CHEMICAL HYGIENE PLAN

Appendices:

I. Goals of the Laboratory Safety Program

To design and disseminate safe procedures for storage, handling and disposal of chemicals in the Bard College Biology, Chemistry, Psychology, and Physics Departments. To train all persons working in the Reem Kayden Center for Science and Computation and Rose Science Laboratory in the departments listed above as described in Appendix B.

II. General Recommendations for Safe Practices in the Laboratory

Scientists must use hazardous material and therefore certain precautions must be regularly observed in order to minimize the probability and consequences of an accident. Safety is a result of an alert, thoughtful an informed attitude on the part of each individual. Thus the most important and reliable way to maintain a safe working environment is to assure that everyone involved in laboratory operations is safety conscious. It is the responsibility of all administrators, faculty, staff and students to promote safety awareness.

While it is impossible to design a specific set of rule which will encompass all potential dangers and thus assure safety in all laboratories, the following general guidelines have proven useful in avoiding accidents and minimizing injuries in the laboratory. A general respect for these rules, which have been learned over the years, sometimes at great cost to others, can make the laboratory a very safe place to work.

1. Before beginning any new task or experiment, prepare yourself by carefully reading instructions and any necessary background information such that you are aware of any potential hazards (physical, chemical, biological or radiological). Be prepared for the "worst case scenario" accident and take the necessary precautions.
2. All persons working in the laboratory should be familiar with the location and operation of the basic safety equipment appropriate for the specific laboratory, for example, fire extinguishers, eye washes, showers, fume hoods spill clean up kits, and exits.

3. Consumption of food or drink or smoking is prohibited where chemicals are being used or stored or anywhere in the laboratories.
4. Safety goggles must be worn in the laboratory at all times. Wearing contact lenses is not recommended in a laboratory.
5. Appropriate dress should be worn in the laboratory; this means shoes not sandals, and excludes clothing of fluffy or bulky material or which exposes large areas of skin. Long hair should be tied back.
6. Wear appropriate personal protective equipment, for example, chemical-resistant laboratory apron or coat and gloves to protect against biological hazards, corrosive liquids, allergenic, sensitizing, or toxic chemicals. Use fume hoods when necessary.
7. Avoid unnecessary exposure to chemicals; do not taste chemicals and generally do not "sniff" to test chemicals. Do not mouth pipette chemicals. Do not leave chemicals in unmarked containers.
8. Never light a Bunsen burner in the laboratory without considering what flammable materials may be in use in the laboratory. Never leave a lit burner unattended.
9. Avoid hazards to the environment by following appropriate waste disposal procedures. Be sure all waste containers are clearly labeled with their contents.
10. Keep all work areas, especially laboratory benches and shelves free of clutter. Keep all aisles, hallways and stairs clear of all chemicals and obstructions. Store chemicals in their proper location.
11. Promptly clean up all spills; properly dispose of the spilled chemical and clean-up materials.
12. Wash your skin well with soap and water whenever your skin has come in contact with a hazardous chemical. Always wash your hands before leaving the laboratory.

III. Standard Operating Procedures for Laboratory Safety In Reem Kayden Center for Science and Computation

Appendix J explains some specific laboratory safety procedures to be understood and followed by anyone using any of the Bard College Laboratories. Every laboratory user must read and understand these

standard operating procedures. Failure to comply with these safety procedures could result in a suspension of laboratory privileges.

IV. Safe Handling of Hazardous Chemicals

All personnel should familiarize themselves this the potential hazards of all chemicals and procedure they will be performing, and should act appropriately.

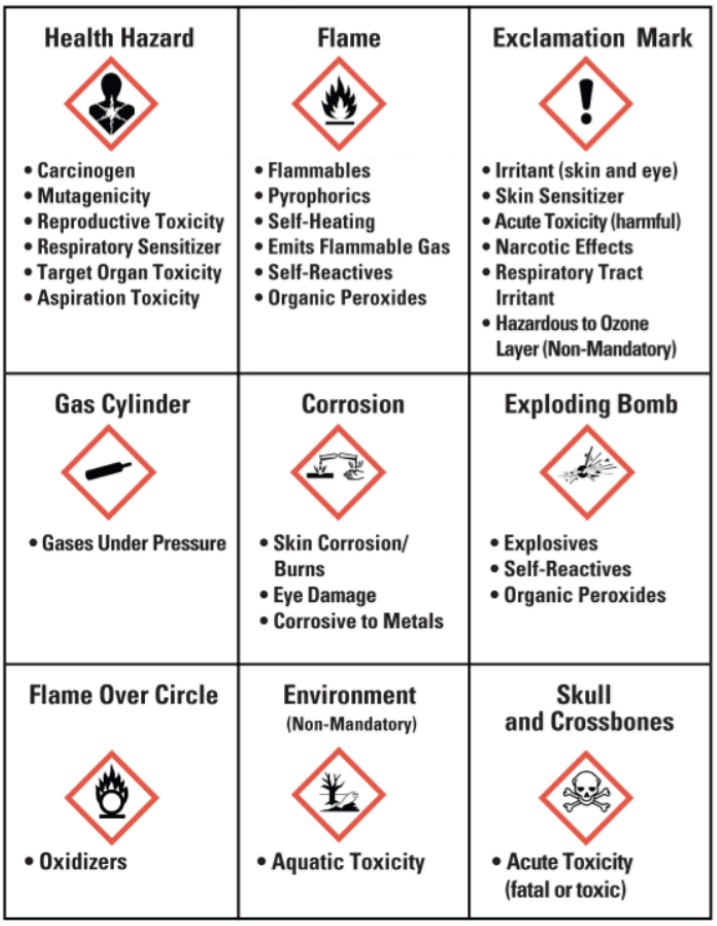
PICTOGRAMS:

New pictograms are being used as warnings on bottles, etc.

These are the Harmonized Hazard Symbols.

Symbols = Pictograms

- Pictograms include the harmonized hazard symbols plus other graphic elements, such as borders, background patterns or colors which are intended to convey specific information.



A. Preparation before working in the laboratory:

Always read through an experimental procedure carefully before you plan to conduct the experiment. Be aware of the hazards associated with the experiments, for example, special techniques, and specific chemicals, which may be hazardous, specific biological hazards. Before starting any experimental or research procedures a copy of the Course Laboratory Preparation or Laboratory Preparation form shall be completed (see Appendix R and S) and submitted to the laboratory manager for record keeping. Any unusual procedures should get prior approval from the Program chair. All personnel need to be trained on site and shown, in person, by authorized personnel, the correct way to conduct the work. Subsequently, each student/worker has to demonstrate that he/she is proficient and able to perform the tasks correctly in accordance with safety protocols. Once trained, if he/she does not follow the rules, privileges will be revoked until the training procedure mentioned is completed again. All training records need to be kept with the general lab-training safety records. For example, any of the following circumstances would require prior approval: **1**-Using quantities of hazardous chemicals, which exceed what is considered laboratory scale. **2**-Using extremely hazardous procedures and materials as listed in Appendix H, teratogens, blood products, or infectious agents as listed in Appendix K. **3-**EPA P-listed chemicals in Appendix L. **3**-Using chemicals for which an SDS is not available. **4-**Any procedures that might be dangerous to lab personnel, the environment or other laboratory organisms. **5**- Any live animal work.

All laboratories where hazardous chemical are used should be equipped with basic safety equipment: Fire extinguishers, showers, fume hoods, eye washes. Acquaint yourself with the location and use of all safety equipment. In addition, gloves should be available to all workers in the laboratory. Chemical "spill kits" should be placed in strategic locations in the laboratory such that they are easily accessible to instructors and laboratory assistants. All chemical containers must be labeled clearly with the identity of the contents and any special hazards those contents present to others. Containers, which are not labeled properly, should be treated as waste and disposed of in an appropriate manner. Broken glass should not be disposed of with ordinary garbage but placed in specially marked receptacles. Contaminated, single-use glassware shall be disposed of in an appropriate manner in specially marked receptacles.

B. Procedure-Specific Safety Procedures

In all cases when working with chemicals use common sense. If you are unfamiliar with a specific chemical you plan to use, consult the Safety Data Sheet (SDS) which are maintained by the Laboratory Manager. They are available as hard copies in binders in Reem Kayden Center for Science and Computation and on-line on the internet, and thought our through our subscriptions with Vertere and ChemWatch. Familiarize yourself with the specific hazards and take note of the recommended procedures for handling a spill and proper disposal of the chemical. Consult an appropriate reference for specific disposal procedures. The law states that a material is not a waste until the worker declares it a waste. Thus considerations of recycling and treatment of chemicals rendering them non-hazardous should be considered. Key references are included in Appendix I.

Avoid working alone in the laboratory. If this is not possible, arrange for a co-worker to check in with you periodically.

Toxic Chemicals:

Toxic chemicals are those which damage biological structure and function through exposure or accumulation in the tissues. Usually a poison is defined as a substance which may cause serious health effects or death if relatively small amounts of the toxin are inhaled, ingested or absorbed by the skin. The MSDS for many chemicals used in the laboratory will state the recommended limits or OSHA-mandated limit, or both, as guidelines for exposure. These limits may be used to assist the worker in determining the safety precautions, control measures and safety apparel appropriate when working with this chemical.

Carcinogens are a class of toxic chemicals capable of increasing the risk of cancer through exposure, usually over time. Teratogens are toxic chemicals capable of causing an increased risk of birth defects in children of exposed workers. Prudent practices are essential when working with known or suspected carcinogens and teratogens to minimize exposure to these chemicals.

Generally when the volatile chemical has a threshold limit value, TLV, or permissible exposure level, PEL, which is 50 ppm or 100 mg/M^3, an approved fume hood should be used. Avoid skin contact by wearing the proper type of protective gloves. The experimental procedure should include specific instructions on proper disposal of the toxic material.

All laboratories, which use mercury, including mercury thermometers, should be equipped to handle mercury spills. Two procedures prevail as the leading methods for the proper disposal of mercury. 1. Vacuuming of the spilled mercury with a laboratory aspirator set-up or "sweeper' followed by storage in a closed container for later disposal as heavy metal waste. 2. Hg AbsorbTM powder and sponges are available in the stockroom; a mercury amalgam is generated and the resulting amalgam will not emit dangerous mercury vapors.

Flammable Chemicals:

Flammables are materials that may easily ignite, burn and serve as a source of fuel for a fire. In general, the flammability of a chemical is determined by its flash point, the lowest temperature at which an ignition source can cause the chemical to ignite momentarily under certain controlled conditions. Chemicals with low flash points, below 200°F (93.3°C), are generally considered "fire-hazard chemicals." Organic solvents are the most common flammable chemicals in the science laboratories. All fire-hazard chemicals should be stored in a flammable-solvent storage area or in a designated cabinet. Remember the vapors of flammable liquids are always heavier than air and thus will travel along bench tops and down drain troughs. It is therefore essential that all flames within the vicinity of a flammable liquid be extinguished. Adequate ventilation is one of the best ways to prevent vapors from accumulating and thus when working with large quantities of flammable liquids, work in a fume hood.

When working with flammable materials be sure there is a fire extinguisher and safety shower nearby. Should a person's clothing catch fire place the person under a safety shower or push them to the ground and roll them over to extinguish the flames. Prevent the victim from running. A so-called fire-blanket should not be used - it tends to funnel flames past the victim's mouth, and clothing continues to char beneath it. However, it is useful for retaining warmth to ward off shock after the flames are out.

Reactive Chemicals:

Reactives are materials that may release large amounts of energy under certain reaction conditions. A reliable reference on chemical reactivity is the current edition of “Handbook of Reactive Chemical Hazards” by L. Bretherick. Guidelines on which chemicals are reactive are sometimes provided on the SDS and on container labels. Particular caution should be exercised when working with oxidizers, organic peroxides, water reactive materials, air sensitive materials and explosives. In general handle

reactive chemicals with all the proper safety precautions, including segregation in storage and prohibition on mixing even small quantities with other chemicals without prior approval and appropriate protection.

Laboratories that use ethers should be wary of peroxide formation. Cans or bottles of ether solvents should be dated when opened and, if not used within a year, should be tested and treated for peroxides or disposed of.

Disposal of reactive chemicals generally requires prior treatment to render the chemical less hazardous. Consult an appropriate reference (Appendix I).

Corrosive and Contact-Hazard Chemical:

Strong acids, alkalis, dehydrating agents and oxidizing agents should be handled carefully avoiding contact with the skin and eyes and to avoid breathing the corrosive vapors which attack the respiratory tract. Corrosivity, allergenic and sensitizer information is often given on manufacturer's MSDS or on container labels. Wear safety goggles, gloves and a protective laboratory apron or coat. Because many acids and bases release a tremendous amount of heat when they are mixed with water, they should always be added to water rather than water added to them.

All spills should be cleaned up immediately diluting with large quantities of water. Large spills of concentrated acid and bases should be neutralized before diluting with water. See Appendix F for more information.

If skin or eye contact does occur with one of these substances, the affected area should be washed thoroughly with large quantities of water for a minimum of 15 minutes, using the sink faucet or eye wash fountain as the situation warrants. No attempt should be made to neutralize the reagent chemically. Remove any contaminated clothing. Notify the lab supervisor in the event of any accident.

Compressed Gases:

Regardless of the use or contents of a cylinder, compressed gas cylinders represent a serious health and safety hazard. Flammable gases and toxic gases present obvious hazards but even 'harmless" or inert gases may cause asphyxiation if the gas accumulates in high concentration. All cylinders should be checked for leaks, before and after a regulator is put in place. A compressed gas cylinder is a potential projectile or bomb if not properly secured. All compressed gas cylinders should be clamped securely at all times during usage, transport and storage. In addition, during transport and storage the cylinder caps

should be secured. Gas cylinders must always be transported in a cylinder cart. Unused and empty cylinders should be stored in the gas cylinder cage located in the basement of the Reem Kayden Center for Science and Computation. This includes the use and safe handling of liquid nitrogen (see appendix Y) and liquid helium.

Chemical Spills:

Regardless of the chemical involved an immediate and appropriate response is essential. Generally small spills (less than one liter) may be handled safely with the proper materials and appropriate training. A chemical spill kit should be available in all laboratories where chemicals are used and stored. See Appendices F and G for detailed small spill response procedures.However, never attempt to clean up a chemical spill if you are uncertain how to do so safely, or lack the proper protective equipment. Evacuate the area and get assistance. In addition, if the spill is large refer to Bard Environmental Resources Department Policy No, F-BERD-005 SPILL NOTIFICATION PROCEDURE as seen in Appendix M.

Attend to any individual contaminated in the spill. If skin contact with a corrosive or toxic chemical is involved immediately douse the affected area with water, using a shower, sink faucet or eye wash as necessary. Remove all contaminated clothing and jewelry and continue flushing with large quantities of water for at least fifteen minutes. Seek medical attention if needed by calling Bard Security (ext. 7777) which will notify the college health services / EMS / Ambulance. Notify the laboratory supervisor See Appendix C. The laboratory supervisor must complete an Accident/Incident Report (Appendix T) and submit it to the Laboratory Manager for record keeping.

There are two basic options when handling a small chemical spill - chemical neutralization and chemical absorption. Most organic solvents (both water soluble and insoluble) should be collected using a dry absorbent. Absorption reduces the chance for fire by suppressing flammable vapors. The resulting waste should be collected, bagged, labeled and stored for proper disposal. Most acids and bases can be safely neutralized by using sodium bicarbonate, $NaHCO_3$, or a commercially available neutralizer. Be sure to follow directions that accompany the commercial neutralizers. Spill Kits are available in the stockroom. See Appendices F and G.

Spill Kit Contents:

2 pounds acid neutralizer	4 chemical sorbent sheets
2 pounds base neutralizer	2 waste disposal bags
5 pounds clay-type absorbent	spill waste disposal labels
2 pairs gloves	1 organic vapor/acid gas respirator
2 pairs safety goggles	Hg Absorb powder

V. Safe Handling and Disposal of Biological Hazards:

Biological hazards (e.g. bacteria, viruses, etc.) will not normally be used in the Bard chemical laboratories. If used note Chapter IV section A for procedures for prior approval from the Biology Program Chairperson of specific laboratory procedures.

When handling biological hazards prudent practices (sterile techniques) and appropiate protective equipment (gloves, lab coat, goggles, biological safety cabinet, etc.) will be used at all times. A reliable reference on biological hazards in the current edition of "Biosafety in the Laboratory" (Appendix I). Normally infectious agents as listed in "Biosafety in Microbiological and Biomedical Laboratories", U.S. Department of Health and Human Services, 3rd Edition, May 1993 (Appendix K) will not be used the laboratories. Special approval from the laboratory supervisor will be needed before any work with these infectious agents or blood products can begin. Any waste generated must be kept separate from the general biological waste and treated as Regulated Medical Waste to be disposed of in accordance with NY State Laws and Regulations. See Appendix N for the specific safety protocols for working with Biosafety Level 2 Organisms. See Appendix N-1 for the specific safety protocols for working with live ticks in the laboratory. A safety inspection must be completed by personnel or students after each use of the BSL-2 designated area. Please see Appendix U for the BIOSAFETY LEVEL 2 OPERATIONS SAFETY CHECKLIST.

All personnel or students working with BSL-2 organisms or live ticks must be trained in the contents of Appendix N or N-1, as applicable by the Primary Investigator for the project. If there is evidence that personnel or students are not coplying with any of the requirements in Appendix N or N-1, they will be required to be retrained by the Primariy Investigator for the project before resuming work with BSL-2 organisms or live ticks.

Mainstream biological waste should be placed in appropriately labeled receptacles and disposed of by autoclaving at 121°C @ 15 psi for one hour. After this treatment, the waste is considered non-hazardous waste and can be disposed of in the appropriate manner in the general laboratory waste stream.

Contaminated syringes, needles and Pasteur pipettes should be disposed of in appropriately labeled "sharps" containers and stored properly until approved pick-up is arranged. See Bard's Environmental Resources Policy No. F-BERD-002 in Appendix Q for specific disposal details.

VI. Chemical Waste Disposal Program:

The aim of the program is to assure minimal harm to people, organisms and the environment upon disposal of laboratory chemicals. Incineration in an environmentally acceptable manner is the most practical method for disposal of combustible laboratory waste. However, recycling and chemical decontamination should be used whenever possible.

Each laboratory experiment should include specifics on the safe treatment and disposal of hazardous chemicals used. Chemical waste should be placed in appropriately labeled receptacles and stored properly until the annual pick-up. In general, concentrated acids or bases, highly toxic, malodorous or lachrymatory substances, and any substance which might interfere with the biological activity of waste water treatment plants, create fire or explosion hazards, cause structural damage, or obstruct flow must not be placed in the sewer system.

Generally small quantities of non-toxic water-soluble materials may be disposed of down the sink. Small quantities of acids and bases may be diluted and disposed of down the drain. Larger quantities of acids and base should be neutralized prior to disposal down the sink.

Volatile organic solvents should be separated into halogenated and non-halogenated and stored until the annual pick-up with exact contents on the labels. Organic dyes should be collected and stored in labeled containers, which indicate the mix of dyes, collected. Heavy metal wastes should be collected, labeled and stored for proper processing and disposal. See Appendix E for proper labeling and disposal instructions of hazardous chemical wastes.

Once a chemical container has been designated for disposal it becomes waste and must be treated with special precautions. See Bard Environmental Resources Department Policy No. F-BERD-001 for specific disposal procedures in Appendix O.

See Appendix P, BERD Policy No. F-BERD-004 for specific procedures for disposal of aerosol cans.

VII. Handling of Radioactive materials

Bard has aquired a license from the State of New York for the handling of Radioactive Materials for invitro research only. Radiations Safety Officer is Dr. Swapan Jain. See Appendix V for license. Training and safety monitoring will be managed by Swapan Jain as specified in the NYS Radiation license.

VIII. Handling of Lasers

A. Overview of Laser Safety Program

Room 038 of the Reem Kayden Center for Science and Computation is the only room authorized for authorized high power laser use. All individuals must be trained in laser safety before entering this room. Dr. Chris LaFratta is the Laser Safety Officer for that room and is responsible for implementation of the following Laser Safety Program and providing training to personnel. Training will be kept with the PI and with the lab staff personnel.

B. Laser Hazard Classes

The intent of laser hazard classification is to provide warning to users by identifying the hazards associated with the corresponding levels of accessible laser radiation through the use of labels and instruction. It also serves as a basis for defining control measures and medical surveillance.

Lasers and laser systems received from manufacturers are required by federal law, 21 CFR Part 1000, to be classified and appropriately labeled by the manufacturer. It should be stressed, however, that the classification may change whenever the laser or laser system is modified to accomplish a given task.

Lasers and laser systems are assigned one of four broad Classes (I to IV) depending on the potential for causing biological damage.

Class I: cannot emit laser radiation at known hazard levels (typically continuous wave: cw 0.4 μW at visible wavelengths). Users of Class I laser products are generally exempt from radiation hazard controls during operation and maintenance (but not necessarily during service).

Class I.A.: a special designation that is based upon a 1000-second exposure and applies only to lasers that are "not intended for viewing" such as a supermarket laser scanner. The upper power limit of Class I.A. is 4.0 mW. The emission from a Class I.A. laser is defined such that the emission does not exceed the Class I limit for an emission duration of 1000 seconds.

Class II: low-power visible lasers that emit above Class I levels but at a radiant power not above 1 mW. The concept is that the human aversion reaction to bright light will protect a person. Only limited controls are specified.

Class IIIA: intermediate power lasers (cw: 1-5 mW). Only hazardous for intrabeam viewing. Some limited controls are usually recommended.

NOTE: There are different logotype labeling requirements for Class IIIA lasers with a beam irradiance that does not exceed 2.5 mW/cm^2 (Caution logotype) and those where the beam irradiance does exceed 2.5 mW/cm^2 (Danger logotype).

Class IIIB: moderate power lasers (cw: 5-500 mW, pulsed: 10 J/cm2 or the diffuse reflection limit, whichever is lower). In general Class IIIB lasers will not be a fire hazard, nor are they generally capable of producing a hazardous diffuse reflection. Specific controls are recommended.

Class IV: High power lasers (cw: 500 mW, pulsed: 10 J/cm2 or the diffuse reflection limit) are hazardous to view under any condition (directly or diffusely scattered) and are a potential fire hazard and a skin hazard. Significant controls are required of Class IV laser facilities.

C. Maximum permissible exposure limits.

(a) No person shall operate any laser so as to cause the cornea of the eye of any individual to be exposed to laser radiation beyond the limits listed in Table 1 below.

(b) No person shall operate any laser so as to cause the skin of any individual to be exposed to laser radiation beyond the limits listed in Table 2 below.

(c) All high-intensity lasers shall be placed in shielded and interlocked enclosures or operated only in laser radiation areas.

(d) The laser radiation exposure values produced by scanned laser beams shall be determined when such beams are operating in the scanning modes, providing the devices containing the beams are designed and constructed so as to prohibit the beams from operating in non-scanning modes.

D. Laser safety officer.

Chris LaFratta is the Laser Safety Officer for RKC 038. He is responsible for establishing and administering this laser radiation safety program. When the laser safety officer does not personally supervise the safety aspects of laser operation, he may designate another individual, who has been sufficiently instructed and trained by the laser safety officer in appropriate safety techniques, to personally supervise the operation of a laser. The laser safety officer or any individual he designates to supervise the safety aspects of laser operation may also operate laser equipment.

E. Personal protection.

(a) General. Each person who possesses a laser shall instruct and advise every individual employed in or lawfully frequenting a laser radiation area in regard to the following:

(1) The presence of a laser in such area.

(2) The potential hazards associated with the use of the laser and the precautions and procedures necessary to minimize exposure to radiation from the laser.

(3) The applicable provisions of applicable regulations for the protection of such individual from exposure to radiation from the laser.

(b) Personal protective devices.

(1) Approved safety eyewear. Approved safety eyewear, as required by applicable regulations shall be provided by the owner or employer and shall be used by the individuals working with or operating any unshielded laser and by other individuals lawfully frequenting the laser radiation area who may be exposed to laser radiation under circumstances where the conditions of laser use can lead to accidental exposure to radiation above the maximum permissible exposure limits listed in this section. Such safety eyewear shall meet the following specifications:

(i) The optical density of such approved safety eyewear shall reduce the external laser radiation to the cornea of the eye to safe levels as listed in Table 3 below.

(ii) Such safety eyewear shall be designed and tested to insure that the eyewear retains its protective properties during use.

(iii) Such safety eyewear shall be legibly labeled with the optical density of the lens and the wave length at which it was measured.

(iv) Any individual requiring prescription lenses in the normal performance of his work shall be provided with approved prescription eye protection or with approved safety eyewear designed to fit over his regular prescription lenses.

(2) Other personal protective devices. Protective gloves, clothing and shields shall be provided by the owner or employer and used by individuals as determined by the laser safety officer.

F. Special precautions.

(a) No individual shall look directly into a primary laser beam or directly at the specular reflections of such a beam when the intensities of such beam or of such reflections are greater than those listed in Table 1 below, unless such individual is wearing approved eye protection in compliance with the provisions of this section.

(b) Every laser beam shall be terminated whenever necessary by a material that is non- reflecting and fire-retardant. In cases of intentional beam interaction with targets, precautions shall be taken to prevent fires arising from flying particles. In cases of unavoidable reflections, precautions shall be taken to prevent the scatter of laser radiation in excess of the limits listed in this section into uncontrolled areas.

(c) Under circumstances where the conditions of laser operation can lead to accidental exposure to laser radiation above the maximum permissible exposure limits as specified in this section, an area shall be cleared of all individuals for a reasonable distance on all sides of the anticipated path of the laser beam, except for those individuals protected in compliance with the provisions of this section.

(d) Special care shall be taken to assure that approved safety eyewear is matched to the specific wave length of the laser device with which it is to be used and that such eyewear provides the required attenuation.

(e) Any approved safety eyewear which has been exposed to high-intensity laser radiation shall not be reused until it has been reevaluated for shattering and effectiveness of its attenuation.

(f) Laser beam paths shall be cleared of all material or objects that may cause the scatter of laser radiation at levels in excess of the limits listed in this section into uncontrolled areas.

(g) All unshielded lasers which are capable of emitting radiation above the maximum permissible exposure limits as listed in this section shall be capped or otherwise effectively terminated when not in operation.

(h) Interlocks used on enclosures for high-intensity lasers shall not be used to actuate such lasers.

(i) Any closed laser installation with one or more access openings large enough for entry by individuals shall have at least one such opening provided with an exit door which can be manually opened with ease from inside the laser installation.

(j) General illumination in laser radiation areas shall be at least 30 lumens per square foot, except where conditions of laser operation require lower ambient illumination.

(k) Electronic firing systems for pulsed lasers shall be so designed that accidental discharges of stored charges are prevented.

(l) "Fail-safe" safety circuitry shall be used with lasers wherever necessary.

(m) A Laser Safety Checklist such as the one given in Appendix U of this Chemical Hygiene Plan will be placed inside the designated laser radiation area. Any person planning to use laser equipment will read over the checklist to ensure that it is being complied with. Failure to comply with the checklist will result in suspension of use of the laser for the non-compliant individual until the Laser Safety Officer re-trains the person in safe laser use and the specific items on the Laser Safety Checklist.

G. Designation of laser radiation area.

(a) Laser radiation symbol. The laser radiation symbol, as shown below, shall be used to designate lasers and laser radiation areas. The symbol shall be in red and the background area shall be yellow or white.

(b) Laser radiation area. Except as below provided, each person who possesses a laser shall post conspicuously at the entrance to and inside of each laser radiation area a sign constructed of durable material bearing the laser radiation symbol and the words "CAUTION" or "DANGER" and "LASER RADIATION AREA" (shown below). Such words shall be in black letters at least one inch in height.

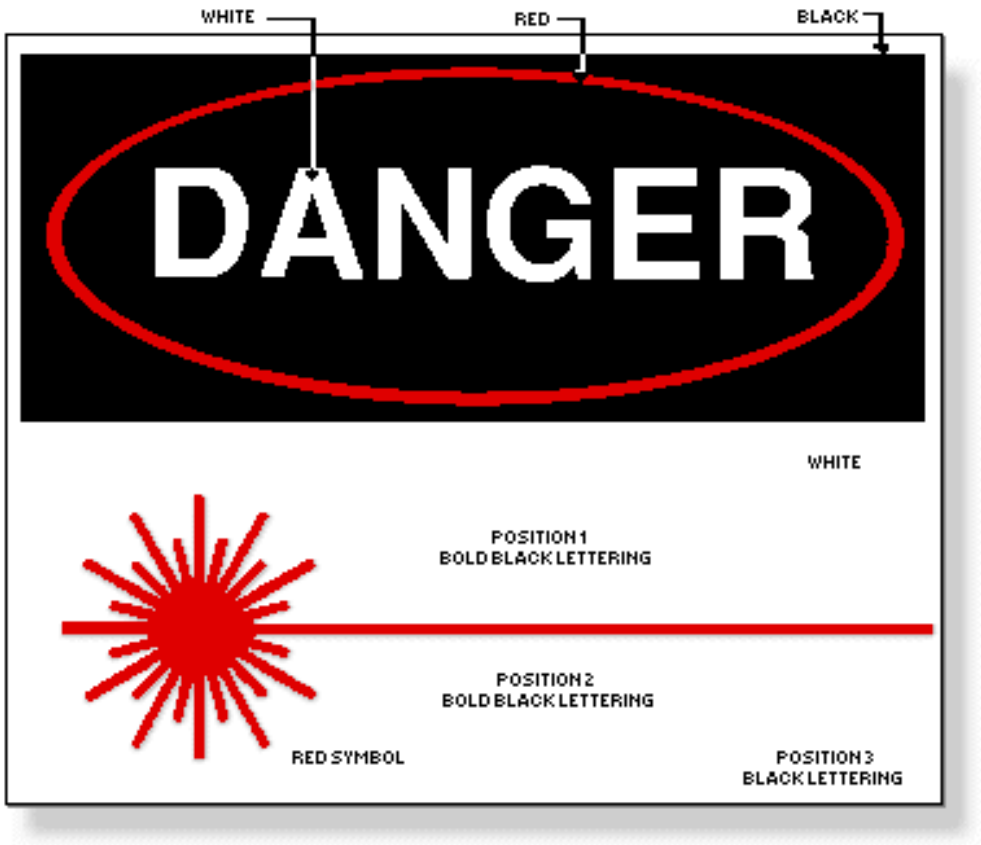


Table 1. Maximum Permissible Corneal Exposure for Direct Specular Reflection of Laser Radiation*

Q-swithed 1 ns to 1 □s pulse (J/cm^2)	Non-Q-switched 1 □s to 0.1 s (J/cm^2)	CW or pulse greater than 0.1 s (W/cm^2)
1.0×10^{-7}**	1.0×10^{-6}	1.0×10^{-5}**
1.0×10^{-3}***	1.0×10^{-2}	1.0×10^{-2}***

(*)The values in this table assume a diffraction limited and zero order transverse mode beam. In the case of a higher order transverse mode in a gas laser where the intrinsic beam divergence exceeds one milliradian the values may be increased on the basis of experimental evidence. Because of the lack of data, no explicit value is listed for the maximum permissible corneal exposure for laser radiation in the wave length range below 400 nm. or for sub-nanosecond pulses; therefore the cornea shall not be directly exposed to this radiation until MPCE values have been established for these conditions.

(**)For lasers operating in the wave length range 400-1400 nm.

(***)For lasers operating in the wave length range above 1400nn.

Table 2. Maximum Permissible Skin Exposure*

Energy Density Pulsed (J/cm^2)	Pulsed Power Density, CW (W/cm^2)
0.1	1.0

(*)For lasers operating in the visible, near-infrared and infrared regions of the electromagnetic spectrum. No information is available on permissible skin exposures to laser radiation in the wave length range below 400 nm. Therefore, caution must be used to avoid such exposure until experimental data is available on permissible levels.

Table 3. Attenuation of Laser Safety Eyewear*

O.D.	Attenuation Factor	Q-switched Max Energy Density (J/cm^2)	Non-Q-switched Max. Energy Density (J/cm^2)	CW Max Power (W/cm^2)
1	10	10^{-6}	10^{-5}	10^{-4}
2	10^2	10^{-5}	10^{-4}	10^{-3}
3	10^3	10^{-4}	10^{-3}	10^{-2}
4	10^4	10^{-3}	10^{-2}	10^{-1}
5	10^5	10^{-2}	10^{-1}	1
6	10^6	10^{-1}	1	10
7	10^7	1	10	
8	10^8	10	10^2	

(*)Because of limitations of safety eyewear material, no eyewear shall be exposed to more than 400 joules or 10 watts of incident laser energy or power, respectively.

REFERENCES: New York Department of Labor Regulations Code Rule 50.
(www.labor.ny.gov/workerprotection/safetyhealth/sh50.shtm)
Occupational Safety & Health Administration (OSHA) Technical Manual Section III, chapter 6.

General Safety and Security

1 Report any suspicious activity to security. Report any unauthorized personel or activity to lab staff or security.

2 The college and RKC has a strict no pet/dog policy. See Appendix W for Jim Bridvig's statement.

3 All students and personel must be trained in the appropriate procedures prior to working in the laboratory.

Pregnancy.

Pregnancy introduces a special set of variables into the consideration of hazards in the laboratory. While the exposure levels to chemicals commonly encountered in a university lab setting pose no or low risk to an adult, they can pose a significantly higher level of hazard to the unborn fetus. Many of these hazards are not well studied, and it is not known what exposure level is safe for an unborn child. It is therefore prudent for pregnant women to limit the unnecessary exposure of a fetus to any chemicals. This is especially true if the chemicals are mutagenic (causes damage to chromosomes) or teratogenic (causes birth defects and/or fetal death). If you have recently become pregnant or you are anticipating becoming pregnant while you are taking lab courses, you should discuss the possible ramifications that working in a chemistry lab might have on the fetus with your instructor and your physician. Your instructor can inform you of specific chemicals that you will be using that are known or suspected to be reproductive toxins and your discussions will be held in strict confidence.

Appendix A: Responsible Personnel

The Vice President of Administration is the Chemical Hygiene Officer (CHO) for the Science Division (SM&C) and will provide technical guidance in development and is responsible for the implementation of the Chemical Hygiene Plan. His office is located on the first floor of the Ludlow building. The Laboratory staff maintains the SDS collection, training records and oversees the procurement, storage and disposal of waste materials. Individual laboratories are supervised by the instructor of each course. These include Professors C. Anderson, E. McLaughlin, S. Jain, C. LaFratta, M. Greenberg in the Chemistry Program; Professors M. Tibbetts, F. Keesing, B. Jude, B. Robertson, G. Perron, E. Dueker, C. Collins, K. Anderson, P. Kashian, R. Todd in the Biology Program; Professors S. Sattar, P. Cadden-Zimansky, H. Haggard, S. Zhang, A. Kontos in the Physics Program; Adam Noach and Maureen O'Callaghan-Scholl, Laboratory Technicians. Their office should be posted in their respective laboratories and by the telephones. They should be contacted immediately in case of any accident occurring in their laboratories. Bard Security (ext. 7777) telephone number should also be posted.

Appendix B: Employee Information and Training

General safety instructions (preferably included in the laboratory books) will be given to every student/employee before he or she uses the laboratory. Directions for addressing problems that are specific to any experiment should accompany that experiment and will be addressed by the laboratory supervisor or instructor.

Laboratory assistants will be given explicit instructions by the course instructor on how to deal with potential problems such as fires, burns, cuts and toxic chemical spills.

All lab workers will be informed as to the provisions of the OSHA standards "Occupation Exposures to Hazardous Chemicals in the Laboratories" (29CFR 1910.1450 dated 5/1/90).

Copies of this Chemical Hygiene Plan will be available to all employees to be read during working hours. Any questions should be directed to the Chemical Hygiene Officer. Employees will be made aware of permissible exposure limits (PEL) for regulated substances and recommended exposure limits for other hazardous chemicals where no OSHA standard applies. All employees will be trained in the use of proper protective equipment such as fume hoods, gloves and goggles. Employees will read, understand and sign off on the "Standard Operating Laboratory Safety Procedures" checklist (Appendix J).

Employees will be made aware of signs and symptoms associated with over exposure to hazardous chemicals. All laboratory workers will be aware of the location of SDS sheets and other reference materials on the safe handling, storage and disposal of hazardous chemicals in the workplace. Employees will be informed and trained if any new hazardous procedure, equipment or chemical is to be used in the laboratory.

Appendix C: Emergency Medical Procedures and Medical Records

In the event of any medical emergency, laboratory personnel are not required to provide direct first aid, although they can do so on a voluntary basis. They are required to contact Security at Ext. 7777 to report the emergency. They shall also contact the laboratory supervisor and/or Chemical Hygiene Officer. The laboratory supervisor will compete an Accident / Incident Report (Appendix T).

I - All injuries occurring in the laboratory should be reported.

2 - A physical examination or medical consultation should be available to employees when:

a)-Any lab worker develops signs or symptoms of a chemical exposure.

b)-Routine exposure, spill, leak or other unusual occurrence causes the probability of an exposure.

c)-Requested by an employee.

3 - The employer will provide the examining physician with specific information on the identity of the hazardous chemical, conditions of exposure, and a description of the signs and symptoms experienced by the worker.

4 - The physician will provide a written opinion for a recommended follow-up examination, test results, detected medical conditions that may pose increased risk, and a statement that the employee was informed of medical examination and consultation results.

Appendix D: Safety Inspections

There will be an annual safety inspection including fire extinguishers, first aid kits, safety showers, spill kits and stockrooms. All fume hoods will be periodically checked for proper functioning. Each fume hood will be marked to identify safe operating sash heights. Eyewashes will be activated and flushed weekly to clear the lines while labs are in use.

Biology and Chemistry room monitoring for general safety issues will be performed periodically. Research laboratories and research projects will follow a safety checklist each time they leave their research lab at the end of that day. In addition, checklists for will be used in rooms requiring special procedures, such as BSL-2 or Laser work. Please see Appendix U for the Laboratory Safety Checklists.

This Chemical Hygiene Plan will be reviewed and updated annually by the Chemical Hygiene Officer.

Appendix E: Disposal of Hazardous Chemical Waste

Specifically labeled Hazardous Waste Accumulation containers must be kept available for waste materials. These should include but is not limited to “Halogenated Solvents”, “Non-Halogenated Solvents", “Organic Solids", "Heavy Metals", and "Mercury". A running list of contents will be attached to each waste container also noting the % of each waste chemical. Incompatable waste chemicals shall be separated. All chemical waste will be stored at the site of generation until removal is arranged through Bard’s Environmental Resources Department. Be sure to not mix strong acids, etc. with organic waste. Nuetralize acid and bases before disposing.

Appendix F: Recommended Small Chemical Spill Response

In the event that a chemical carcinogen or toxic material is spilled the following procedure is recommended.

ANY CHEMICAL SPILLS

1. Leave the area immediately.
2. Wash eyes or skin at the eyewash and/or shower for fifteen minutes if contacted with chemical. Discard any contaminated protective clothing.
3. Contact the Laboratory Supervisor who will determine if Bard Security Department should be notified (7777). Post warning signs to keep people out of the spill area. Contact Security at ext. 7777 for medical assistance if necessary.
4. Before returning to spill area be aware of appropriate clean up procedures. Do not enter spill area alone; always have backup assistance available.
5. Wear appropriate personal protective equipment if it is determined the spill can be cleaned up without contacting Security (safety goggles, lab coat or jumpsuit, gloves - two dissimilar pairs, with inner gloves taped to jumpsuit sleeve, respirator, head and shoe protectors)

DRY CHEMICAL SPILLS

1. Cover with wet paper towel (use water or appropriate solvent). DO NOT DRY SWEEP.
2. Remove ignition sources if chemical is flammable.
3. Ventilate area.
4. Carefully pick up bulk of material using spill kit scoop.
5. Wipe up remaining chemical with wet paper towel.
6. Neutralize spilled material using appropriate process to decontaminate area.
7. Dispose of waste according to recommended hazardous waste disposal procedure.

WET CHEMICAL SPILLS

1. Ventilated area.
2. Remove ignition sources if chemical is flammable.
3. Surround material with absorbent material (Solusorb, Nutrasorb, sodium bicarbonate, sand, or vermiculite).
4. Carefully spread more absorbent material onto the chemical, avoid creating aerosols. Allow time for chemical to be soaked up by absorbent.
5. Pick up bulk of material with spill kit scoop. Dispose of waste according to recommended hazardous waste disposal procedure.

Appendix G: Decontamination of Ethidium Bromide Spills

Ethidium bromide is a powerful mutagen and must be disposed of in labeled waste containers to be carted away with other hazardous waste. Any spills can be neutralized by the following procedure.

1. Prepare a Decontamination Solution:

   4.2 g Sodium nitrite

   300 mL Water

   20 mL 50% Hypophosphorous acid

   Stir until well mixed.

   This mixture is good for up to 16 hours.

   Do not try to decontaminate Ethidium bromide concentrations greater than 0.5 mg/mL with this solution.

2. Wear protective clothing including rubber gloves, goggles, and lab coat.
3. Work in chemical fume hood. The decontamination solution releases small amounts of nitrogen
4. Unplug all electrical equipment to be decontaminated.
5. Scrub contaminated surface or equipment with paper towel soaked with fresh decontamination solution.
6. Scrub another 5 times with wet paper towels, using a fresh towel each time.
7. Soak all used paper towels in decontamination mixture for a minimum of 1 hour.
8. Neutralize decontamination mixture with sodium bicarbonate and discard with non-hazardous aqueous waste (down the drain with lots of water).

Adapted from Lunn, G and Sansone, E.B.: Decontamination of Ethidium Bromide Spills. Appl. Ind. Hyg. 4:234-237;1989.

Appendix H: Bard Colleges Most Hazardous Material and Procedures List

CHEMICAL	LOCATION
Acid chlorides (acetyl, benzoyl, thionyl, sulfonyl, etc.)	Chemistry
Acrylamide	Biology
Alkyl Lithium solutions	Organic Chemistry
Benzyl Bromide and Chloride	Organic Chemistry
Bromine	Organic Chemistry
Compressed Gases	Chemistry labs
Ethidium bromide	Biology
Ethylmethane sulfonic acid	Biology
Formaldehyde	Biology/Chemistry
Isocyanates (all)	Chemistry
Nitrosoguanidine	Biology
Sodium	Chemistry
Strong Acids especially Nitric Acid	Biology/Chemistry
Strong Bases	Biology/Chemistry
White Phosphorous	Chemistry
Xylene	Biology/Chemistry

ANY UNLABELED CHEMICAL IN REFRIGERATOR, ON SHELF OR COUNTER

SPILLED CHEMICALS NEAR BALANCES

ANY HUMAN BLOOD, BLOOD PRODUCTS, OR WASTES

ANY COMPRESSED GASSES or LIQUID NITROGEN

PROCEDURES	LOCATION
Electrophoresis	Biology
Autoclaving	Biology
Floor Centrifuge	Biology
Vacuum Pump	Chemistry
Rotary evaporation	Chemistry
Using Ultra Violet light source	Biology/Chemistry
Using any human blood products	Biology
Using any infectious agents from list by U.S. Dept. of Health (Appendix K)	Biology

Appendix I Reference Texts

Hazardous Chemicals, Information and Disposal Guide, 3rd ed., M. A. Armour, L M. and G. L Weir. Department of Chemistry, University of Alberta, Edmonton, Alberta, T6G 2G2, 1988.

Destruction of Hazardous Chemicals in the Laboratory, G. Lunn and E. B. Sansone, Wile York, 1990.

Prudent Practices for the Disposal of Chemicals from Laboratories, National Academy Washington, D.C. 1983.

Prudent Practices for Handling Hazardous Chemicals in Laboratories, National Academy Washington, D.C. 1981.

Safety and Health Practices for Working with Metallic Mercury, W Stopford. Bethlehem Apparatus Co., Inc. Hellertown, PA. 1985.

Safety and Compliance Directory, Lab Safety Supply, 1994.

Radiation Safety Manual 2nd Edition, University of Michigan, Ann Arbor, MI, 1984.

Hazardous Material, Substances and Waste Compliance Guide & 1996 North American Emergency Response Guide, Keegan and Keegan. Hazardous Materials Publishing Co., Inc, Kutztown, PA, 1997.

Laboratory Safety Video Sets, Howard Hughes Medical Institute, 1992.

Blood and Body Fluid Exposures in the Workplace: An Occupational Concern, Hazard Communication Specialists, Inc.

Biosafety in the Laboratory, Prudent Practices for the Handling and Disposal of Materials, National Academy Press, Washington, D.C. 1989.

Handbook of Laboratory Safety, The Chemical Rubber Company, Cleveland, Ohio 1971.

Laboratory Health and Safety Handbook, John Wiley and Sons, NY, 1990.

Laboratory Safety and Health Audio Course, J Kaufman. Kaufman and Associates, 1992.

Appendix J: STANDARD OPERATING LABORATORY SAFETY PROCEDURES

1) Know the location and how to use eye wash fountains, emergency shower, exits, and fire extinguishers.
2) Safety goggles should be worn when working with hazardous materials in the laboratory.
3) Do not wear loose clothing and tie back long hair to prevent accidents and reduce risk of catching on fire. Disposable gloves and aprons are available for your protection. If you put a pair of gloves on take them off before you do anything else. Do not wear gloves outside of the lab or touch doors with them on!
4) No eating, drinking or smoking is permitted in the laboratory.
5) Take only as much of a chemical as you need. **DO NOT** return any excess chemical to a reagent bottle.
6) Keep reagent bottles closed when not in use and return to chemical stock room shelves.
7) If you use the last of a chemical, place the empty bottle in the plastic bin under the hood in the Biology prep room or Chemistry lab 125.
8) **Never** leave chemical stockroom door open, and **never** prop open any doors.
9) **DO NOT** store chemicals from the stock room in the fume hood, on lab benches, or in laboratory drawers. Return chemicals to stock room as soon as possible.
10) Be sure fume hood fan is on and door is in working position or closed (if possible) when using chemicals in hood.
11) If chemicals **MAY** have contaminated you eyes or skin wash them immediately for 15 minutes and notify the laboratory instructor/supervisor.
12) Contact you laboratory instructor/supervisor, lab staff or security personnel (x7777) in the event of a chemical spill or accident of any manner so proper procedures can be determined.
13) Dispose of chemicals, broken glassware and sharps in the appropriate manner and in the appropriate recepticle. There are receptacles for glass, sharps, and biohazards. There is also a designated site for liquid and solid chemical waste in the prep room. Liquid waste should be in capped bottles clearly labeled with their contents. If you are unsure about where or how to dispose of something ask a faculty member or laboratory support person for help. No biohazard waste should be placed on any cart in the lab not designated for the purpose of storing bioharzard waste.
14) Safety Data Sheets (SDS) are available in the cabinet in RKC 115 or via links to manufacuterers pages on the lab computers, and through our subscriptions to Vertere and ChemWatch.
15) Label all secondary containers holding working chemicals and solutions with : **Full** name of contents, date, your name and your advisors initials.
16) Items for long term storage should alse be labeled clearly (**Full** name of contents, date, your name and your advisors initials.) and placed in appropriate long term storage boxes.
17) Do not attempt to use any piece of equipment you have not been shown how to use by a faculty member or laboratory support person.
18) All chemical are potentially dangerous so keep work areas clean and uncluttered, **ESPECIALLY IN COMMON AREAS AND AROUND BALANCES.** Accidental mixing of spilled unknown chemicals can have hazardous results. Be sure to keep sinks clear and clean.
19) Replace any common equipment to its designated area when you are finished with it.
20) Book bags are not to be stored on the benches or on the floor.
21) Do not remove anything from another persons lab bench without their permission.
22) Wash hands thoroughly **BEFORE** leaving the laboratory.
23) Always put safety first when working in the lab to protect others and yourself.

Appendix K: Listing of Infectious Agents

CENTERS FOR DISEASE CONTROL AND NATIONAL INSTITUTES OF HEALTH
LISTING OF INFECTIOUS AGENTS

(taken from " BIOSAFETY IN MICROBIOLOGICAL AND BIOMEDICAL LABORATORIES", U.S. Department of Health and Human Services, 3rd Edition, May 1993)

THE FOLLOWING LIST OF INFECTIOUS AGENTS (NOT ALL INCLUSIVE BUT REPRESENTS AGENTS USED AT BIOSAFETY LEVELS 2 THROUGH 4) HAVE BEEN ASSOCIATED WITH HUMAN DISEASE OF VARYING SEVERITY AND ARE A POTENTIAL HAZARD TO THE ENVIRONMENT. CLINICAL, DIAGNOSTIC, RESEARCH, TEACHING AND OTHER FACILITIES WORKING WITH THESE AGENTS SHOULD HANDLE CONTAMINATED MATERIALS/EQUIPMENT AS A REGULATED MEDICAL WASTE IN ACCORDANCE WITH APPLICABLE NEW YORK STATE LAWS AND REGULATIONS. IF YOU BELIEVE YOU ARE WORKING WITH AN INFECTIOUS AGENT NOT INCLUDED ON THIS LIST, PLEASE CONTACT THE CENTERS FOR DISEASE CONTROL.

Parasitic agents
- Nematodes
  - Ascaris spp., Strongyloi spp., Hookworms, Enterobius, and Trichinella spp.
- Protozoans
  - Toxoplasma spp., Plasmodium spp. (including P. cynomologi), Trypanosoma spp., Entamoeba spp., Coccidia spp., Giardia spp., Leishmania spp., Sarcocystis spp., Cryptosporidia spp., Babesia spp., Microsporidia spp., and Naegleria fowleri
- Trematodes
  - Schistosoma spp. (cercariae), Fasciola spp. (metacercaria)
- Cestodes
  - Echinococcus granulosus, Taenia solium (cysticercus cellulosae), and Hymenolepsis nana

Fungal agents
- Blastomyces dermatitidis, Coccidioides immitis, Cryptococcus neoformans, Histoplasma capsulatum, Sporothrix schenckii, and Pathogenic Members of Epidermophyton, Microsporum, and Trichophyton
- Molds
  - Cladosporium (Xylohypha) trichoides, Cladosporium bantianum, Penicillium marnefii, Exophiala (Wangiella) dermatitidis, Fonsecaea pedrosoi, and Dactylaria gallopava (Ochroconis gallopavum)

Bacterial agents
- Bacillus anthracis, Bordetella pertussis, Brucella (B. abortus, B. canis, B. melitensis, B. suis, Campylobacter (C. jejuni/C. coli, C. fetus subsp. fetus), Chlamydia psittaci, C. pneumoniae, C. trachomatis, Clostridium botulinum, C. tetani, Corynebacterium diphtheria, Francisella tularensis, Leptospira interrogans - all serovars, Legionella pneumophila; other Legionella-like agents, Mycobacterium leprae, M. kansasii, M. avium complex, M. xenopi, M. malmoense, M. asiaticum, M.simiae, M. szulgai, M. scrofulaceum, M. fortuitum, M. ulcerans, M.marinum, M. chelonei, M. tuberculosis, M. bovis, Neisseria gonorrhoeae, N.

Rickettsial agents
- Coxiella burnetii, Rickettsia prowazekii, R. typhi (R. mooseri), R. tsutsugamushi, R. canada, and Spotted Fever Group agents of human disease; Rickettsia rickettsii, R. conorii, R. akari, R. australis, and R. siberica

Viral agents (other than arboviruses)
- Hepatitis A Virus, Hepatitis E Virus, Hepatitis B Virus, Hepatitis C Virus, (formerly known as nonA nonB Virus), Hepatitis D Virus, Herpesvirus simiae (B-virus), Human Herpesviruses, Influenza, Lymphocytic Choriomeningitis Virus, Poliovirus, Poxviruses, Rabies Virus, Retroviruses, including Human and Simian Immunodeficiency Viruses (HIV and SIV), Transmissible Spongiform Encephalopathies (Creutzfeldt-Jakob, Kuru and related agents), and Vesicular Stomatitis Virus

Arboviruses, Arenaviruses, or Filoviruses

Virus (Biosafety Level 2)	Vaccine Strains
Chikungunya	131/25
Junin	Candid #1
Rift Valley fever	MP-12
Venezuelan equine encephalomyelitis	TC-83
Yellow fever	17-D

See Table A for additional agents

Virus (Biosafety Level 3)
- Venezuelan equine encephalomyelitis, Rift Valley fever, Chikungunya, Yellow fever, Japanese encephalitis, Louping ill, West Nile, Lymphocytic choriomeningitis, Orungo, Pery, Wesselsbron, Mucambo, Oropouche, Germiston, Bhanja, Hantaan, Mayaro, Spondweni, Murray Valley encephalitis, Semliki Forest, Powassan, Dugbe, Issyk-kul, Koutango, Aino, Akabane, Bhanja, Cocal, Dugbe, Everglades, Flexal, Getah, Israel Turkey mening., Junin, Kairi, Kimberley, Middelburg, Mobala, Mopeia, Nairobi sheep disease, Ndumu, Negishi, Peaton, Piry, Puumala, Sagiyama, Sal Vieja, San Perlita, Seoul, St. Louis enc. Thogoto, Tocio, Turuna, Vesicular Stomatitus (alagoas), and Zinga
- See Table B for additional agents

Virus (Biosafety Level 4)
- Junin, Marburg, Russian Spring-Summer encephalitis, Congo-Crimean hemorrhagic fever, Omsk hemorrhagic fever, Lassa, Machupo, Ebola, Tick-borne encephalitis virus complex, (Absettarov, Hanzalova, Hypr, Kumlinge, Kyasanur Forest disease), and Guanarito

Table A. Arboviruses and Arenaviruses Assigned to Biosafety Level 2

Acado
Acara
Aguacate
Aituy
Almpiwar
Aroa
Aruac
Arumowot
Aura
Avalon
Abras
Abu Hammad
Aebahoyo
Bageza
Bahig
Bakau
Baku
Bandia
Bangoran
Bangui
Benzi
Bermah Forest
Berur
Betai
Batama
Bauline
Bebaru
Belmont
Benevides
Benfica
Bertioga
Bimiti
Birao
Bluetongue
Boracela
Botambi
Boteke
Boubou
Bujaru
Bunyamwera
Bunyip
Burg E Arab
Bushbush
Bussuquara
Buttonwillow
Johnston Atoll
Jolnjakaka
Juan Diaz
Jugra
Jurona
Jutiapa
Kadam
Kaeng Khoi
Kakaiur
Kasodi
Kamese
Kammavan pettai
Kannaman galani
Amapari
Anarindeua
Anhanga
Anhembi
Anopheles A
Bwamba
Cacao
Cache Valley
Calmito
California enc.
Calovo
Candiru
Cape Wrath
Capim
Caraparu
Carey Island
Catu
Chaco
Chagres
Chandipura
Changuinola
Charleville
Chenuda
Chilibre
Chobar gorge
Clo Mor
Colorado tick fever
Corriparta
Cotia
Cowbone Ridge
Csiro Village
Culaba-
D'aguilar
Dakar Bat
Dengue-1
Dengue-2
Dengue-3
Dengue-4
Dera Ghazi Khan
East. equine enc. [a]
Edge Hill
Lanjan
Las Maloyas
Latino
Le Dantec
Lebombo
Lednice
Lipovnik
Lokern
Lone Star
Lukuni
M'poko
Madrid
Maguari
Mahogany Hammock
Anopheles B
Apeu
Apoi
Aride
Arkonam
Entebbe Bat
Ep. Hem. Disease
Erve
Eubenangee
Eyach
Flanders
Fort Morgan
Frijoles
Gamboa
Gan Gan
Gomoka
Gossas
Grand Arbaud
Great Island
Guajara
Guama
Guaratuba
Guaroa
Gumbo Limbo
Hart Park
Hazara
Highlands J
Huacho
Hughes
Icoaraci
Ieri
Ilesha
Ilheus
Ingwavuma
Inkoo
Ippy
Iritula
Isfahan
Itaporanga
Itaqui
Jamestown Canyon
Japanaut
Jerry Slough
Mossuril
Mount Elgon Bat
Murutucu
Mykines
Navarro
Nepuyo
Ngaingan
Nique
Nkolbisson
Nola
Ntaya
Nugget
Nyamanini
Nyando
Kao Shuan
Karimabad
Karshi
Kasba
Kemerovo
Kem Canyon
Kotapang
Keterah
Keuraliba
Keystone
Kismayo
Klamath
Kokobera
Kolongo
Koongol
Kotonkan
Kowanyama
Kunjin
Kununurra
Kwatta
La Crosse
La Joya
Lagos Bat
Landjia
Langat
Puchong
Punta Salinas
Punta Toro
Qalyub
Quaranfil
Restan
Rio Bravo
Rio Grande
Ross River
Royal Farm
Sabo
Saboya
Saint Floris
Sakhalin
Salehabad
San angelo
Sandfly f. (Naples)
Sandfly f. (Sicilian)
Sandjimba
Sango
Sathuperi
Sawgrass
Sebokele
Seletar
Sembalam
Serra do Navio
Shamonda
Shark River
Shuni
Silverwater
Simbu
Simian hem. fever
Sindbis
Main Drain
Malakal
Manawa
Manzanilla
Mapputta
Maprik
Marco
Marituba
Marrakai
Matariya
Matruh
Matucare
Melao
Mermet
Minatitlan
Minnal
Mirim
Mitchell River
Modoc
Moju
Mono Lake
Mont. myotis leuk.
Moriche
Mosqueiro
Sixgun City
Snowshoe Hare
Sokuluk
Soldado
Sororoca
Stratford
Sunday Canyon
Tacaiuma
Tacaribe
Taggert
Tahyna
Tamiami
Tanga
Tanjong Rabok
Tataguine
Tehran
Tembe
Tembusu
Tensaw
Tete
Tettnang
Thimiri
Thottapal-ayam
Tibrogargan
Timbo
Timboteua
Tindholmur
Toscana
Toure
Tribec
Triniti
Trivittatus
Trubanaman
O'nyong -nyong
Okhotskiy
Okola
Olifantsviei
Oriboca
Ossa
Pacora
Pacui
Pahayokee
Palyam
Parana
Pata
Pathum Thani
Patois
Phnom-Penh Bat
Pichinde
Pixuna
Pongola
Ponteves
Precarious Point
Pretoria
Prospect Hill
Tsuruse
Turlock
Tyuleniy
Uganda S
Umatilla
Umbre
Una
Upolu
Urucuri
Usutu
Uukuniemi
Vellore
Venkatapuram
Vinces
Virgin River
VS-Indiana
VS-New Jersey
Wad Medani
Wallal
Wanowrie
Warrego
West. equine enc. [a]
Whataroa
Witwatersrand
Wonga
Wongorr
Wyeomyia
Yaquinea Head
Yata
Yogue
Zaliv Terpeniya
Zegla
Zika
Zinglamo
Zirqa

[a] A vaccine is available and is recommended for all persons working with this agent

Table B. Arboviruses and Certain Other Viruses Assigned to Biosafety Level 3 (on the basis of insufficient experience)

Adelaide River
Agua Preta
Alenquer
Arbia
Arboledas
Babanki
Batken
Belem
Berrimah
Bimbo
Bobaya
Bobia
Bozo
Buenaventura
Cabassue [b,c]
Cacipacore
Calchaqui
Cananeia
Caninde
Chim
Coastal Plains
Connecticut
Corlou
Dabakala
Douglas
Enseada
Estero Real
Fomede
Forecariah
Fort Sherman
Gabek Forest
Gadgets Gully
Garba
Gordil
Gray Lodge
Gurupi
Iaco
Ibaraki
Ife
Ingangapi
Inini
Issyk-Kul
Itaituba
Almeirim
Altamira
Andasibe
Itimirim
Itupiranga
Jacareacanga
Jamanxi
Jari
Kedougou
Khasan
Kindia
Kyzylagach
Lake Clarendon
Llano Seco
Macaua
Mapuera
Mboke
Meaban
Moju Dos Compos
Monte Dourado
Munguba
Naranjal
Nariva
Nasoule
Ndelle
New Minto
Ngari
Ngoupe
Nodamura
Northway
Odrenisrou
Omo
Oriximina
Ouango
Oubangui
Oubi
Ourem
Palestina
Para
Paramushir
Paroo River
Antequera
Araguari
Aransas Bay
Perinet
Petevo
Picola
Playas
Pueblo Viejo
Purus
Radi
Razdan
Resistencia
Rochambeau
Salanga
San Juan
Santa Rosa
Santarem
Saraca
Saumarez Reef
Sedlec
Sena Madureira
Sepik
Shokwe
Slovakia
Somone
Spipur
Tai
Tamdy
Telok Forest
Termeil
Thiafora
Tilligerry
Tinaroo
Tlacotalpan
Tonate [b,c]
Tlinga
Xiburema
Yacaaba
Yaounde
Yoka
Yug Bogkano-vac

Appendix L: EPA P-LISTED CHEMICALS

67

Environmental Protection Agency § 261.33

Industry and EPA hazardous
waste No. Hazardous waste Hazard
code
K145 ..... Residues from naphthalene collection and recovery operations from the recovery of
coke by-products produced from coal.
(T)
K147 ..... Tar storage tank residues from coal tar refining ..... (T)
K148 ..... Residues from coal tar distillation, including but not limited to, still bottoms ..... (T)

[46 FR 4618, Jan. 16, 1981]

EDITORIAL NOTE: For FEDERAL REGISTER citations
affecting § 261.32, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and on GPO Access.

§ 261.33 Discarded commercial chemical products, off-specification species, container residues, and spill residues thereof.

The following materials or items are hazardous wastes if and when they are discarded or intended to be discarded as described in § 261.2(a)(2)(i), when they are mixed with waste oil or used oil or other material and applied to the land for dust suppression or road treatment, when they are otherwise applied to the land in lieu of their original intended use or when they are contained in products that are applied to the land in lieu of their original intended use, or when, in lieu of their original intended use, they are produced for use as (or as a component of) a fuel, distributed for use as a fuel, or burned as a fuel. (a) Any commercial chemical product, or manufacturing chemical intermediate having the generic name listed in paragraph (e) or (f) of this section. (b) Any off-specification commercial chemical product or manufacturing chemical intermediate which, if it met specifications, would have the generic name listed in paragraph (e) or (f) of this section. (c) Any residue remaining in a container or in an inner liner removed from a container that has held any commercial chemical product or manufacturing chemical intermediate having the generic name listed in paragraphs (e) or (f) of this section, unless the container is empty as defined in § 261.7(b) of this chapter. [*Comment:* Unless the residue is being beneficially used or reused, or legitimately recycled or reclaimed; or being accumulated, stored, transported or treated prior to such use, re-use, recycling or reclamation, EPA considers the residue to be intended for discard, and thus, a hazardous waste. An example of a legitimate re-use of the residue would be where the residue remains in the container and the container is used to hold the same commercial chemical product or manufacturing chemical intermediate it previously held. An example of the discard of the residue would be where the drum is sent to a drum reconditioner who reconditions the drum but discards the residue.] (d) Any residue or contaminated soil, water or other debris resulting from the cleanup of a spill into or on any land or water of any commercial chemical product or manufacturing chemical intermediate having the generic name listed in paragraph (e) or (f) of this section, or any residue or contaminated soil, water or other debris resulting from the cleanup of a spill, into or on any land or water, of any off-specification chemical product and manufacturing chemical intermediate which, if it met specifications, would have the generic name listed in paragraph (e) or (f) of this section. [*Comment:* The phrase ''commercial chemical product or manufacturing chemical intermediate having the generic name listed in . . .'' refers to a chemical substance which is manufactured or formulated for commercial or manufacturing use which consists of the commercially pure grade of the chemical, any technical grades of the chemical that are produced or marketed, and all formulations in which the chemical is the sole active ingredient. It does not refer to a material, such as a manufacturing process waste, that contains any of the substances listed in paragraph (e) or (f). Where a manufacturing process waste is deemed to be a hazardous waste because it contains a substance listed in paragraph (e) or (f), such waste will be listed in either § 261.31 or § 261.32 or will be identified as a hazardous waste by the characteristics set forth in subpart C of this part.] (e) The commercial chemical products, manufacturing chemical intermediates or off-specification commercial chemical products or manufacturing chemical intermediates referred to in paragraphs (a) through (d) of this

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section, are identified as acute hazardous wastes (H) and are subject to be the small quantity exclusion defined in § 261.5(e). [*Comment:* For the convenience of the regulated community the primary hazardous properties of these materials have been indicated by the letters T (Toxicity), and R (Reactivity). Absence of a letter indicates that the compound only is listed for acute toxicity.] These wastes and their corresponding EPA Hazardous Waste Numbers are:

Hazardous
waste
No.
Chemical abstracts
No. Substance
P023 107–20–0 Acetaldehyde, chloro-
P002 591–08–2 Acetamide, N-(aminothioxomethyl)-
P057 640–19–7 Acetamide, 2-fluoro-
P058 62–74–8 Acetic acid, fluoro-, sodium salt
P002 591–08–2 1-Acetyl-2-thiourea
P003 107–02–8 Acrolein
P070 116–06–3 Aldicarb
P203 1646–88–4 Aldicarb sulfone.
P004 309–00–2 Aldrin
P005 107–18–6 Allyl alcohol
P006 20859–73–8 Aluminum phosphide (R,T)
P007 2763–96–4 5-(Aminomethyl)-3-isoxazolol
P008 504–24–5 4-Aminopyridine
P009 131–74–8 Ammonium picrate (R)
P119 7803–55–6 Ammonium vanadate
P099 506–61–6 Argentate(1-), bis(cyano-C)-, potassium
P010 7778–39–4 Arsenic acid H_3AsO_4
P012 1327–53–3 Arsenic oxide As_2O_3
P011 1303–28–2 Arsenic oxide As_2O_5
P011 1303–28–2 Arsenic pentoxide
P012 1327–53–3 Arsenic trioxide
P038 692–42–2 Arsine, diethyl-
P036 696–28–6 Arsonous dichloride, phenyl-
P054 151–56–4 Aziridine
P067 75–55–8 Aziridine, 2-methyl-
P013 542–62–1 Barium cyanide
P024 106–47–8 Benzenamine, 4-chloro-
P077 100–01–6 Benzenamine, 4-nitro-

P028 100–44–7 Benzene, (chloromethyl)-
P042 51–43–4 1,2-Benzenediol, 4-[1-hydroxy-2-(methylamino)ethyl]-, (R)-
P046 122–09–8 Benzeneethanamine, alpha,alpha-dimethyl-
P014 108–98–5 Benzenethiol
P127 1563–66–2 7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-, methylcarbamate.
P188 57–64–7 Benzoic acid, 2-hydroxy-, compd. with (3aS-cis)-1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethylpyrrolo[2,3-b]indol-5-yl methylcarbamate ester (1:1).
P001 [1] 81–81–2 2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenylbutyl)-, & salts, when present at concentrations greater than 0.3%
P028 100–44–7 Benzyl chloride
P015 7440–41–7 Beryllium powder
P017 598–31–2 Bromoacetone
P018 357–57–3 Brucine
P045 39196–18–4 2-Butanone, 3,3-dimethyl-1-(methylthio)-, O-[methylamino)carbonyl] oxime
P021 592–01–8 Calcium cyanide
P021 592–01–8 Calcium cyanide $Ca(CN)_2$
P189 55285–14–8 Carbamic acid, [(dibutylamino)- thio]methyl-, 2,3-dihydro-2,2-dimethyl- 7-benzofuranyl ester.
P191 644–64–4 Carbamic acid, dimethyl-, 1-[(dimethyl-amino)carbonyl]- 5-methyl-1H- pyrazol-3-yl ester.
P192 119–38–0 Carbamic acid, dimethyl-, 3-methyl-1- (1-methylethyl)-1H- pyrazol-5-yl ester.
P190 1129–41–5 Carbamic acid, methyl-, 3-methylphenyl ester.
P127 1563–66–2 Carbofuran.
P022 75–15–0 Carbon disulfide
P095 75–44–5 Carbonic dichloride
P189 55285–14–8 Carbosulfan.
P023 107–20–0 Chloroacetaldehyde
P024 106–47–8 p-Chloroaniline
P026 5344–82–1 1-(o-Chlorophenyl)thiourea
P027 542–76–7 3-Chloropropionitrile
P029 544–92–3 Copper cyanide
P029 544–92–3 Copper cyanide Cu(CN)
P202 64–00–6 m-Cumenyl methylcarbamate.
P030 ..... Cyanides (soluble cyanide salts), not otherwise specified
P031 460–19–5 Cyanogen

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Hazardous waste No. Chemical abstracts No. Substance
P033 506–77–4 Cyanogen chloride
P033 506–77–4 Cyanogen chloride (CN)Cl
P034 131–89–5 2-Cyclohexyl-4,6-dinitrophenol
P016 542–88–1 Dichloromethyl ether
P036 696–28–6 Dichlorophenylarsine
P037 60–57–1 Dieldrin
P038 692–42–2 Diethylarsine
P041 311–45–5 Diethyl-p-nitrophenyl phosphate
P040 297–97–2 O,O-Diethyl O-pyrazinyl phosphorothioate
P043 55–91–4 Diisopropylfluorophosphate (DFP)
P004 309–00–2 1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexa- chloro-1,4,4a,5,8,8a,-hexahydro-, (1alpha,4alpha,4abeta,5alpha,8alpha,8abeta)-
P060 465–73–6 1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexa- chloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta,5beta,8beta,8abeta)-
P037 60–57–1 2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2aalpha,3beta,6beta,6aalpha,7beta, 7aalpha)-
P051 [1] 72–20–8 2,7:3,6-Dimethanonaphth [2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2abeta,3alpha,6alpha,6abeta,7beta, 7aalpha)-, & metabolites
P044 60–51–5 Dimethoate
P046 122–09–8 alpha,alpha-Dimethylphenethylamine
P191 644–64–4 Dimetilan.
P047 [1] 534–52–1 4,6-Dinitro-o-cresol, & salts
P048 51–28–5 2,4-Dinitrophenol
P020 88–85–7 Dinoseb
P085 152–16–9 Diphosphoramide, octamethyl-
P111 107–49–3 Diphosphoric acid, tetraethyl ester
P039 298–04–4 Disulfoton
P049 541–53–7 Dithiobiuret
P185 26419–73–8 1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-, O- [(methylamino)- carbonyl]oxime.
P050 115–29–7 Endosulfan
P088 145–73–3 Endothall
P051 72–20–8 Endrin
P051 72–20–8 Endrin, & metabolites
P042 51–43–4 Epinephrine
P031 460–19–5 Ethanedinitrile
P194 23135–22–0 Ethanimidothioc acid, 2-(dimethylamino)-N-[[(methylamino) carbonyl]oxy]-2-oxo-, methyl ester.
P066 16752–77–5 Ethanimidothioic acid, N-[[(methylamino)carbonyl]oxy]-, methyl ester
P101 107–12–0 Ethyl cyanide
P054 151–56–4 Ethyleneimine
P097 52–85–7 Famphur
P056 7782–41–4 Fluorine
P057 640–19–7 Fluoroacetamide
P058 62–74–8 Fluoroacetic acid, sodium salt
P198 23422–53–9 Formetanate hydrochloride.
P197 17702–57–7 Formparanate.

P065 628–86–4 Fulminic acid, mercury(2+) salt (R,T)
P059 76–44–8 Heptachlor
P062 757–58–4 Hexaethyl tetraphosphate
P116 79–19–6 Hydrazinecarbothioamide
P068 60–34–4 Hydrazine, methyl-
P063 74–90–8 Hydrocyanic acid
P063 74–90–8 Hydrogen cyanide
P096 7803–51–2 Hydrogen phosphide
P060 465–73–6 Isodrin
P192 119–38–0 Isolan.
P202 64–00–6 3-Isopropylphenyl N-methylcarbamate.
P007 2763–96–4 3(2H)-Isoxazolone, 5-(aminomethyl)-
P196 15339–36–3 Manganese, bis(dimethylcarbamodithioato-S,S′)-,
P196 15339–36–3 Manganese dimethyldithiocarbamate.
P092 62–38–4 Mercury, (acetato-O)phenyl-
P065 628–86–4 Mercury fulminate (R,T)
P082 62–75–9 Methanamine, N-methyl-N-nitroso-
P064 624–83–9 Methane, isocyanato-
P016 542–88–1 Methane, oxybis[chloro-
P112 509–14–8 Methane, tetranitro- (R)
P118 75–70–7 Methanethiol, trichloro-
P198 23422–53–9 Methanimidamide, N,N-dimethyl-N′-[3-[[(methylamino)-carbonyl]oxy]phenyl]-, monohydrochloride.
P197 17702–57–7 Methanimidamide, N,N-dimethyl-N′-[2-methyl-4-[[(methylamino)carbonyl]oxy]phenyl]-
P050 115–29–7 6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-
hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide

Hazardous
waste
No.
Chemical abstracts
No. Substance
P059 76–44–8 4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-
3a,4,7,7a-tetrahydro-
P199 2032–65–7 Methiocarb.
P066 16752–77–5 Methomyl
P068 60–34–4 Methyl hydrazine
P064 624–83–9 Methyl isocyanate
P069 75–86–5 2-Methyllactonitrile
P071 298–00–0 Methyl parathion
P190 1129–41–5 Metolcarb.
P128 315–8–4 Mexacarbate.
P072 86–88–4 alpha-Naphthylthiourea
P073 13463–39–3 Nickel carbonyl
P073 13463–39–3 Nickel carbonyl $Ni(CO)_4$, (T-4)-
P074 557–19–7 Nickel cyanide
P074 557–19–7 Nickel cynaide $Ni(CN)_2$
P075 [1] 54–11–5 Nicotine, & salts
P076 10102–43–9 Nitric oxide
P077 100–01–6 p-Nitroaniline
P078 10102–44–0 Nitrogen dioxide
P076 10102–43–9 Nitrogen oxide NO
P078 10102–44–0 Nitrogen oxide NO_2
P081 55–63–0 Nitroglycerine (R)
P082 62–75–9 N-Nitrosodimethylamine
P084 4549–40–0 N-Nitrosomethylvinylamine
P085 152–16–9 Octamethylpyrophosphoramide
P087 20816–12–0 Osmium oxide OsO_4, (T-4)-
P087 20816–12–0 Osmium tetroxide
P088 145–73–3 7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid
P194 23135–22–0 Oxamyl.
P089 56–38–2 Parathion
P034 131–89–5 Phenol, 2-cyclohexyl-4,6-dinitro-
P048 51–28–5 Phenol, 2,4-dinitro-
P047 [1] 534–52–1 Phenol, 2-methyl-4,6-dinitro-, & salts
P020 88–85–7 Phenol, 2-(1-methylpropyl)-4,6-dinitro-
P009 131–74–8 Phenol, 2,4,6-trinitro-, ammonium salt (R)
P128 315–18–4 Phenol, 4-(dimethylamino)-3,5-dimethyl-, methylcarbamate (ester).
P199 2032–65–7 Phenol, (3,5-dimethyl-4-(methylthio)-, methylcarbamate
P202 64–00–6 Phenol, 3-(1-methylethyl)-, methyl carbamate.
P201 2631–37–0 Phenol, 3-methyl-5-(1-methylethyl)-, methyl carbamate.
P092 62–38–4 Phenylmercury acetate
P093 103–85–5 Phenylthiourea
P094 298–02–2 Phorate
P095 75–44–5 Phosgene
P096 7803–51–2 Phosphine
P041 311–45–5 Phosphoric acid, diethyl 4-nitrophenyl ester
P039 298–04–4 Phosphorodithioic acid, O,O-diethyl
S-[2-(ethylthio)ethyl] ester
P094 298–02–2 Phosphorodithioic acid, O,O-diethyl
S-[(ethylthio)methyl] ester
P044 60–51–5 Phosphorodithioic acid, O,O-dimethyl S-[2-(methylamino)-2-oxoethyl] ester
P043 55–91–4 Phosphorofluoridic acid, bis(1-methylethyl) ester
P089 56–38–2 Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester
P040 297–97–2 Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester
P097 52–85–7 Phosphorothioic acid,
O-[4-[(dimethylamino)sulfonyl]phenyl] O,O-dimethyl ester

P071 298–00–0 Phosphorothioic acid, O,O,-dimethyl O-(4-nitrophenyl) ester
P204 57–47–6 Physostigmine.
P188 57–64–7 Physostigmine salicylate.
P110 78–00–2 Plumbane, tetraethyl-
P098 151–50–8 Potassium cyanide
P098 151–50–8 Potassium cyanide K(CN)
P099 506–61–6 Potassium silver cyanide
P201 2631–37–0 Promecarb
P070 116–06–3 Propanal, 2-methyl-2-(methylthio)-,
O-[(methylamino)carbonyl]oxime
P203 1646–88–4 Propanal, 2-methyl-2-(methyl-sulfonyl)-, O-[(methylamino)carbonyl] oxime.
P101 107–12–0 Propanenitrile
P027 542–76–7 Propanenitrile, 3-chloro-
P069 75–86–5 Propanenitrile, 2-hydroxy-2-methyl-
P081 55–63–0 1,2,3-Propanetriol, trinitrate (R)
P017 598–31–2 2-Propanone, 1-bromo-
P102 107–19–7 Propargyl alcohol

Environmental Protection Agency § 261.33

Hazardous
waste
No.
Chemical abstracts
No. Substance
P003 107–02–8 2-Propenal
P005 107–18–6 2-Propen-1-ol
P067 75–55–8 1,2-Propylenimine
P102 107–19–7 2-Propyn-1-ol
P008 504–24–5 4-Pyridinamine
P075 [1] 54–11–5 Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)-, & salts
P204 57–47–6 Pyrrolo[2,3-b]indol-5-ol, 1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethyl-,
methylcarbamate (ester), (3aS-cis)-.
P114 12039–52–0 Selenious acid, dithallium(1+) salt
P103 630–10–4 Selenourea
P104 506–64–9 Silver cyanide
P104 506–64–9 Silver cyanide Ag(CN)
P105 26628–22–8 Sodium azide
P106 143–33–9 Sodium cyanide
P106 143–33–9 Sodium cyanide Na(CN)
P108 [1] 57–24–9 Strychnidin-10-one, & salts
P018 357–57–3 Strychnidin-10-one, 2,3-dimethoxy-
P108 [1] 57–24–9 Strychnine, & salts
P115 7446–18–6 Sulfuric acid, dithallium(1+) salt
P109 3689–24–5 Tetraethyldithiopyrophosphate
P110 78–00–2 Tetraethyl lead
P111 107–49–3 Tetraethyl pyrophosphate
P112 509–14–8 Tetranitromethane (R)
P062 757–58–4 Tetraphosphoric acid, hexaethyl ester
P113 1314–32–5 Thallic oxide
P113 1314–32–5 Thallium oxide Tl_2O_3
P114 12039–52–0 Thallium(I) selenite
P115 7446–18–6 Thallium(I) sulfate
P109 3689–24–5 Thiodiphosphoric acid, tetraethyl ester
P045 39196–18–4 Thiofanox
P049 541–53–7 Thioimidodicarbonic diamide $[(H_2N)C(S)]_2NH$
P014 108–98–5 Thiophenol
P116 79–19–6 Thiosemicarbazide
P026 5344–82–1 Thiourea, (2-chlorophenyl)-
P072 86–88–4 Thiourea, 1-naphthalenyl-
P093 103–85–5 Thiourea, phenyl-
P185 26419–73–8 Tirpate.
P123 8001–35–2 Toxaphene
P118 75–70–7 Trichloromethanethiol
P119 7803–55–6 Vanadic acid, ammonium salt
P120 1314–62–1 Vanadium oxide V_2O_5
P120 1314–62–1 Vanadium pentoxide
P084 4549–40–0 Vinylamine, N-methyl-N-nitroso-
P001 [1] 81–81–2 Warfarin, & salts, when present at concentrations greater than 0.3%
P205 137–30–4 Zinc, bis(dimethylcarbamodithioato-S,S′)-,
P121 557–21–1 Zinc cyanide
P121 557–21–1 Zinc cyanide $Zn(CN)_2$
P122 1314–84–7 Zinc phosphide Zn_3P_2, when present at concentrations greater than 10% (R,T)
P205 137–30–4 Ziram.

[1] CAS Number given for parent compound only.

(f) The commercial chemical products, manfacturing chemical intermediates, or off-specification commercial chemical products referred to in paragraphs (a) through (d) of this section, are identified as toxic wastes (T), unless otherwise designated and are subject to the small quantity generator exclusion defined in § 261.5 (a) and (g). [*Comment:* For the convenience of the regulated community, the primary hazardous properties of these materials have been indicated by the letters T (Toxicity), R (Reactivity), I (Ignitability) and C (Corrosivity). Absence of a letter indicates that the compound is only listed for toxicity.] These wastes and their corresponding EPA Hazardous Waste Numbers are:

Appendix M: SPILL NOTIFICATION PROCEDURE BERD POLICY NO. F-BERD-005

Policy No. F-BERD-005: Spill Notification Procedure

Area: Facilities - Environmental Resources Department
Adopted: 6/5/2006
Revisions approved:

Description:
To ensure that potentially hazardous conditions are addressed immediately, we are identifying spill notification procedures for campus personnel to follow.

Procedures:
If there is a spill or hazardous situation on campus, the discovering party should notify Security. Security will immediately notify the on call emergency responder who will make a determination about whether to handle the incident in-house or use one of our outside spill response companies.

Anyone discovering a spill or condition that could eventually lead to a spill, shall immediately notify Security x 7777 and report the following:

- individual's name
- location of spill
- time of the spill
- description of the magnitude of the spill
- whether personnel have been injured
- the portion of the facility involved in the spill

For record keeping purposes, Security will generate an incident report and provide a copy to the Director of Buildings & Grounds.

Appendix N: SAFETY PROTOCOL FOR BIOSAFETY LEVEL 2 ORGANISMS AND ORGANISMS THAT COULD BE HARMFUL TO LABORATORY MODEL ORGANISM

Safety Protocol for Biosafety Level 2 Organisms: Bard College, Reem Kayden Center for Science and Computation

8-03-09

1. **Biosafety level 2 work involves agents with a moderate potential hazard to personnel and the environment or any agent deemed potentially harmful to any laboratory model organisms.**

2. **People working with biological safety level 2 laboratory must:**

   2.1. Receive specific training in handling pathogenic agents. All personnel need to be trained on site and shown, in person, by authorized personell, the correct way to conduct the work. Subsequently, each student/worker has to demonstrate that he/she is proficient and able to perform the tasks correctly in accordance with safety protocols. Once trained, if he/she does not follow the rules, privileges will be revoked until the training procedure mentioned is completed again. All training records need to be kept with the general lab-training safety records.

   2.2. Be under the supervision of the Principal Investigator and Jim Brudvig the Chemical Hygiene Officer.

3. **This biosafety level 2 work must adhere to the following rules and regulations:**

   3.1. Standard Microbiological Practices:

   3.1.1. Windows should be closed at all times while working in the laboratory.

   3.1.2. Mouth pipetting is absolutely prohibited.

   3.1.3. Eating, drinking, smoking, and applying any cosmetics inside any laboratory are absolutely prohibited. Refrigerator/freezers inside RKC are specifically for chemicals and other substances and may not be used for storage of food and/or drinks.

   3.1.4. Persons wash their hands after handling infectious materials **and** when they leave the laboratory.

   3.2. Special Practices:

   3.2.1. Access to the designated BSL-2 space is limited to persons involved in the project when work with BL-2 agents is being conducted.

   3.2.2. Authorized personnel include only the Principal Investigator and their designated trained technicians and Bard laboratory staff. Any intruders are to be reported to the Chemical Hygiene Officer.

   3.2.3. Proper hazard warning signs will be posted on each door to the laboratory at the start of each work session to limit assess when a BL-2 agent is being handled.

   3.2.4. Laboratory coats must be worn at all times while in the laboratory when any BL-2 work is taking place.

3.2.5. Gloves (powder free) must be worn while working inside the laboratory to avoid skin contamination. Gloves used inside the biological safety cabinet must be disposed of inside the cabinet.

3.2.6. Work with any BSL-2 agent must be done inside a designated restricted area in the RKC laboratories.

3.2.7. All materials needed from other areas must be inside the restricted area prior to carrying out an experiment inside the restricted area.

3.2.8. Disposable cloth sprayed with “Vesphene II” decontamination solution must be laid out on the inside work surface of the restricted area prior to working with the infectious agent.

3.2.9. All waste will be treated and tested separately before disposal.

3.2.9.1. A separate plastic waste container must be present in restricted area to place used pipette tips and other sharps. This reusable container must be filled up to a centimeter with “Wescodyne”.

3.2.9.2. This sharps container must be sealed and the outside wiped with “VespheneII” after each work session if it is not full and will remain in the restricted area.

3.2.9.3. Once the sharps container is two thirds filled it must be sealed and shaken to decontaminate contents. The outside will be sprayed with “Vesphene II” prior to removal from the restricted area for autoclaving.

3.2.9.4. A biohazard waste labeled autoclave bag must also be present inside the restricted area to dispose of large contaminated materials. Prior to removal from the restricted area for disposal, the outside of this bag must be sprayed with “Vesphene” solution and sealed.

3.2.9.5. A third waste container lined with a biohazard waste labeled autoclave bag will be set up inside the restricted area for contaminated pipettes. When filled, the outside of this bag must also be sprayed with “Vesphene” solution and sealed prior to removal from the restricted area for autoclaving.

3.2.10. Any spills are to be decontaminated immediately with “Wescodyne” solution and reported to the Principal Investigator.

3.2.11. The restricted area must be emptied of all waste a minimum of once a week. If something is to be left behind, permission must be obtained from the Principal Investigator.

3.2.12. The surfaces of the restricted area must me wiped down with “Vesphene II” solution soaked into the disposable cloth inside the cabinet at the end of each work session.

3.3. Growing Biosafety Level 2 Cultures:

3.3.1. Any live cultures of a BL-2 agent will be incubated in the restricted area or a designated incubator.

3.3.2. Any cultures to be incubated outside the restricted area must be in an approved containers. The outside of these containers must be sprayed with “Vesphene” solution and sealed prior to removal from the restricted area.

3.3.3. The approved container must be labeled with a sign indicating live Biosafety level 2 organisms are inside.

3.3.4. Liquid waste must be discarded into container containing Wescodyne solution.

3.3.5. Glass pipettes used to handle liquid waste must be submerged in a Wescodyne solution for at least 10 minutes prior to cleaning and sterilization.

3.4. Autoclave Concerns:

3.4.1. Any object or waste container leaving the restricted area must be autoclaved immediately for 1 hour prior to disposal.

3.4.2. A spore sterility indicator test must used at least once a week during an autoclave run of biosafety level 2 waste to confirm proper decontamination.

3.4.3. Each autoclave run of biosafety level 2 waste and spore sterility test results must be recorded in the “Autoclave Log book” located near the autoclave.

3.4.4. Autoclaved biosafety level 2 waste is to be placed in a specially labeled trash container to wait for the results of the spore sterility indicator test.

3.4.5. Once autoclave performance has been confirmed as sterile, the autoclaved waste can be disposed of in the regular trash.

BIOHAZARD

Biosaftey Level 2
BSL2 strains in use:
Vibrio cholerae and
Vibrio parahaemolyticus

AUTHORIZED PERSONNEL ONLY

CONTACT PERSON:	DR. BROOKE JUDE
TITLE:	P.I.
OFFICE/LAB PHONE:	RKC 210/ (845) 752-2337
AFTER HOURS NUMBER:	(603) 304-6948

BIOHAZARD

Biosaftey Level 2
BSL2 strains in use:
Vibrio cholerae and
Vibrio parahaemolyticus

AUTHORIZED PERSONNEL ONLY

CONTACT PERSON:	DR. BROOKE JUDE
TITLE:	P.I.
OFFICE/LAB PHONE:	RKC 210/ (845) 752-2337
AFTER HOURS NUMBER:	(603) 304-6948

Appendix N-1: HANDLING BIOSAFETY LEVEL II ORGANISMS FOR TICK RESEARCH

Handling Biosafety Level II (BSL-2) Organisms for Tick Research

(adapted from Bard College Biology protocol[1])

Introductory Remarks

BSL-2 Organisms are potentially hazardous to researchers and must be handled by authorized personnel in designated laboratory areas. At Bard College, the basement field lab of the RKC Biology department and RKC 113-G are the designated area for the purpose of handling live ticks. Proper handling of such organisms is required by Federal and State Law as well as Bard Policy, and trained personnel are expected to follow the safety precautions outlined in the protocol below. All personnel need to be trained on site and shown, in person, by authorized personell, the correct way to conduct the work. Subsequently, each student/worker has to demonstrate that he/she is proficient and able to perform the tasks correctly in accordance with safety protocols. Once trained, if he/she does not follow the rules, privileges will be revoked until the training procedure mentioned is completed again. All training records need to be kept with the PI and with the general lab-training safety records with the lab staff.

Organism(s) of Concern

Ixodes scapularis, the black-legged tick, is a vector host species for various pathogens including *Borrelia burgdorferi* and *Anaplasma phagocytophylum. S*uch pathogens have been shown to cause disease and death in humans. These BS-2 level organisms are present only inside live ticks, and transmitted to humans only through tick bite.

Environmental Requirements

1) Windows and doors to the designated laboratory must be closed.
2) Hazard warning signs must be clearly posted at every entrance to the area where live ticks are being handled, including a biohazard sign containing organism information and personnel contact information. This information must be posted during the time the ticks are being handled and where any live ticks are stored
3) Freezers and refrigerators are not to be used for personal items.
4) All materials/supplies must be inside designated area prior to handling of organisms.
5) Live ticks must be handled over pans rimmed with double-sided tape to ensure they are not able to escape the immediate area. Pans must also cantain a layer of diatomaceous earth.
6) Soap and water are to be used to decontaminate surfaces before and after work.[2]

Behavioral Requirements

1) All live ticks must be contained prior to entering Reem Kayen Center for Science and Computation and be transported directly to a BSL-2 area. Ticks must remain in the BSL-2 designated area until processed as waste. See cleanup below.
1) Latex gloves are required to be worn at all times.
2) Eating, drinking, smoking and/or the use of cosmetics is not allowed.
3) Washing hands after handling biological agents is required.
4) Washing hands before leaving the designated laboratory is required.
5) Date, researcher, total number ticks processed, and total number unaccounted for ('lost') ticks must be recorded in the Live Tick Handling Log at the end of each session.
6) If any ticks are not accounted for during or after handling, a notification specifying this information (date, researcher, contact, and total number unaccounted for ('lost') ticks) must be posted at the entrance to the work area and on any relevant work surfaces for a period of 72 hours. A copy of the Tick Handling Log will be maintained by the Primary Investigator, with a copy given to lab staff weekly when live tick research is going on in the laboratories.

---

[1] Adapted from *Safety Protocol for Biosafety Level 2 Type Organisms that could be harmful to laboratory model organism, Bard College, Reem Kayden Center for Science and Computation, 16 July 2009.*

[2] RODGERS ET AL.: SUBOPTIMAL ATMOSPHERIC MOISTURE AFFECTS TICK SURVIVAL, JOURNAL OF MEDICAL ENTOMOLOGY Vol. 44, no. 2, pp. 372-375.

Cleanup and Waste Requirements

1) All tick waste (from mortalities) must be placed into ethanol-filled vials prior to discarding, and left in the ethanol for a minimum of one day. Ethanol will later be strained out and placed into appropriate liquid waste bottle, and remaining dead ticks will be discarded in trash can.
2) All waste must be discarded appropriately and at least once per week.

Personnel report to the Principal Investigator(s) of Research and the Chemical Hygiene Officer at Bard College[3]. While additional requirements involving culture growth, sharps, and pipetting are specified in Bard's protocol, this project does not involve these components and therefore their specific requirements are not stated here.

[3] As per this protocol and the *Anaplasma* research project, the Principal Investigator(s) at Bard College Biology, are Mike Tibbets and Felicia Keesing; the Chemical Hygiene Officer at Bard is Jim Brudvig.

Live Tick Handling Log

Date	Researcher(s)	# Live Ticks processed	# Live Ticks unaccounted for	Notes

Tick Alert

A tick got loose in RKC 113G on
_____ at _____AM/PM.

Please take extra care when using this room and do a thorough tick check after exiting.

BIOHAZARD

Biosaftey Level 2

BSL2 strains in use:

Borrelia burgdorferi, Anaplasma phagocytophylum,and potential other tick-borne pathogens

AUTHORIZED PERSONNEL ONLY

CONTACT PERSON:	DR. FELICIA KEESING
TITLE:	PRIMARY INVESTIGATOR
OFFICE/LAB PHONE:	RKC 211/ (845) 752-2331
AFTER HOURS NUMBER:	(845) 797-9046

BIOHAZARD

Biosaftey Level 2

BSL2 strains in use:

Borrelia burgdorferi, Anaplasma phagocytophylum,and potential other tick-borne pathogens

AUTHORIZED PERSONNEL ONLY

CONTACT PERSON:	DR. FELICIA KEESING
TITLE:	PRIMARY INVESTIGATOR
OFFICE/LAB PHONE:	RKC 211/ (845) 752-2331
AFTER HOURS NUMBER:	(845) 797-9046

Appendix O: EMPTY CHEMICAL CONTINER DISPOSAL BERD POLICY NO. F-BERD-001.1

Policy No. F-BERD-001: Hazardous Materials – Handling, Disposal and Minimization

Area: Facilities - Environmental Resources Department
Adopted: 4/14/05 (interim policy)
Revisions Approved:

Description: Hazardous Chemicals – Handling, Disposal and Minimization
Bard's policy is to minimize the production of hazardous wastes and to prevent the production of air and water pollutants. To this end, Bard is committed to protecting the environment through waste reduction, conscientious recycling practices and by the reclamation of our waste materials.

Disposal of hazardous chemicals is expensive and creates a regulatory burden for the campus. Bard's new chemical inventory system will streamline purchasing and help Bard minimize the use and disposal of hazardous chemicals.

No EPA P-listed chemicals may be purchased without prior clearance from the Chemical Hygiene Officer

Procedures:

- Empty Chemical Container Disposal—No. F-BERD-001.1

Chemical Containers That When Empty Contain EPA-listed Acute Hazardous Waste
Empty chemical containers are still hazardous to Bard personnel and the environment until they are properly managed. All empty chemical containers shall be left at the Satellite Waste Accumulation Site as described below.

Container must be triple-rinsed using a solvent (which might be water) capable of removing the acute hazardous chemical prior to disposal of the container as regular trash. Each rinsing should be performed with an amount of solvent equal to approximately 5 percent of the volume of the container (for example, use three 50ml rinses for a 1 liter bottle). The rinsate must be collected and disposed of as hazardous waste in an appropriately labeled waste collection container. The barcode on the empty chemical containers should then be removed and placed on the "Disposed Chemical Barcodes" collection sheet located at each Satellite Waste Accumulation Site. This allows the chemical to be taken off the master inventory list. Now the empty chemical container should be defaced of any chemical or hazardous labels and the cap removed prior to removal for recycling. Place containers in the yellow trash bag located in the green bin.

All Other Chemical Waste Containers
A container that has held any other hazardous chemical can be recycled once all the contents have been removed. Any contents should be disposed of according to our standard waste collection procedures at the assigned Satellite Waste Accumulation Area leaving as little residue as possible in the container, and rinsed with a solvent (that might be water). The barcode on the empty chemical containers should then be removed and placed on the "Disposed Chemical Barcodes" collection sheet located at each Satellite Waste Accumulation Site. This allows the chemical to be taken off the master inventory list. The empty containers should then be defaced of any chemical or hazardous labels and the cap should be removed prior to removal for recycling. Place containers in the yellow trash bag located in the green bin.

Appendix P: AEROSOL CAN DISPOSAL PROCEDURE BERD POLICY NO. F-BERD-004

Policy No. F-BERD-004: Aerosol Cans

Area: Facilities - Environmental Resources Department
Adopted: 2/3/06
Revisions Approved:

Description: Proper Disposal of Aerosol Cans
Aerosol cans can be extremely dangerous if they are improperly disposed. They can become a projectile if they are compacted in the back of a trash truck and can spray Bard personnel with hazardous materials. Empty aerosol cans may be recycled in our metal stream.

The EPA requires that only empty aerosol cans may be recycled; containers that are not empty may be considered hazardous waste and must be processed through our Hazardous Waste program.

Procedures:

- Proper Disposal of Aerosol Cans—No. F-BERD-004.1

F-BERD-004.1: Proper Disposal of Aerosol Cans

Employees using aerosol cans must ensure that they are completely empty of product and propellant. Empty, non food-containing aerosol cans must be placed in specially designated collection containers. Containers are located in the Physical Plant, Recycle Yard, Fisher Arts Center, and the Performing Arts Center.

If you have unusable product in an aerosol can, please contact reduce@bard.edu or Laurie Husted at x7180 so we can ensure proper disposal.

Appendix Q: SHARPS DISPOSAL PROCEDURES

Policy No. F-BERD-002: Proper Disposal of Hypodermic Syringes, Needles and Lancets (Sharps)

Area: Facilities - Environmental Resources Department
Adopted: 9/24/05
Revisions Approved:

Description: Proper Disposal of Hypodermic Syringes, Needles and Lancets (Sharps)
Bard College recognizes the need to provide a safe work environment, and that risk from sharps injury requires a specific policy. Protect yourself and protect sanitation workers through proper disposal of sharps.

Procedures:

- Proper Disposal of Sharps—No. F-BERD-002.1

Used disposable needles/sharps shall be discarded immediately after use WITHOUT RECAPPING into an approved SHARPS CONTAINER, a container that is puncture resistant, leak proof on the sides and bottom, properly labeled and closable. These containers are available free from Health Services (758-7433).

If a sharp is found in non-teaching areas such as the grounds or in non-science Divisions, phone security immediately (758-7777), advising them of the location of the item. **Do not** pick up the item.

If a person sustains a sharps injury contact Health Services immediately. Wherever possible, keep the sharp or contaminated object or any material that has caused the contamination to the object that then caused the sharps injury. Testing may need to be undertaken to establish the level of risk.

Appendix R: COURSE LABORATORY PREPARATION FORM

LABORATORY PREPARATION SHEET
***Please attach lab to prep sheet**

Course name _____Today's Date _____

Instructor name _____Number of students _____

Name of lab _____

Date of lab _____ Number of lab sessions ____

Duration of lab (single or multiple sessions) _____

Students will work in groups of _____

Equipment needed	per lab	per group	per student	Special instructions for ordering or setup
Microscopes				
Spectrophometers				
pH meters				
Stir plates/ heaters				

Supplies needed	per lab	per group	per student	Special instructions for ordering or setup
Burners/strikers				
Tape				
Parafilm				
markers				
Microscope slides				
Cover slips				
Inoculating loops				
Immersion oil				
Water bottles				

Organisms needed	**per lab**	**per group**	**per student**	**Special instructions for ordering or setup**
(include amounts)				

Reagents needed	**per lab**	**per group**	**per student**	**Special instructions for ordering or setup**
(include amounts)				

Recipes or concentrations of reagents: (attach sheet if needed)

Will you need help at any time during lab? – Be specific.

Will anything need to remain available to students after the laboratory period? If so what and for how long?

Any added comments or requests. The more specific your requests the more likely it will be fulfilled correctly.

Make any notes on how the lab went. What was successful, what was not….

Appendix S: RESEARCH LABORATORY PREPARATION FORM

RESEARCH LABORATORY PREPARATION SHEET

Principal Researcher _____

Today's Date _____

Type of Research_____

Expected duration of research _____

Number of students or lab workers _____

Names of lab workers _____

Describe research procedures to be used in the RKC laboratories.
Be sure to note chemicals, equipment and any live organism you will be using. Include information on their hazards and what will be done to ensure the safety of personnel, the environment and other laboratory organisms

Appendix T: ACCIDENT / INCIDENT REPORT

Bard College Laboratory
Accident/Incident Report Form

Date of incident: _____ Time: _____ AM/PM

Location of Incident: _____

Name of person(s) involved in the Incident: _____

_____

Was person involved? (circle): Student Staff Faculty

Details of incident. Be as specific as possible: _____

_____

_____

_____

Describe any actions taken after the incident: _____

_____

Was anyone injured? Yes ___ No _____

Describe the injury: _____

_____

_____

Was medical treatment provided Yes ___ No _____ Refused _____

If so, where (circle): Lab Clinic Emergency Room Other

Print Name of Reporter: _____ Date Reported:_____

Reporter Signature _____ Title: _____

Appendix U: LABORATORY SAFETY CHECKLISTS

GENERAL LABORATORY SAFETY CHECKLIST
(This checklist should be confirmed in this lab space each day of use.)

Is the room/area free of clutter and clean?

Are the aisles from the work areas to the available exits maintained free of obstructions?

Are all safety equipment items (e.g. eyewash, shower, etc.) unobstructed and ready for use?

Is the appropriate attire and PPE being worn by everyone in the room (e.g. gloves, goggles, safety glasses, lab coats, closed-toe shoes, masks, etc.)?

Are unused gas cylinders labeled, secured, and off?

Are all unused hood valves closed and sashes down?

Are unused equipment (e.g. hotplates, etc.) turned off?

Are all reagent bottles labeled properly?

Is all hazardous waste being disposed of appropriately and all hazardous waste bottles labeled and closed?

Are sharps discarded in the sharps containers?

Is the laboratory free of evidence that people are eating or drinking in the lab? By the way, eating or drinking in the labs is prohibited at all times!

Are work surfaces decontaminated daily and after spills?

Are all other hazard-specific checklists (in addition to this laboratory safety checklist) being completed after use of this lab space?

Are personnel washing their hands before leaving the laboratory?

BIOSAFETY LEVEL 2 OPERATIONS SAFETY CHECKLIST
(This checklist should be confirmed in the BSL-2 room each day of use.)

Is the “General Laboratory Safety Checklist” being used?

Is the laboratory door closed?

Are hazard warning signs and organism information signs clearly displayed on the door?

Are there biohazard signs on freezers, refrigerators and other storage units?

No personal items are being stored in the refrigerator/freezer?

Are all materials/supplies inside the designated area prior to handling of organisms?

Is soap and water used to decontaminate surfaces before and after work?

Is all tick waste being treated appropriately:
placed into ethanol-filled vials,
being left to stand for at least one day,
ethanol strained and placed in hazardous waste container,
remaining dead ticks discarded into the trash?

Is waste being discarded at least once per week?

Are storage containers adequated and properly labeled?

Are all operations conducted over proper containment trays, for example are pans rimmed with double-sided tape and filled with a layer of diatomaceous earth?

Are biohazard wastes being stored in the lab until they can be autoclaved?

Are all ticks being transpored directly into the BSL-2 room in sealed containers?

Is the tick handling log being used?

Is the tick release alert sign being used if a tick is lost?

LASER SAFETY CHECKLIST

(This checklist should be confirmed in this lab space each day of use.)

Is the “General Laboratory Safety Checklist” being used?

Is there appropriate signage outside and inside the laser room?

Are there safety glasses available for every laser type in the lab?

Are there appropriate interlocks to prevent using the microscope while the laser is on?

Are there any stray beams leaving the table?

Are the electronics that power the laser safely packaged (no loose/exposed wires)?

Are beam blocks available to terminate the laser(s) path?

Is there an emergency switch to shut off all lasers?

Is there a power meter available to measure the power output of each laser?

Is the laser secured and housed to prevent stray beams?

Appendix V: RADIOACTIVE MATERIALS LICENSE
(See the following six (6) pages)

STATE OF NEW YORK
DEPARTMENT OF HEALTH

Flanigan Square 547 River Street Troy, New York 12180-2216

Richard F. Daines, M.D.
Commissioner

James W. Clyne, Jr.
Executive Deputy Commissioner

Bard College
Reem Kayden Center, Room 134
31 Campus Road
Annandale-on-Hudson, New York 12504

MAR 22 2010

Attention: Swapan S. Jain, Ph.D.
Radiation Safety Officer

RE: NYS Dept. of Health Radioactive
Materials License No. 5405
DH No. 09-1047 (Corrected Copy)

Dear Dr. Jain:

Enclosed is a corrected copy of New York State Department of Health Radioactive Materials License No. 5405, which authorizes the licensee to hold radioactive material with a physical half-life of less than 90 days for decay-in-storage before disposal in ordinary trash, as provided under License Condition No. 19.

If I may be of assistance, please contact this office at (518) 402-7590 or:

New York State Department of Health
Bureau of Environmental Radiation Protection
Radioactive Materials Section
547 River Street
Flanigan Square - Room 530
Troy, New York 12180-2216

Sincerely,

Ashraf Chaudhry
Associate Radiophysicist

CJB/AC:ks

Enclosure: License No. 5405, corrected copy

cc: James Brudrig, Vice President for Administration

NEW YORK STATE DEPARTMENT OF HEALTH
RADIOACTIVE MATERIALS LICENSE

Corrected Copy

Pursuant to the Public Health Law and Part 16 of the New York State Sanitary Code, and in reliance on statements and representations heretofore made by the licensee designated below, a license is hereby issued authorizing radioactive material(s) for the purpose(s), and at the place(s) designated below. The license is subject to all applicable rules, regulations, and orders now or hereafter in effect of all appropriate regulatory agencies and to any conditions specified below.

---

1. Name

   Bard College

2. Address

   Reem Kayden Center, Room 133
   31 Campus Road
   Annandale-on-Hudson, New York 12504

   Attention: Swapan S. Jain, Ph.D.
   Radiation Safety Officer

3. License Number

   5405

4. a. Effective Date

   March 10, 2010

   b. Expiration Date

   March 10, 2020

5. Reference Number
   DH No. 09-1047

---

6. Radioactive Materials (element & mass no.)	7. Chemical and/or Physical Form	8. Maximum quantity licensee may possess at one time
A. Phophorus 32	A. Liquid	A. 5 millicuries
B. Sulfur 35	B. Liquid	B. 5 millicuries

9. Authorized use (unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above).

   A. and B. For in-vitro research only. No human or animal use authorized.

Doc:BOIL\ACADLIC (81400) REV. 9/98

NEW YORK STATE DEPARTMENT OF HEALTH
RADIOACTIVE MATERIALS LICENSE

CONDITIONS

License No. 5405
(Corrected Copy)

10. A. Radioactive material listed in Item 6 shall only be used by, or under the supervision of the following individual(s):

Swapan Jain, Ph.D.

B. Radioactive materials listed in Item 6 shall be used by Swapan Jain, Ph.D., as appropriate to fulfill the responsibilities of the Radiation Safety Officer.

11. Except as specifically provided otherwise by this license, the licensee shall possess and use licensed material described in Items 6, 7 and 8 of this license, in accordance with statements, representations, and procedures contained in the documents (including any enclosures) listed below:

A. Application for New York State Department of Health Radioactive Materials License dated November 6, 2009, signed by James Brudrig, Vice President.

B. Letter dated February 22, 2010, signed by Swapan S. Jain.

The New York State Department of Health's regulations shall govern the licensee's statements in applications or letters unless the statements are more restrictive than the regulations.

12. A. Experimental animals administered radioactive materials, or their products shall not be distributed to the public or used for human consumption.

B. Radioactive material shall not be used in or on humans or in products distributed to the public.

C. The licensee shall not use licensed material in field applications where activity is released, except as provided otherwise by permit from the New York State Department of Environmental Conservation.

13. A. Radioactive material shall be stored in a locked facility in the original shipping container, or a container providing equivalent radiation protection. Such a facility may be a cabinet, a safe, or a room, providing the facility is locked at all times when no activities are in progress relating to the use of the radioactive material. This includes periods of brief absence of personnel from a nuclear medicine department, laboratory, etc., where radioactive materials are used or stored.

NEW YORK STATE DEPARTMENT OF HEALTH
RADIOACTIVE MATERIALS LICENSE

CONDITIONS

License No. 5405
(Corrected Copy)

13. B. Radioactive materials shall not be stored in the same facilities with materials which might substantially increase the fire or explosion hazard of the storage space and its radioactive contents.

14. A. Transportation of licensed radioactive material shall be subject to all regulations of the U.S. Department of Transportation and other agencies of the United States having jurisdiction insofar as such regulations relate to the packaging of radioactive material, marking and labeling of the packages, loading and storage of packages, monitoring requirements, accident reporting, and shipping papers.

B. Transportation of low level radioactive waste shall be in accordance with the regulations of the New York State Department of Environmental Conservation as contained in 6 NYCRR Part 381.

15. All use of radioactive materials at this institution shall be coordinated with and approved by the Radiation Safety Committee of Bard College.

16. The licensee shall have available an appropriate survey meter which shall be maintained operational and shall be calibrated before initial use and at subsequent intervals not exceeding twelve months by person(s) specifically authorized by the U.S. Nuclear Regulatory Commission or an Agreement State to perform such services. Records of all calibrations shall be kept a minimum of five years.

17. The licensee shall conduct a physical inventory every three months to account for all sealed sources received and possessed under the license. The records of the inventories shall be maintained for five years from the date of the inventory for inspection by the Department, and shall include the quantities and kinds of licensed material, location of the sealed sources, and the date of the inventory.

18. Leak tests of sealed sources shall be performed in accordance with Section 16.10 (a) (4), New York State Sanitary Code (10 NYCRR 16). Off-site analysis of leak test samples shall be performed by persons specifically authorized by the U.S. Nuclear Regulatory Commission or an Agreement State to perform such services. On-site analysis of leak test samples shall be in accordance with procedures approved by the Department.

NEW YORK STATE DEPARTMENT OF HEALTH
RADIOACTIVE MATERIALS LICENSE

CONDITIONS

License No. 5405
(Corrected Copy)

19. The licensee is authorized to hold radioactive material with a physical half-life of less than 90 days for decay-in-storage before disposal in ordinary trash, provided:

    A. Effected radioactive waste shall be held for decay a minimum of ten half-lives.

    B. Prior to disposal as normal waste, radioactive waste shall be surveyed to determine that its radioactivity cannot be distinguished from background. All radiation labels will be removed or obliterated.

20. A. The licensee shall not release any licensed radioactive materials into the environment except as allowed by the New York State Department of Environmental Conservation.

    B. Before use or disposal of any licensed radioactive material in a manner that could result in discharge or release to the environment, the licensee shall obtain from the New York State Department of Environmental Conservation either:

        i) A valid permit, or

        ii) A letter stating that no permit is required.

    C. The licensee shall maintain the letter or valid permit required in paragraph B of this condition on file for the duration of the license and make such letter or permit available for inspection by the Department upon request.

21. Plans of facilities which the licensee intends to dedicate to operations involving the use of radioactive material shall be submitted to the Department for review and approval prior to any such use.

22. The licensee shall submit complete decontamination procedures to the Department for approval ninety (90) days prior to the termination of operations involving radioactive materials in any restricted area.

23. The licensee shall maintain records of information important to safe and effective decommissioning at the location listed in License Condition No. 2 and at other locations as the licensee chooses. The records shall be maintained until this license is terminated by the Department and shall include:

NEW YORK STATE DEPARTMENT OF HEALTH
RADIOACTIVE MATERIALS LICENSE

CONDITIONS

License No. 5405
(Corrected Copy)

23. A. Records of spills or other unusual occurrences involving the spread of contamination in and around the facility, equipment, or site;

B. As-built drawings and modifications of structures and equipment in restricted areas where radioactive materials are used and/or stored, and locations of possible inaccessible contamination, such as buried pipes which may be subject to contamination;

C. Records of the cost estimate performed for the decommissioning funding plan or the amount certified for decommissioning, and records of the funding method used for assuring funds if either a funding plan or certification is used.

FOR THE NEW YORK STATE DEPARTMENT OF HEALTH

Date: March 10, 2010
Corrected Copy issued: MAR 22 2010

By _____
Charles J. Burns, Chief
Radioactive Materials Section
Bureau of Environmental Radiation Protection

CJB/AC:ks

cc: James Brudrig,
Vice President for Administration

Appendix W

This is an absolutely strict policy of not allowing dogs into any labs, let alone into RKC (or any other building as set by college policy, see below). Dogs are a hazard to people and equipment. If seen they must be removed immediately. The college policy is appended below as sent out by Chemical Hygeine Officer and Vice-President for Administration, James Brudvig.

August 17, 2010

Re: Dog policy

In the month of July I received complaints about dogs being present in the dorms. I let the residents know that I would be coming around to check to see if I could find any dogs, and that if I did I would ask the owner to either board his/her dog or move off campus. I did not find any dogs in the dorm that day.

I extended my search for dogs to other campus buildings and found a number of employees who bring their dogs to work. I asked those that I met to leave their dogs at home. I didn't really provide a rationale at the time, so as word got around that we have a "no dog" policy, I've received many notes, emails, and even a few petitions asking that specific exceptions be made for certain dogs in certain buildings. Here is my response to all requests and petitions: **please leave your dogs at home or find daycare for them.**

Why? Two reasons in particular. First, it wasn't until word started to circulate about the enforcement of the policy on pets that I started to receive a bevy of mail in support of the enforcement action. I was amazed, frankly, that there were so many people who took the time to write about this issue. Many expressed huge relief that their workplace would be safer, better, and generally more professional—either because they don't like dogs and never felt comfortable expressing it to their dog-bringing colleagues, or have an allergy to dogs. Second, we ask employees not to bring their children to work for extended periods of time (i.e. every day, for months at a time). Actually, we never really have to say it; it is just understood that children take care and attention and one cannot work productively in one's office and care for a child simultaneously. It is at great care and expense that the employee-parent finds adequate daycare for the child during the workday. (**Please note:** I am not referring to the occasional presence of Johnny or Susie in Mom or Dad's office due to childcare issues so please don't send emails saying Bard now has a "no-children" policy). I think it is entirely reasonable to ask pet owners to do the same. Find a place where "your dog can be a dog" if you want your dog to be happy and not left alone during the day. Or leave your dog at home and hire someone to walk him if necessary, although he may be perfectly fine until you get home. I'm no dog expert nor do I know your individual circumstances—I do, however, have an obligation to implement and enforce a policy of health and safety on our campus.

Please use the next few weeks to find places for your dogs other than the office. I would like our offices to pet-free by the start of the new semester.

Thank you for your understanding and cooperation.

Jim Brudvig

Appendix X:

Chemical Safety and Chemical Hygiene Plan for Citizen Science - January Session

In compliance with and following the the current Bard Chemical Hygiene Plan, the Citizen Science laboratory curriculum has been designed to provide an a safe and engaging experience for all faculty and students participating.

Laboratory exercises will be centered around the growth of bacteria and bacteriophages, examination of bacterial antibiotic resistance, and isolation of DNA from cells. The organisms that will be utilized include a non pathogenic strain of *Escherichia coli* and T4 and lambda bacteriophages (viruses that can only infect bacterial cells).

All media and materials will be prepared by 4 laboratory assistants that have been hired specifically for Citizen Science, and trained in laboratory safety procedures. The 4 laboratory assistants will be present in the lab during all lab sessions, along with the faculty instructor of each section.

During the initial session for each of the laboratory modules, each laboratory instructor will indicate to the students the location of the closest exit, fire extinguisher, sink, shower, eyewash and telephone in case of emergency.

To limit potential danger in the lab, exercises were designed to eliminate the use of open flames of any kind, as bacterial spreading will be completed with sterile wooden dowels and glass beads.

All waste produced in the lab will be discarded in biohazard containers and bags and be autoclaved prior to disposal to add an additional measure of caution.

Appendix Y: Protocol – Liquid Nitrogen Page 1 of 2

1. Purpose – context for development of the protocol
This Protocol is designed to provide guidance on the correct handling of liquid nitrogen at Bard College

2. Scope – to which positions/groups does the protocol apply
All staff and students.

3. Definitions and acronyms used
Cryogens: Liquified gases that are cooled below room temperature
Dewar: Vacuum Flask used to store cryogens such as liquid nitrogen

4. Protocol statement

4.1. Handling Liquid Nitrogen
When handling Liquid Nitrogen ALWAYS REMEMBER liquid nitrogen poses two main dangers: Suffocation and Freezing

4.1.1. Suffocation
• **Make sure** there is enough ventilation: 1 litre of liquid nitrogen becomes about 700 litres of gas! Do not store of transfer liquid Nitrogen in a room without ventilation.
• **DO NOT** transport liquid nitrogen in lifts carrying people – and do not ride in the lift with the liquid nitrogen.

4.1.2. Freezing
• Liquid nitrogen can freeze body tissues, including those of the eye. ALWAYS use appropriate PPE (see below).
• Liquid nitrogen makes lino and stone floors crisp and crumble easily, so avoid spills where possible and take extra care around liquid nitrogen.
• Normal thermos flasks cannot handle low temperatures and the danger of explosion is present.

4.2. Personal Protective Equipment (PPE) for Liquid Nitrogen
• Wear clean and dry clothing that covers arms and legs.
• The clothing should be loose, so it is easy to remove it when an accident happens.
• **Avoid** wearing open trouser pockets and wrapped sleeves.
• Wear **cryogenic gloves** *under* the sleeves so no liquid can fall in the gloves.
• Wear a **face shield** or **safety glasses**
• Wear non-slip **closed footwear** and **apron**.

4.3. Clean-up Procedures
• If cryogenic liquids are spilt inside a building make sure there is adequate ventilation.
• Evacuate the area until the liquid has evaporated and oxygen levels are at normal atmospheric levels.
• If cryogenic liquids are spilt outside, keep up wind of the spill.
• If there is a large spill, or if a vessel is leaking, contact security at 7777.

4.4. Dispensing Liquid Nitrogen From Storage Tanks
• Dispense only into Dewars that are rated for liquid nitrogen:
○ Never use a Dewar that does not have a pressure relief valve or pressure venting lid/stopper.
○ Never use Dewars with makeshift or homemade lids/stoppers.
○ Use pressure venting lids/stoppers supplied by the Dewar manufacturer

• Dispense only into Dewars that are:
    - Equipped with carrying handles or wheels
    - Stable/not in danger of tipping over easily
• Persons filling Dewar(s) will be in constant attendance during filling
• Prevent Splashing. Place filling hose at or below the mouth of the receiving Dewar
• Use a dipstick to assess the level of the liquid where necessary. Not your hand.
• Wear Required Personal Protective Equipment (see **PPE for Liquid Nitrogen**)

4.5. Refilling Dewars In Laboratories

• Never refill Dewars or transfer Liquid Nitrogen alone!
• Make sure that there is good ventilation. Open a door if you are in a small room.
• Use Dewars rated for liquid nitrogen (see A.2 above)
• Dewars larger than 20 Litres will be lifted and poured by two people
• Do not use a Funnel
• Use a dipstick to assess the level of the liquid where necessary. Not your hand.
• Wear Required Personal Protective Equipment (see **PPE for Liquid Nitrogen**)

4.6. Transporting Liquid Nitrogen

• Only use Dewars rated for liquid nitrogen to transport liquid nitrogen. (See A.2 above)
• Ensure that the Dewar is your ONLY load (no books, coffee, other items)
• Never Transport Liquid Nitrogen in an Open Container
• Wear or Carry Required Personal Protective Equipment (see PPE for Liquid Nitrogen)
• Do not use unstable wheeled carts or Dewars
• Avoid other people who may bump into you and grates, large cracks in sidewalks/pavement, and other hazards that could cause tipping of the liquid nitrogen
• **NEVER** transport Liquid Nitrogen in passenger lifts. Send the liquid nitrogen down the elevator alone while someone waits for it to arrive.
• If you are carrying a Dewar containing Liquid Nitrogen carry transport Dewar as far away from your face and body as possible

Freezer Alarm Standard Operating Procedure

The Reem Kayden Center for Science and Computation laboratories have six critical freezers that have been connected to individual freezer alarm units.
These units are programmed to call up to three telephone numbers in the event of a power failure or a dramatic temperature rise.
Each unit's location and parameters are listed below:

Freezer Location	Will Alarm When	Will Call First	Will Call Second	Will Call Third
RKC 113 north freezer	temperature rises to -50°C power fails for 5 minutes	Lab Coordinator	Lab Coordinator	Security
RKC 113 south freezer	temperature rises to -50°C power fails for 5 minutes	Lab Coordinator	Lab Coordinator	Security
RKC 125 -80°C	temperature rises to -50°C power fails for 5 minutes	Lab Coordinator	Dr. Swapan Jain Chemistry Prof.	Security
RKC 126 -20°C south wall	temperature rises to 0°C power fails for 5 minutes	Lab Coordinator	Dr. Swapan Jain Chemistry Prof.	Security
RKC 133 -20°C	temperature rises to 0°C power fails for 5 minutes	Lab Coordinator	Dr. Swapan Jain Chemistry Prof.	Security
RKC 135 -20°C small freezer	temperature rises to 0°C power fails for 5 minutes	Lab Coordinator	Dr. Swapan Jain Chemistry Prof.	Security

When a freezer alarm call is answered a recorded message will state the cause of the alarm and the room number. This 4 digit room number followed by the # key is also the security code to silence the alarm.
Once the alarm has been silenced the unit will be reset so unless conditions are corrected the freezer alarm will begin calling again. If the alarm is not silenced, the unit will begin calling telephone numbers from the list again.
Please contact Buildings and Grounds to inform them there is an alarm situation in RKC. Be sure to include the room number and the cause of the alarm.
To reset the alarm at the freezer location, toggle the power switch to "Standby" then back to "On".