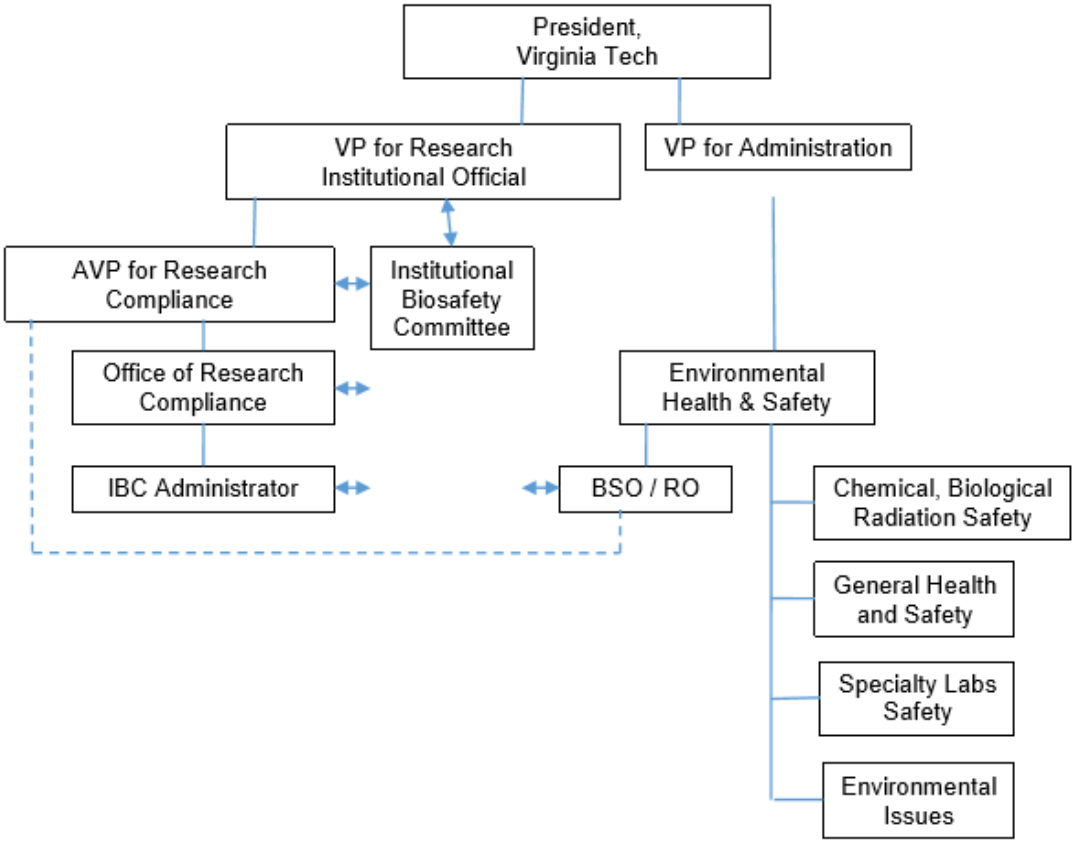
Approved January 28, 2014 by Virginia Tech Institutional Biosafety Committee (IBC)
Approved January 29, 2014 by Vice President for Research, Robert W. Walters.
Approved May 15, 2014 by University President, Charles W. Steger.

- Revision 1
  - Technical revision and title changes throughout
  - Included provision for in-person annual review meetings in section 2.2.2.2

  Policy review and technical changes recommended by the Virginia Tech Institutional Biosafety Committee and by IBC Administrator, Regina Allen on November 12, 2019.

  Approved January 7, 2020 by Vice President for Policy and Governance, Kim O'Rourke.

Appendix A – Organizational Interactions Related to the IBC



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