Laboratory and Environmental Safety

ROWAN UNIVERSITY POLICY

Title: *Laboratory and Environmental Safety*

Subject: *Facilities and Operations*

Policy No: *Fac: 2015:05*

Applies: *University-Wide*

Issuing Authority: *Senior Vice President for Facilities, Planning and Operations*

Responsible Officer: *Assistant Vice President for Facilities and Operations*

Adopted:

Amended:

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I. PURPOSE

The purpose of this policy is to provide safe work practices and procedures to laboratory personnel.

II. ACCOUNTABILITY

Under the direction of the Senior Vice President for Facilities, the Assistant Vice President for Facilities and Operations shall implement this policy. The XX and XX shall ensure compliance with this policy.

III. APPLICABILITY

This policy applies to all faculty, staff, students and volunteers working in or assisting in laboratories on a Rowan University campus.

IV. REFERENCES

A. Federal Laboratory Safety Standard 29 CFR 1910.1450

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

C. Prudent Practices for Disposal of Chemicals in Laboratories, National Academy Press: Washington, D. C. 1983

D. Hazardous Waste Management at Educational Institutions, NACUBO: Washington, D.C. 1987. NJAC 7:26-1, 4, 7-13A, 16, 6A, 17;

E. Hazardous Waste Regulations, NJDEP: Trenton, NJ (current edition)

V. POLICY

A. PEOSH (FEDERAL OSHA) Laboratory Safety Standard - Chemical Hygiene Plan

1. The University will comply with the Federal Laboratory Safety Standard 29 CFR 1910.1450, when adopted by PEOSHA.

2. The appropriate colleges/schools have developed Chemical Hygiene Plans as a site-specific document. This requires all laboratory managers, directors, or those in direct control of a laboratory to develop the plan(s); not the Safety & EMS section.
3. Laboratory Safety
   The Safety Office will assist in developing such plans or provide input or review on those activities outside of the laboratory portion (e.g., emergency management, etc.).

B. Personal Protective Equipment

1. Everyone in a laboratory will wear appropriate personal protective equipment as dictated by the type of hazard within the laboratory. The minimum equipment will consist of eye protection, lab coat or apron, and shoes, not sandals or open toe or topped footwear.
2. Use of PPE is considered mandatory. Employees who fail to wear PPE or enforce this requirement may be subject to disciplinary action. Students who fail to wear PPE will be directed to leave the laboratory and may have appropriate academic sanctions initiated, or be referred to the Dean of Students for further disciplinary action for violation of University policy.

C. Fume Hood and Emergency or Special Equipment Maintenance and Testing

1. Fume hood-operating features and functions will be checked every time prior to the hood being operated. This is considered a mandatory safety rule and is the responsibility of the person using the hood and the immediate supervisor.
2. Should a hood appear to be malfunctioning, it WILL NOT be used and the Facilities Department is to be telephoned for repair service. Any hood that is unserviceable must be tagged "Out of Service" and a warning sign placed on the door/sash.
3. Periodic maintenance of fume hoods, including smoke tests and velocity tests will be conducted on a minimum of a quarterly basis, or in accordance with other appropriate standards to be approved by the using department, who must keep records of such tests available for inspection for the immediate past two years.
4. Velocity will conform to manufacturer specifications, or if none are available, in accordance with GASS of 70-100 cfm measured at the face of the hood. All hood sashes will be marked in such a manner to indicate the point that optimum hood velocity is reached (e.g., 100 cfm).
5. Emergency equipment such as safety showers and eye wash stations will be inspected daily, or prior to the start of each use of a laboratory.
6. Testing of safety showers and eye wash stations will be done quarterly by plant maintenance; however, the using department must request such tests.
7. First aid kits must be provided and kept supplied, in accordance with the manufacturer's specifications; by the department controlling, or using the laboratory.
8. It will be the responsibility of the using department to see that equipment requiring special testing, inspection or maintenance is coordinated directly with the service provider at the intervals recommended or specified by the manufacturer in lieu of any other safety standard.
9. The using department for inspection by the Safety & EMS section or regulatory agencies must keep all equipment maintenance and test records.

D. General Laboratory Safety Rules The following are considered basic laboratory safety rules. These may be expanded or modified. They will not be reduced:

1. A basic Personal Protective Equipment ensemble will be worn at all times.
2. Individuals will not work alone in a laboratory.
3. No smoking, drinking, or eating is allowed in laboratories.
4. A laboratory supervisor must conduct a safety orientation prior to the first laboratory class, or use of a piece of apparatus by a student.
5. The individual in charge of each laboratory during a class must inspect and verify that all safety equipment is present and serviceable (or has no obvious defects) prior to the start of each class or work shift.
6. Horseplay or other inappropriate conduct will not be tolerated. Students will be referred to the Dean of Students and employees to their appropriate supervisor for disciplinary action.

E. NJ DEP RCRA Requirements

1. Policies and procedures have been developed to comply with NJDEP, NJPEOSH, and Federal regulations governing safety, storage, and handling of hazardous materials and wastes (see Exhibit 15-1). Compliance with these policies and procedures is an individual responsibility.
2. The Safety & EMS section will assist individuals in developing safe work practices in order to comply with the regulatory requirements; however, the Safety section is not responsible, except as an emergency response agency, for the conduct of any individual.
3. Training in these policies and procedures is mandated by NJAC 7:26-1, et seq., Hazardous Waste Regulations.
4. Anyone desiring additional information should contact the Safety Department.

F. Hazardous Materials Storage and Disposal

All hazardous materials will be stored and disposed of in a safe, legal, appropriate manner as outlined in appropriate regulatory codes (e.g., State fire codes, State DEP regulations), or in accordance with GASS (e.g., Prudent Practices for Chemicals in Laboratories).

VI. ATTACHMENTS

1. Attachment 1, Hazardous Waste Program For Rowan University Laboratories
2. Attachment 2, Basic Safety Information
3. Attachment 3, Personal Protective Equipment
4. Attachment 4, General Safety Equipment
5. Attachment 5, Emergency Equipment and Information
6. Attachment 6, Emergency/Contingency Planning

ATTACHMENT 1

HAZARDOUS WASTE PROGRAM FOR ROWAN UNIVERSITY LABORATORIES

A. Introduction

1. Each laboratory using chemicals is required to develop its own Chemical Hygiene Plan in accordance with 29 Code of Federal Regulation 1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories.
2. To ensure that University personnel are able to work safely and appropriately with hazardous materials, including hazardous wastes, and are knowledgeable about regulatory requirements (especially disposal) and can respond effectively to hazardous materials emergencies, the following topics will be reviewed in detail:
    a. New Jersey Hazardous Waste Regulations
    b. Basic Safety Information
    c. Emergency Equipment And Information
    d. Emergency/Contingency Planning Information
    e. Emergency Procedures
3. Rowan has a strong commitment to the safety of employees, students, visitors and guests, our facilities, and our surrounding environment.
4. The following training program is designed to increase staff awareness and provide basic informational tools to create a safe working and learning environment. This program is supplemental to the Right-to-Know, Asbestos Management, and other safety programs already in place.
5. Remember, the Right-to-Know Program provides an overview on hazardous materials, the use of Material Safety Data Sheets (MSDS), and NJ Hazardous Substances Fact Sheets. Under Federal and State regulations generators of hazardous wastes, such as the University, are required to:
6. Conduct periodic training on hazardous materials or waste operations including the safe handling and use, treatment, storage, and ultimate disposal of hazardous waste materials.
7. Develop an Emergency Contingency Plan, and test that plan on a periodic basis.

B. New Jersey Hazardous Waste Regulations

1. These detailed regulations define the legal and technical requirements for the disposal of hazardous wastes. In some instances the NJ Regulations are stricter than those of the Federal Environmental Protection Agency.
2. Hazardous waste must be disposed of legally and safely. One can no longer pour hazardous materials or wastes down a drain or simply throw them in a dumpster. To do so is not only a violation of the law that could subject an individual or the University to heavy penalties, but is morally unconscionable.
3. Detailed technical procedures on how to dispose of hazardous materials or wastes are outlined in the references at the end of this document.
4. Additional information on a case-by-case basis can be obtained from Safety & EMS.

ATTACHMENT 2

BASIC SAFETY INFORMATION

Safety is basically common sense; however, there are three safety rules which are violated with great regularity in laboratories, but which must be observed:

1. Never work alone in a laboratory facility. If it is not possible to have two people in the same laboratory, ensure someone else is in close proximity (e.g., the same floor, or an adjacent room).
2. No smoking, eating, or drinking is permitted in laboratories. Toxic material entry routes include inhalation and ingestion. Fire prevention safety prohibits smoking in high hazard areas, such as laboratories.
3. Properly grounded electrical equipment or that especially designed for use in laboratories must be used. Home type equipment, e.g., refrigerators are not explosion proof and approved for laboratory use.
4. Laboratory workers need to pay special attention to their personal grooming and jewelry items. Long hair must be restrained to prevent its coming in contact with hazardous materials or operations. Watches and rings should not be worn since they could react with hazardous chemicals or materials or get caught in equipment.

ATTACHMENT 3
PERSONAL PROTECTIVE EQUIPMENT

1. The correct use of personal protective equipment (PPE) can help reduce or minimize injuries to individuals working with hazardous materials or wastes. This apparel is intended to protect normal street clothing or skin from contact with hazardous materials.
2. There are several types of protective apparel normally included within the term PPE. Some examples are eye, hand, body, foot, and respiratory protection. The use of any PPE must be very carefully matched against any of the materials involved and the degree of protection required. For example, almost all protective apparel can develop static electricity, so that if an individual does not ground, or bond himself or herself, there is a great danger that a static discharge might ignite volatile materials. In addition, protective apparel has time limits on the amount of time it can resist hazardous materials.
3. Individuals wearing protective apparel needs to be mindful of those limits for the apparel and the type of hazardous material to which he/she is being exposed; therefore, it is important to be familiar with the proper selection and use of PPE prior to starting work.
4. All PPE must be inspected before each use, and it is the responsibility of the individual wearer to accomplish this. A Pre-use inspection should include: looking for tears, punctures, discoloration, or brittle spots, which could indicate a defective condition. Defective PPE must not be worn or used. Laboratory workers should know the appropriate techniques for donning (putting on) and doffing (removing) contaminated protective clothing in an emergency.
5. Examples of Personal Protective Equipment and Its Use
    a. Eye Protection:Eye protection is required for everyone (employees, students and visitors) in any location where chemicals are stored or handled. Protective eyewear is designed to keep material out of the eyes, or off of the face.
    b. Safety Glasses:Safety glasses must be made in accordance with the Standard for Occupational and Educational Eye and Face Protection (ANSI Z87. 1), from the American National Standards

Institute. These requirements include: a minimum lens thickness of 3mm, impact resistance standards to be met, passage of a flammability test, and lens retaining frames. These can be prescription or non-prescription. Side shields may be attached to safety glasses that do not have built-in shields; however, side shields offer only limited protection for objects or materials approaching from the side of the wearer, and do not offer adequate protection against splashes or mists/vapors

c. Goggles and Face Shields:
    i. Goggles are required for handling chemicals and hazardous materials within the confines of the facility. They are intended for use when there is danger of splashing chemicals, flying particles, or vapors/mists. Only "chemical style" goggles will be approved for use in the facility.
    ii. Face shields offer some protection to the face and neck. Full-face shields should always be worn when maximum protection from harmful materials, especially liquids or particles, is needed. Safety glasses or goggles should be worn under the shield.

6. Other Protective Clothing
   The PPE Ensemble includes gloves, lab coats or aprons; coveralls or full body suits, and protective footwear constructed of fabric, or special materials such as butyl rubber or Tyvek.
    a. Gloves must be worn whenever it is necessary to handle rough or sharp objects, hot or cold materials, or whenever protection is needed against exposure to chemicals. Skin contact is a potential source of exposure to toxic materials. Gloves should not be worn around moving equipment or where they could become entangled and damaged.
    b. Lab coats are intended to prevent contact with dirt and minor chemical splashes or spills encountered in laboratory scale work. Lab coats, depending upon the materials they are made from, do not significantly resist penetration by organic liquids, and if contaminated, should be removed immediately.
    c. Aprons of plastic or rubber generally provide better protection for corrosive or irritating liquids, but can complicate injuries in the event a wearer is involved in a fire.
    d. Coveralls or full body suits, especially disposal ones, are generally preferred in high-risk situations. Generally, any coverall will have limitations as to the degree of protection offered and must be matched against the type of operation being performed and the materials involved.
    e. Foot protection such as rubber boots or plastic shoe covers may be required to avoid possible exposure to corrosive chemicals or solvents; however, shoe covers can increase the possibility of falling since they generally do not exert a great deal of friction on walking surfaces.
    f. Sandals or open toed shoes are prohibited in laboratories
7. Respiratory Protection
    a. The primary method for protection of laboratory personnel from airborne contaminates is by engineered ventilation (e.g. fume hoods, exhaust systems). However, there are circumstances when these systems are not available, or increased personal protection is required. Should this be the case, suitable respiratory protection must be provided and used.
    b. Under Public Employee's Occupational Safety and Health Adoption of the Federal OSHA Standards (29CFR 1910), only equipment listed and approved by the Mine Safety and Health Administration (MSHA) and National Institute for Occupational Safety and Health (NIOSH) may be used. In addition, a respirator program must be in place within the institution.
    c. This program requires written information on the limitations, fitting methods, inspection and cleaning for each type of respirator that is used at the institution. The program begins with a physical examination prior to an individual being entered into a program that requires use of a respirator [Federal OSHA 29 CFR 1910.134 (b) (10)]. Specific training and fit testing of a respirator to each individual is also required
8. Non-Emergency Respiratory Protection
    a. There are several types of non-emergency respirators available for protection in atmospheres that are not immediately dangerous to life or health (IDLH), but could be detrimental to an individual after prolonged or repeated exposure to a toxic atmosphere or substance.
9. These respirators must be used only in atmospheres where the oxygen level is within normal range (19.5% approximately). Generally, use of a respirator will require the use of some other PPE (e.g., protective coveralls and gloves to protect skin from splashes of corrosives or materials that can be absorbed through the skin). Some types of common respirators are outlined below:

a. Chemical Cartridge Air Purifying Respirators (APR) are designed for protection only against a particular individual or class of vapors or gases as specified on the cartridge. These units work by absorbing or filtering the contaminants out of the air. Activated charcoal is probably the most common type of absorbent. Because breakdown of the material of which the respirator is constructed is possible, it is important that the user know the type of hazardous material they are working with and any odors associated with the material. These respirators can be of complete or half-face coverage.

10. Dust, Fume and Mist Respirators:
    a. These can be used only for limited protection against a particular class of dusts, fumes and mists; as specified by the manufacturer. These respirators trap toxic materials in a filter of fiber material. These are disposable units which are discarded when you can no longer easily breathe through them.
    b. Mask type respirators, such as surgical masks," are of little value and offer unsatisfactory protection in a laboratory environment. These types of respirators will not be used in Rowan laboratories.
    c. All respirators have certain drawbacks. For example, difficulty in breathing when the filter becomes clogged (a sign the filters must be changed), or over breathing. Over breathing occurs when the face piece collapses against the wearer's face because of insufficient airflow through the filters. This results from an improperly fitted face piece.
    d. An improperly fitted face piece will allow contaminated air into the wearer's respiratory system.
11. Emergency Respirators:
    a. Self-Contained Breathing Apparatus (SCBA) are for trained emergency response personnel and are not available to employees, students, or guests. These devices consist of: An air supply cylinder, generally 5-30 minutes, a harness assembly to strap the unit on the wearer's back, and a regulator, which is hooked to the air supply cylinder.
    b. A protective ensemble is always required when wearing a self-contained breathing apparatus.

ATTACHMENT 4
GENERAL SAFETY EQUIPMENT

A. All laboratories or storerooms in which chemicals are used should have certain routine safety equipment available; for example, safety showers, eye wash stations, first aid kits, lab sinks, fume hoods, and portable shields are required. Each laboratory worker (employee or student) needs to know the location of and proper use of each piece of safety equipment in the lab and should inspect each piece of equipment daily to ensure it will perform properly.

B. Examples of General Safety Equipment and Its Use Safety Showers and Eye Wash Units

1. Safety Showers must be tested periodically.
2. Eye wash units must be capable of providing a soft stream or spray of water at no greater than 30 psig for an extended period (15-30 minutes). Insure that access to safety showers and eyewashes is not blocked or obstructed.
3. First Aid Kits are required to be on hand in each laboratory for the prompt treatment of accidental injuries.
4. Fume hoods are designed to remove noxious fumes from the work area. These hoods need to be inspected daily and before each use to insure the fans are operating. They should be tested at least semiannually to ensure that the design criteria are still met (e.g., to deliver 100 cfm of air across the face of the hood). A hood that is not operating cannot be used. Of course, fume hoods are not approved storage locations for hazardous materials; however, apparatus may be kept erected within a hood.
5. Portable safety shields should be used whenever spattering, spraying, or explosion of chemicals or apparatus may occur.
6. Vacuum distillation or other pressure related operations require the use of a portable shield.

ATTACHMENT 5
EMERGENCY EQUIPMENT AND INFORMATION

A. Typical safety and emergency equipment in laboratories and related facilities are: portable fire extinguishers, automatic suppression or extinguishing systems, fire hose, fire blankets, and spill control equipment.

B. Fire Classification: It is important to understand the fire classification system, because fire extinguishers use the same system.

- CLASS A fires leave ash or debris, for example, a trash can fire with wood, cloth or paper.
- CLASS B fires are burning liquids such as gasoline, solvents, paints, and oils or cooking fats.
- CLASS C fires are electrical fires such as an electric heater or computer. Once the electric power is shut off to the unit, the fire is reclassified into the appropriate type for whatever is burning; for example, a burning computer after the power is shut off is a Class A fire.
- CLASS D fires are special metals. Magnesium, Thermite, and Phosphorous are examples of these metals.

C. Portable Fire Extinguishers

1. All fire extinguishers have certain things in common. Each fire extinguisher has:
    a. A container with an extinguishing agent inside.
    b. A means of activation with a safety pin, seal and shutoff device.
    c. A discharge nozzle or hose.
    d. An instruction or identification plate, and label which tells the fire extinguisher classification and instructions for use.
2. Class A fire extinguishers are used only on class A fires. On the Rowan campus these are 2 1/2 gallon water extinguishers.
3. Class B and C fire extinguishers are a combination unit. These can be Carbon Dioxide, Dry Chemical (baking soda or potassium soda), or Halon 1211 agent.
4. Class D fire extinguishers are filled with a special powder or highly refined sand. These cannot be used on any other class of fire.
5. Multi-Class A,B,C, fire extinguishers are filled with a multi-purpose dry chemical powder and can be use on any of these classes of fire.
6. *Note*: Bosshart Hall
    - In Bosshart Hall, the portable fire extinguishers mounted in the hallways are Class A (the large chrome containers), and Multi-class ABC (the smaller red containers). Extinguishers must be inspected monthly by the building staff and the inspection tag dated and initialed on the back. The Safety Office will arrange for annual inspection of all portable extinguishers. Each laboratory user should inspect the fire extinguisher in their laboratory prior to each use of the lab, to insure it is serviceable. If the safety pin has been pulled, if the safety seal destroyed, if the gauge shows that the operating pressure is under or over limits, if there is some obvious defect, or if an extinguisher is missing, contact the Safety & EMS section for a replacement.
    - Automatic fire suppression systems: Bosshart Hall's volatile storage room on the ground floor has a Halon 1301 system. Staff members concerned with working within that room will receive special instructions on the capabilities and use of this system.
7. Fire Hoses: The University is no longer required to keep fire hoses on the campus.
8. Fire Blankets: Many laboratories still have "fire blankets." These are now used only for first aid for shock, not for fire suppression or extinguishing of a person whose clothing is on fire. A person who has their clothes on fire should stop, drop and roll on the floor or ground, or use a safety shower if available, to extinguish the fire.

ATTACHMENT 6
EMERGENCY/CONTINGENCY PLANNING

A. Emergency/Contingency Planning

1. In the event of an emergency such as a fire, explosion, spill of hazardous material or wastes, or personal injury, it is important to have emergency plans and procedures in place to limit injuries and minimize damage to the facility and the environment.
2. The first step in establishing emergency procedures is preplanning and training. Rowan Staff will be offered training in the use of fire extinguishers, first aid, and spill control techniques at a later time.
3. You should be aware that the University works closely with the emergency management team of Glassboro community to ensure appropriate support and response to emergency situations. Drills of mutual benefit will be conducted.
4. Preplanning, for chemical spills will minimize exposure of personnel and property, as well as protecting the environment. Each laboratory and supply room should have a supply of spill containment equipment on hand. PPE must be utilized whenever cleanup of a spill is undertaken.
5. A small spill should be able to be dealt with by University staff. In the event that this cannot be accomplished, or the spill is a large one, the University's emergency spill contract service will be called. Individual laboratory users are not authorized to call the service directly. This number is on file with the main stockroom, security, and safety departments.
6. In addition to PPE necessary for each worker involved in routine cleanup operations, routine spill control supplies should be maintained in each laboratory and stockroom to handle up to a 2 1/2 gallon spill of each class or type of material within the room.
7. For example, if liquid acids and solvents are stored or used within the room on a regular basis, supplies for a spill of 2 1/2 gallons of each material would be necessary.
8. NOTE: It takes approximately 50 pounds of clay (e.g. Kitty Litter, Oil Dry, etc.) to absorb one gallon or 3 Liters of liquid.
9. Generally, spill control supplies include neutralizing agents such as sodium carbonate or bisulfate, and absorbents such as vermiculite, sand, dry clay, or commercially available spill pillows, booms, or agents. Non-corrodible buckets or pails, brooms or brushes, scoops or shovels, mops, and blotting or wiping clothes suitable for use with hazardous materials must also be included in spill control operations.
10. If a spill occurs, a competent, qualified staff member must immediately decide if the spill can be handled in-house. If this cannot be done, the contract spill control service must be called. The spill control service must be called by notifying the Safety & EMS section at Public Safety, 256-4922, or the Emergency Line, 256-4911.

B. Emergency Procedures

1. The following information has been developed to provide guidance in case of an emergency situation arising in the facility.
2. The first procedure outlined is for general use. Other more specific procedures are also provided. Remember, a single procedure cannot cover every possible situation; however, certain steps can be applied to many different situations.

C. General Emergency Procedure

In the event of a emergency such as a fire, explosion, hazardous materials/waste spill or leak, or personal injury accident:

1. Call the PUBLIC SAFETY EMERGENCY LINE 856-256-4911 and provide the following information:
    a. Your name and the telephone number from which you are calling.
    b. The location of the fire or emergency (e.g. Bosshart Hall, second floor stockroom, etc.).
    c. Describe the situation (e.g. smell of smoke, fire, deep cut and bleeding, spill of chemicals, etc.).
    d. If possible, describe what is burning (e.g. wastebasket, fume hood, etc.); or what has spilled (e.g. acid, solvents, etc.).
    e. Hang up the phone only after the emergency operator has done so, if you are not in great personal danger. You may need to supply additional information.
2. All others in the area should leave the area unless designated to assist with emergency actions. They should leave by the nearest EXIT. Do Not Use the elevator. If you can do so safely, attempt to use a portable fire extinguisher to contain a small fire. Small is a wastebasket or piece of apparatus, or an extremely small container of materials that is not subject to explode. If the emergency cannot be

immediately contained, initiate a fire alarm by pulling the nearest FIRE ALARM BOX, to start building evacuation. Close the door of the room(s) involved on your way out of the room. If possible, shut off all utilities into the room, but don't waste time attempting to do so.

3. Move well away from the building. Emergency Response Teams need room to work. Warn others to stay out of the building. Render First Aid if needed. Follow all instructions given by uniformed members of the Emergency Response Teams. Be prepared to assist response team. Do not reenter the building until told to do by a uniformed team member from the campus emergency response team.

D. Spill Emergency Procedures

1. General Rules for small spills of 2 1/2 gallons or less:
    a. Notify persons in the area about the spill, request their help in initiating emergency actions.
    b. Attend to anyone who may have been contaminated or injured.
    c. Evacuate all non-essential personnel from the spill area. If you are in danger you should also leave the area.
    d. Avoid breathing vapors of spill. Use a respirator if one is available, along with all other necessary PPE.
    e. Take appropriate action regarding ventilation.
    f. Secure spill control equipment and initiate cleanup if a small spill and control or cleanup is possible; or initiate emergency spill response and attempt to confine spill if possible.
    g. Handle all debris as contaminated until it has proven to be otherwise. Dispose of all in accordance with appropriate regulations.
    h. Report the spill to the Public Safety Department.
2. Handling of large spills (more than 2 1/2 gallons):
   Initiate evacuation of area; make primary notifications and request assistance. Secure the building to prevent unauthorized entry and protect others from accidental exposure.
   Handling of spilled liquids (Small Spills):
    a. Confine or contain spill to a small area. Do not allow it to spread outside of the room or area.
    b. For small quantities of inorganic acids or bases, use a neutralizing agent, or an absorbent mixture. For small quantities of other materials absorb the spill with a non-reactive material (such as vermiculite, spill pillows, dry sand or clay).
    c. If the spilled material is extremely volatile, let it evaporate and be exhausted by the ventilation system (provided the hood and exhaust systems are spark-proof). If the material is flammable, turn off ignition and heat sources within the area.
    d. Clean up debris and residue, dispose of as contaminated material, in accordance with appropriate regulations.
3. Handling of spilled solids (small quantities):
    a. Sweep or otherwise confine spill to as small an area as possible. Do not allow it to spread.
    b. For small quantities of inorganic acids or bases, use a neutralizing agent, or an absorbent mixture. For small quantities of other materials, absorb the spill with a non-reactive material such as vermiculite or spill control pillow.
    c. If the spilled material is extremely volatile, let it evaporate and be exhausted by the mechanical ventilation system (provided the system is spark proof). If the spilled material is flammable, turn off ignition and heat sources.
    d. Clean up residue and surrounding area. Disposed of debris as contaminated materials in accordance with appropriate regulations.
4. Handling Leaking Compressed Gas Cylinders:
   Occasionally a cylinder or one of its component parts develops a leak. Most such leaks occur at the top of the cylinder in areas such as valve threads or stem, safety devices or outlets. If a leak is suspected, do not use a flame for leak detection; use a flammable gas leak detector, soapy water or other suitable solution. If a leak is found and it cannot be remedied by tightening a valve gland or packing nut, Emergency Procedures should be initiated and the supplier of the cylinder telephoned for emergency assistance.
5. Leaking Cylinder Emergency Procedure
    a. Place a shroud (e.g. heavy plastic bag, rubber apron, or similar material) over the top of the cylinder, or leak, and tape it in place with duct tape.
    b. Follow any instructions given by the vendor regarding safe handling of the cylinder.

c. Using an appropriate handcart, secure the cylinder to the handcart and remove it from the building, to the loading dock area.
d. Secure the cylinder upright to prevent it from falling. Guard the cylinder, or post warning signs with the appropriate basic safety information: Danger [Type of material in cylinder], Leaking Cylinder, No Smoking (if appropriate).

6. The following information is provided for general guidance.
   a. Flammable, inert, or oxidizing gases: Move the cylinder to an isolated area (away from combustible or reactive material if the gas is flammable or an oxidizer).
   b. *Corrosive gases:* May increase the size of the leak as they are released through the leak. Some corrosives are also oxidizers, or flammables. Move the cylinder to an isolated, well-ventilated area, and if possible, use a suitable means to direct the gas into an appropriate chemical neutralizer.
   c. *Toxic gases:* Follow the above procedure for corrosive gases. NOTE: PPE may require the use of a self- contained breathing apparatus. If this is the case, do not attempt to move the cylinder, initiate evacuation and make appropriate emergency notifications.