Spill Prevention and Response Plan

September 2011

Prepared by the:

Environmental Health and Safety Office
Facilities Planning and Management
Ball State University

Table of Contents

1. Introduction

A hazardous spill is defined as the uncontrolled release of a hazardous chemical, oil, or biological material, either as a solid, liquid or a gas. Spills at Ball State University (BSU, or the University) may occur in a variety of worksites, from research & teaching laboratories, to trades workshops, to campus utility (heat, chill, and geothermal) operations and art and technology labs or shops. The challenges related to dealing with spills will vary with the type and volume of chemical or material involved and the potential exposures. Chemical spills in laboratories generally involve small volumes of a potentially large variety of chemicals, whereas support or utility settings generally use fewer, but larger quantities of chemicals. For some chemicals and biologicals, exposure to employees is the priority concern; whereas with others, such as petroleum compounds, the greater, or more immediate, concern is a release to the environment.

Regardless of the type or quantity of hazardous chemical or substance involved, all worksites must implement measures to reduce the potential for spills and have a plan for responding to spills. This document describes generic methods for preventing spills, directly responding to spills of low or minor hazard, and the procedures for reporting and addressing larger, or major, releases at the University.

Preparedness and response to releases of oil (fuels, petroleum/synthetic oils, vegetable oils) are covered much more comprehensively in the BSU *Spill Prevention Control and Countermeasures (SPCC) Plan*. The BSU *Chemical Hygiene Plan* also addresses spill prevention and response specific to laboratory settings for laboratory workers, while the *BSU Hazard Communication Plan* addresses spill response for hazardous chemicals used by all BSU employees.

This Plan first sets out the roles and responsibilities of everyone in the BSU community (**Section 2**), then summarizes spill prevention recommendations (**Section 3**), provides spill preparation guidance in **Section 4**, relates the general spill response procedures applicable to all chemical and biological releases (**Section 5**), presents specific response guides to a variety of common spill types (**Section 6**), and relates the necessary reporting obligations in **Section 7**. The **Appendices** at the rear of the Plan include a flow chart summarizing spill response considerations (**A**), the recommended contents of spill kits (**B**), chemical compatibility information for storage and handling (**C**),and a summary guide to these BSU spill response procedures with a "*Caution – Spill Hazard*" sign (**D**).

2. Roles and Responsibilities

The following sets out the responsibilities of various individuals or entities on the BSU Campus insofar as the prevention and response to spills of chemicals, petroleum, biological, and other types of hazardous or noxious materials.

2.1. Departments

The various academic, facilities, maintenance, and support departments of the University are responsible for the following:

- Implementing measures to prevent potential spills of those hazardous materials within their use or control;
- Providing secondary containment for any liquid containers of 55-gallon or more capacity, and wherever else containment is needed to prevent the release of chemicals or biologic agents to the environment, sewers, drains, or waterways;
- Development of "site specific" spill response procedures where hazardous products are used or stored or procedures performed that present a special risk for exposure or releases;
- To respond to spills that are within the capability of their faculty or staff based on their training, the hazards presented by the chemical or biological agent, the nature of the release, the PPE required, and the available response supplies;
- To request assistance from the BSU Environmental Health and Safety Office (EHS Office) when needed for preparedness or response training, incident planning, assistance in release response, or for response supplies;
- To notify the University Police of any major releases of chemicals or biological articles for which assistance is needed from the EHS Office, or outside emergency response authorities (fire department, emergency medical assistance, private contractors); and,
- To report any spill incidents to the EHS office in case reporting to local, state, or federal authorities is required. The reportable quantity (RQ) is as little as 1 pound for many hazardous chemicals – less for some materials, or in the event a waterway is impacted.

2.2. The Faculty, Staff, and Employees

All BSU faculty, staff, principal investigators, supervisors, and employees are expected to cooperate for the purpose of protecting their own health and safety and that of other workers, students, and the public. Specifically, these responsibilities include:

- Take all necessary steps to minimize the chance of spills when working with chemicals, oils, biological, or radioactive materials (see **Section 3, Spill Prevention**);

- Cooperate with their supervisor, Department, and the EHS Office to implement a chemical spill program in their area;
- Respond to those minor spills for which they are responsible (or discover) and for which they have the requisite training and equipment; and,
- Be aware that BSU maintenance and custodial staff are not trained or equipped to respond to spills or releases other than those they may have caused with the chemicals with which they are familiar and have received training.

2.3. The Supervisor or Principal Investigator

Staff and shop supervisors and Principal Investigators or Laboratory Managers, when involved in the supervision of staff members, students, graduate assistants, or others are responsible for performing the duties of the employer specified under the federal Occupational Health and Safety Act (OSHA) as designated representatives of the University. Specifically, these include:

- Ensuring that an adequate number of persons are trained in chemical spill response for their area, workshop, or laboratory;
- Providing site-specific and material-specific training for their area, workshop, or laboratory—including the response to chemical and biological releases;
- Ensuring that all employees or lab workers have received the required OSHA hazard training under the *BSU Hazard Communication* and/or *Chemical Hygiene Plans*;
- Ensuring there are sufficient and appropriate spill response supplies in their area for the hazard characteristics and quantities of the chemicals or substances stored or handled;
- Taking all necessary steps to minimize the chance of spills when working with chemicals (**see Section 3. Spill Prevention**);
- Cooperating with their Department and the EHS Office to implement a chemical spill program in their area;
- Provide assistance in response to chemical spills. The extent to which the Department personnel respond to chemical spills will vary with Department policy. The supervisors will coordinate response and summoning of additional response personnel, and will be available after hours to provide assistance or direction in the event of a spill.
- Provide “site-specific” training to Department staff that work with chemicals and will potentially be involved in chemical spill / emergency response situations.
- Regularly inspect workshops, chemical storage areas, or labs to ensure that spill kits are available and that supplies are relevant to the chemicals being handled in the area for which the spill kit is designated for use.
- Maintain records regarding inspections conducted, personnel training completed, emergency equipment testing, and spill kit maintenance.

2.4. The Environmental Health and Safety Office

The Office of Environmental Health and Safety (EHS) will:

- Provide training to the various Departments, shops, and other individuals that may require spill response training. This training will involve review of these guidelines, hazard assessment, the use and selection of personal protective equipment, spill response training, incident reporting procedures, and review of Department responsibilities;
- Provide assistance to Departments in developing site specific spill response procedures and procuring spill response kits with the necessary equipment or devices;
- Perform inspections of chemical, biological, and oil storage and handling areas to ensure proper precautions are being followed and response capabilities maintained;
- Respond to chemical spills that are beyond the training, ability, or equipment of Departmental or workshop personnel to address;
- Request assistance from outside authorities and contractors in the event of a spill or release beyond university control capabilities;
- Report, as required or advisable, any spills or releases to the necessary governmental entities; and,
- Investigate chemical incidents to determine direct, indirect, and root causes, and to provide preventative recommendations.

2.5. University Police / Department of Public Safety

The University Police will contact the appropriate university or emergency response personnel depending on the material type, location, nature of the spill, and extent of exposure. The Police may also secure the location or site of the release and take whatever measures are necessary to protect the public and minimize damage.

3. Spill Prevention

The first step in chemical or biological spill response is to prevent the exposure, release, or spill from happening in the first place. The shop, worksite, chemical storage area, or laboratory should be examined to identify measures that can be taken to minimize the risk of a release occurring. These measures can be identified during regular worksite and laboratory safety inspections. The precautions may include physical controls (secondary containment, safety cabinets); standard operating procedures (labeling, container specifications, lab procedures), or staff and student training.

Chemical, biological, or radiological spills occur during five types of activities: *Storage, Transport, Transfers, Usage,* and *Disposal*. *Material Safety Data Sheets* (MSDSs) must be maintained reasonably available for each chemical or product containing hazardous chemicals--throughout each of the following activities:

3.1. Storage

Storage may be temporary, long-term, or for daily use. Regardless, certain precautions must be taken:

- Ensure that all containers are properly identified with the common chemical name (not a formula), physical and health hazards (labels or words), and manufacturer. All containers must include these three pieces of information. This will be on all chemicals as received and must be maintained in a legible condition or be replaced when necessary.
- If a chemical or other hazardous or biological material is removed from its primary container for use or dispensing, the secondary container must be labeled with the same information – chemical name, hazards, and manufacturer. Mixtures must

also be so identified. The “manufacturer” name may be the individual preparing the material or decanting it to the working container.

- Store no more hazardous chemicals in a room or area (control area), or building floor than is allowed for exempt areas under the Indiana (International) Fire Code;
- Ensure shelving units, counters, or cabinets are sturdy. Shelves used for chemical storage should be securely fastened to the wall or floor to provide added stability. The shelves should have “lips” to prevent falling of the containers from the shelves.
- Do not overcrowd storage rooms, laboratories, cabinets, or shelving units. Access must be provided for the identification of the materials and inspection of the area for spillage.
- Identify the presence and hazards of chemicals stored in an enclosed area, storage room, or in laboratories housing large quantities of chemicals, biological agents, or radiological material on the entry door or the approach to the area.
- Ensure chemicals are stored within easy reach of everyone in laboratories, storage rooms, or shops, and no higher than eye level. Large bottles and containers should be stored as close to floor level as possible. Liquid containers should be stored no higher than shoulder height.
- Flammable, combustible, and corrosive chemicals should be stored in safety cabinets whenever possible.
- Do not store chemical containers directly on the floor where they might be knocked over and broken--unless they are in ULC approved safety cans or still in their original shipping carton and packing (and do not cause a tripping or egress hazard).
- Do not store chemical containers on top of flammable storage or acid storage cabinets.
- Minimize the number of chemicals and size of containers stored in the lab. For commonly used chemicals (i.e. acids, solvents), a good rule of thumb is to keep quantities in the lab to either a single bottle or a one-week supply, whichever is less.
- Ensure that lighting and ventilation is adequate is the storage area.
- Regularly inspect chemicals in storage to ensure there are no leaking or deteriorating containers. Some items to note:
    - Keep the outside of containers clean and free of spills and stains.

- Check that caps and closures are secure and free of deformation. Use only screw caps on chemical containers in storage; foil, Parafilm™, corks or other plugs are not acceptable.
- Ensure that containers are free of rust, bulges or signs of pressure buildup.

- Do not store chemicals in unsuitable containers or containers made of incompatible material (eg: no HF in glass containers).

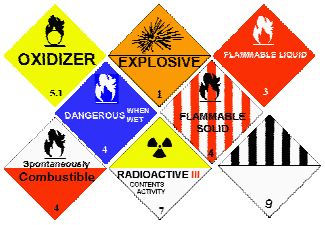
- Do not store incompatible chemicals together (e.g. acids with bases, oxidizers with acids). Chemicals must be stored by hazard category and not alphabetically (except within a hazard group) or by size. An incompatibility guide and chemical shelving pictorial are provided in **Appendix C.**

- Purchase solvents in containers with a plastic safety coating.

- Ensure that all gas cylinders are securely fastened and upright with cylinder caps in place when not in use.

- Any waste chemicals or products should be identified as waste or unwanted material and, if a hazardous waste, be so identified. Contact the EHS Office for waste characterization assistance or removal.

3.2. Transport



- When transporting large, heavy, or a multitude of containers use a cart suitable for the load with high edges or spill trays that will contain any spills or leaks. Two people should be involved when transporting large amounts of chemicals.

- A drum cart should be used when moving 55-gallon containers.

- Carry glass containers in bottle carriers or another leak resistant, unbreakable secondary container.

- Use a gas cylinder handcart when transporting large gas cylinders. Ensure the cylinder is securely strapped to the cart.

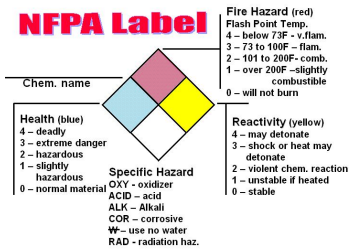
- When possible, transport chemicals in freight elevators to avoid the possibility of exposing people on passenger elevators in the event of a spill. Do not take the stairs.

- Contact the EHS Office regarding shipping of hazardous materials off campus or transport of hazardous materials on University or public roads or property.

3.3. Decanting

- When transferring chemicals between containers, pay careful attention to the size of the receiving container to prevent overfilling it.
- When transferring liquids from large containers, use pumps, siphoning (not initiated by mouth) or other mechanical means instead of pouring.
- Use funnels and spill containment trays to catch leaks and spills when transferring liquids.
- Use approved safety containers when transferring flammable and combustible liquids.
- When transferring flammable liquid from drums, ensure that both the drum and receptacle are grounded and bonded together to avoid an explosion initiated by a static electric spark.
- Ensure that the materials are compatible prior to mixing.
- Remember to label the secondary container with the material name, hazards, and manufacturer.
- Perform the material transfers only in locations with containment to capture or retard the escape of any spillage to the environment or drains.

3.4. Handling and Use

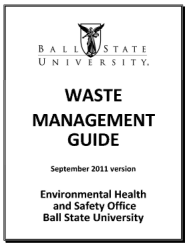


- In workshops, during maintenance work on campus, and in laboratories, ensure that ventilation is adequate for the chemical or material being handled, used, or applied. Remember that vapors, particulates, or odors may cause exposure to persons not in the immediate vicinity.
- In laboratories, work in a fume hood whenever possible and always when dealing with volatile or reactive substances. Use biological safety cabinets as required. Use such equipment properly.
- When setting up and working with laboratory apparatus:
    - Inspect laboratory glassware for cracks or defects before using it.
    - Secure flasks and beakers to prevent them from tipping over.
    - Do not stage experiments below heavy objects which might fall on them. Ensure the work area is free of unnecessary clutter.
    - Select equipment that has a reduced potential for breakage (e.g. Pyrex).
    - Mercury spills are one of the most common lab spills. Replace mercury with alcohol thermometers or other alternate type of temperature measuring device.
- When planning laboratory experiments, anticipate possible accidents and provide controls to deal with problems that may occur.
- If you must work alone, ensure the working alone protocol addresses chemical spill response as part of the emergency procedures
- Check gas cylinder valves and gas tubing for leakage before use.
- If possible, keep cylinders of highly toxic or corrosive gases in a fume hood or other ventilated enclosure.
- Ensure you have access and know the location of a suitable spill response kit before you start working with chemicals.

- Know the location and how to use emergency equipment such as eye washes, and emergency showers, be aware of the exits and evacuation routes, telephone locations, and Material Safety Data Sheets.

3.5. Disposal

The *BSU Waste Management Guide* should be consulted for the proper identification, handling, storage, and disposal or recycling of chemical and other wastes.



The following are some general precautions:

- Properly identify the contents of all waste containers and the associated hazards to avoid unsafe or inappropriate disposal.
- Be knowledgeable of the types of waste you may generate (hazardous waste, universal waste, solid waste, etc.) and how to properly identify, label, and arrange for dispose of the wastes.
- Do not mix incompatible wastes together--otherwise unexpected or uncontrolled chemical reactions may occur.
- Do not mix chemical wastes together unless they are of the same chemical nature in order to minimize disposal expenses. For example, mixing chlorinated solvent wastes with oil wastes will require disposal of the used oil as hazardous waste rather than being recycled.
- Notify the EHS Office of any waste (or recyclable) materials requiring disposal. Do not deposit hazardous chemicals in the trash or down the drain without approval. Do not leave chemical or biological wastes near dumpsters or other campus locations without notifying the EHS Office for prompt and separate pickup.

- Leave at least 10% air space in bottles of liquid waste to allow for vapor expansion and to reduce the potential for spills due to overfilling.
- When not in use (emptying or adding contents), keep waste containers securely closed or capped. Do not leave open funnels in waste containers.
- Dispose of waste on a regular basis; do not allow excess waste to accumulate in the work area. Contact the EHS Office for waste pick-up to ensure prompt and proper disposal.
- Be sure that any containers being discarded have been emptied. Containers storing some chemicals (some hazardous wastes and pesticides) must be triple rinsed before discarding.

4. Spill Response Preparation

Emergency preparedness is an important element of a spill response plan. When shops, worksites, building chemical storage areas, or laboratories are prepared for chemical spills--fewer errors are made and there is a reduced risk to persons, property and the environment. The essential elements of spill response preparation are: *Training, Hazard Information, Proper Equipment,* and *Written Procedures* as described below.

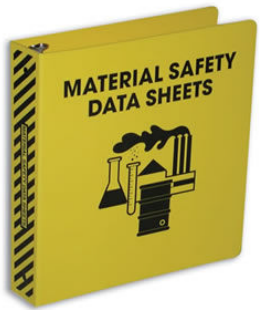
4.1. Training

Spill response training is provided by the *Environmental Health and Safety Office* to trade shop personnel, building and grounds maintenance personnel, representatives of the various Departments that handle chemicals, biological agents, or radioactive materials, laboratory workers, and other interested individuals. The Department staff may then use this to develop Department specific training which they provide to staff in their Departments, as well as to student employees.

This training normally includes, but is not limited to: Review of these Environmental Health and Safety Office guidelines for spill response, review of any Department, shop, or laboratory specific chemical spill response plans, instruction in spill cleanup techniques and equipment, and review of hazards found in the work area (chemical, physical, biological, radiological) which may be of concern during spill response. Training is separately provided to BSU personnel involved in the handling of oil products and response to oil spills under the University *SPCC Plan*. Much of the required spill response training for many Departments and staff is adequately completed during their employee's OSHA *Hazard Communication* and OSHA *Laboratory Safety Standard (Chemical Hygiene Plan)* training.

4.2. Hazard Information

Information on the chemical hazards present at the worksite must be kept up-to-date and readily available. Sources of information include Material Safety Data Sheets, signs, container labels, posters, and reference books. The worksite supervisor, lab manager, principal investigator and Department supervisors are responsible for ensuring that this information is readily available to employees in the trade, worksite, laboratory, and maintenance areas. The availability of MSDSs is mandated under the *OSHA Hazard Communication* (Worker Right to Know) for all University employees, as well as under the *OSHA Laboratory Safety Standard* (*Chemical Hygiene Plan*) for all laboratory workers. All BSU employees handling hazardous chemicals should be aware of the *BSU Hazard Communication Plan* and personnel working in or supporting laboratories must be knowledgeable of the BSU *Chemical Hygiene Plan.*



4.3. Equipment

The various facilities, support, utility, academic, and laboratory Departments are responsible for ensuring that an adequate supply of spill response and personal protective equipment is maintained in each Department, work area, or laboratory. Similarly, other University entities such as Facilities Planning and Management, Housing and Residence Life, and Recreation Services are responsible to ensure that the necessary spill preparedness and response equipment is available for their personnel and the chemical, biological, or radioactive hazards they deal with or may be exposed to during their work activities. The type of equipment required includes; first-aid equipment (including emergency eye washes/showers), personal protective equipment (gloves, eye protection, etc.), and spill cleanup supplies (absorbents, neutralizing agents, etc.). Recommended contents for generic spill kits are provided in **Appendix B**; (however, spill kits and PPE should be customized to account for specific hazards and conditions in each Department, shop, laboratory, work site, or chemical or biological storage facility, room, or area).

4.4. Procedures

The procedures given in **Sections 5 and 6** provide guidance for responding to a variety of chemical, biological, and radiological spills and **Appendix A** includes a flow chart summarizing the considerations and actions which should be taken in both assessing and responding to spills and releases. A copy of this procedure should be made available to personnel at all worksites. **Appendix C** exhibits chemical compatibility information, while **Appendix D** includes a summary guidance sheet for initial spill assessment and response, as well as a printable or pull-out *CAUTION: SPILL HAZARD* sign for posting in the event of a hazardous spill.

In addition to the general and material specific procedures given in **Sections 5 and 6** of this Plan, chemical specific procedures may also be needed at worksites where other hazardous chemicals, petroleum compounds, or biologicals are used or where large quantities of potentially harmful material is stored. Site-specific procedures should include:

1. Information on the hazards of the chemical; the quantity and storage location of the hazardous chemical;
2. The personal protective equipment and spill abatement equipment required and their location;
3. The instructions for containing and cleaning up the spill;
4. The first-aid measures and materials required to treat exposed individuals; and,
5. The method of residual waste disposal.

5.0 Spill Response Procedures

When a chemical or biological spill occurs, personnel at the spill scene must act quickly to reduce the consequences of the spill. The actions taken depend on the magnitude, complexity, and degree of risk associated with the spill. Refer to **Appendix A: Ball State University Spill Response Flowchart, and Appendix D for summary spill response and reporting procedures**. The following steps outline the general actions which should be taken in response to chemical spills. However, because the appropriate response often depends on the identity or characteristics of the material spilled, a series of **Spill Response Guides** have been developed for certain categories of chemicals, biological agents, and radioactive materials. Those are provided in this section immediately following the general response steps listed below.

1*. Stay clear and warn others.*
Proceed with caution and advise others that are in the immediate area of the spill of the potential danger.

2. Assist injured or contaminated persons.
If persons are injured, provide first-aid if you or another available individual is trained to do so. If persons have been contaminated by the spilled chemical, lead them to the nearest eyewash or emergency shower (depending on the extent / location of the contamination) and assist in washing off the material. However, do not put yourself at risk and become a casualty. Injuries resulting from chemical spills are often medical emergencies, and the **University Police (5-1111 or 911)** should be immediately notified when this occurs.

3. Assess the situation. Is this an emergency?

An emergency situation exists when there is a high risk to:

- Persons;
- Property; or
- Environment.

The following **Spill Response Guides** provide information on the quantity of spilled material that is considered an emergency, or major spill, for different classes or types of hazardous chemicals. **These amounts are for guidance only.** Spills of amounts less than that listed may also constitute an emergency depending on the circumstances. Always consider the whole situation when determining if an emergency situation exists or not. All spills in areas accessible to the general University community (eg: corridors, lobbies) are considered emergencies. Whenever a spill occurs in a public area, immediately contact the **University Police (765-285-1111 or 911).**

If an emergency arises, isolate the area and contact the **University Police (765-285-1111 or 911).** When informed of an emergency situation, the **University Police,** in addition to

responding themselves, will contact the appropriate medical or emergency response persons or team. For this purpose, specific information is needed from the person reporting the incident. This information must include:

- Identity of the person making the report.
- Nature of the incident (fire, explosion, chemical spill, gas leak).
- Location of the incident (building, room number, and location in the room).
- Any injuries or exposures to chemicals, biological agent, or radiation?
- What is the identity of the material and its physical state – liquid, solid, gas?
- Is any of the hazardous material escaping from the spill location – vapors/fumes, run-off?
- When and how the incident occurred.

4. Get help for all but minor spills.

If an emergency does not exist, assistance from outside the immediate work area may still be required. Consider the following;

- Number and response training of persons required;
- Personal protective equipment required;
- Spill abatement material required;
- Nature of the spill (e.g. amount spilled, physical state, hazards of the spilled chemical).
- Is the situation worsening – spreading, oxidizer, fumes, ignition source, liquid run-off to other areas or drains?

Minor spills or spills of chemicals of low toxicity and/or volatility can be handled by trained and equipped personnel at the worksite. These are often referred to as *incidental* spills. More serious spills up to the amounts listed in the following ***Spill Response Guides*** may be handled by local personnel, perhaps with assistance from the other members of the Department. If the nature, quantity or location of the spill exceeds the capacity of Departmental, shop, utility, or laboratory personnel to deal with it safely and effectively, then outside help must be requested by contacting the **University Police (317-285-1111 or 911). If there is any doubt regarding the ability of Departmental personnel to handle a chemical spill, always contact the University Police (765-285-1111 or 911) and request assistance.** The University Police will contact either local emergency response personnel or the BSU Environmental Health and Safety Office to assist in the response,

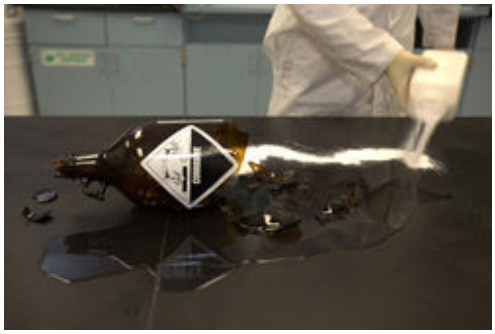
5. Control and clean-up the spill.

The following **Spill Response Guides** provide information on the hazards of spills and how they should be handled in terms of containment, treatment, and clean-up. In all cases, consult the material's Material safety Data Sheet to obtain more specific information on the chemical spilled to be sure it is cleaned up safely and effectively.

6. Report the spill.

If not already done, report the spill to the **Environmental Specialist (765-285-2807)**. All spills, even those which do not require outside assistance, must be reported. See **Section 6** (following the Spill Response Guides) for details on the reporting requirements and procedures. The EHS Office will, in turn, make any required reports to the appropriate regulatory agencies. Further information on reporting spills is provided in **Section 6 of this Plan**, which follows the Spill Response Guides.

Remember*: <u>Any</u> spill of a hazardous chemical, fuel, oil, or other potentially hazardous material must be contained and cleaned up--regardless of quantity or location--or a report must be made to the Indiana Department of Environmental Management (IDEM).*



6.0 Spill Response Guides

The following *Spill Response Guides* summarize procedures for responding to many types of spills or releases that have occurred, or are likely to occur, on the Ball State Campus. No BSU personnel, however, should attempt to cleanup or confine these, or other hazardous materials, unless they have received the training to do so, feel confident in doing so, and have the necessary personal protective equipment and spill cleanup supplies to do so in a safe and protective manner.

While some of the guides may suggest criteria for *minor* versus major *spills*, the above criteria should always determine whether or not you should attempt to control the release--or secure the area and call for outside assistance.

Spill Response Guide No. 1:
Flammable Liquids

Flammable liquids have **flash points below 100°F**, evaporate quickly, and within a short period of time can reach high, and potentially dangerous, vapor concentrations. Some common examples of flammable liquids include ethanol, methanol, hexane, diethyl ether, acetone, and toluene. Larger spills of flammable liquids may require a response by the fire department if vapor concentration exceeds or approaches the lower explosion limit (LEL). **A spill of more than 500 ml (1/2 quart) is an emergency** that requires area evacuation and notification of the **University Police (765-285-1111 or 911)**. Spills of less than 1/2 quart can be cleaned-up by local personnel who are adequately trained and have the proper spill response equipment available. If this is the case, proceed as follows:

1) If spill absorbent is available in the immediate area, dike around the spill (**see Step 7 below**) if it is safe to do so. This will prevent the spill from spreading further and releasing more vapors.

2) Immediately extinguish any open flames and, and isolate and evacuate the spill area.

3) If the area's ventilation system recirculates the air throughout the building, call the **University Police (765-285-1111 or 911)** or **BSU Work Control (765-285-5081)** to have the ventilation shut down to prevent the spread of vapor throughout the building. In addition, close any open doors to also help prevent the spread of vapors.

4) If it can be done without exposure to the spilled substance, plug or cover any open sink or floor drains that may allow escape of the spilled substance.

5) Assemble trained Department members and the spill response kit outside the spill area. **Obtain and read the MSDS** for the substance(s) to determine the hazards associated with it and any special precautions that will need to be taken. Contact the BSU EHS Office (765-285-2807) for assistance if needed.

6) Don the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
    a. Gloves as recommended by MSDS or glove manufacturer.
    b. Splash goggles or face shield.
    c. Shoe covers or rubber boots.
    d. Lab coat or Tyvek™ coveralls.

e. Half mask air-purifying respirator with **organic vapor or combination** cartridges, or **as otherwise recommended by the MSDS or respirator manufacturer – if personnel have been trained** and equipped by the BSU EHS Office in the use of respirators.
f. Ensure that fire extinguishers are readily available and the responder has been trained in their use for escape purposes.

7) If not already done, dike around the spill using spill absorbent or spill pillows. Do not use paper towels to absorb the spill since this increases the rate of evaporation and vapor concentration of the liquid.

8) Carefully cover the spill area with spill absorbent or spill pillows, starting at the outside and working inward.

9) Sweep up the residue using spark-proof tools and place the residue into a labeled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). Contact the EHS Office for pickup and disposal of the spilled material and residuals and to verify the adequacy of the cleanup.

10) Mop the affected area using detergent and water. Dispose of this water to the sanitary sewer.

11) Remove and bag personal protective equipment for cleaning or disposal.

12) If the ventilation system has been shut down, contact **BSU Work Control (5-5081) or the University Police (5-1111)** to have it restarted.

Once the spill has been cleaned up, the area should not be reentered until it has been purged of all remaining vapor. In the absence of air monitoring equipment, wait at least **1 hour** before reentering the area. The EHS Office has monitoring equipment that can determine suitable atmosphere for reentry to the area.

Spill Response Guide No. 2:
Combustible & Other Nonflammable Organic Liquids

Combustible liquids (e.g. mineral spirits) have **flash points above 100°F but below 200 °F** and are not fire hazards at room temperature. The principal hazard from non-flammable, volatile liquid spills is exposure to the vapor by inhalation or skin absorption. **A spill of more than 1 quart (1 liter) is an emergency** that requires area evacuation and notification of the **University Police (765-285-1111 or 911)**. Spills of less than 1 quart / liter can be cleaned up by Department personnel who are adequately trained and have the proper spill response equipment available. If this is the case, proceed as follows:

1) If spill absorbent is available in the immediate area, dike around the spill (**see Step 6 below**) if it is safe to do so. This will prevent the spill from spreading further.

2) Immediately extinguish any open flames, and isolate and evacuate the spill area.

3) If the area's ventilation system recirculates the air throughout the building, call the **University Police (765-285-1111 or 911)** to have the ventilation shut down to prevent the spread of vapor throughout the building. In addition, close any open doors to also help prevent the spread of vapors.

4) If it can be done without exposure to the spilled substance, plug or cover any open sink or floor drains that may allow escape of the spilled substance.

5) Assemble spill team members and the spill response kit outside the spill area. **Obtain and read the MSDS** for the substance to determine the hazards associated with it and any special precautions that will need to be taken.

6) Don the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
    a. Gloves **as recommended by MSDS or glove manufacturer.**
    b. Splash goggles or face shield.
    c. Shoe covers or rubber boots.
    d. Lab coat or Tyvek™ coveralls.
    e. Half mask air-purifying respirator with **organic vapor or combination** cartridges, or **as otherwise recommended by the MSDS or respirator manufacturer**.

7) If not already done, dike around the spill using spill absorbent or spill pillows. Do not use paper towels to absorb the spill since this increases the rate of evaporation and vapor concentration of the liquid.

8) Carefully cover the spill area with spill absorbent or spill pillows, starting at the outside and working inward.

9) Sweep up the residue using spark-proof tools and place the residue into a labeled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). Contact the EHS Office for pickup and disposal of the spilled material and residuals and to verify the adequacy of the cleanup.

10) Mop the affected area using detergent and water. Dispose of this water to the sanitary sewer.

11) Remove and bag personal protective equipment for cleaning or disposal.

12) If the ventilation system has been shut down, contact **University Police (765-285-1111 or 911) or BSU Work Control (765-285-5081)** to have it restarted.

Once the spill has been cleaned up, the area should not be reentered until it has been purged of all remaining vapor. In the absence of air monitoring equipment, wait at least **1 hour** before reentering the area. Alternatively, contact the EHS Office (765-285-2807) to verify a safe atmosphere with monitoring equipment.

Spill Response Guide No. 3:
Acid Spills

The principal concern is the corrosive effect of these substances. Dilute solutions irritate the skin, while concentrated solutions can result in burns and also react violently with water

Hydrofluoric acid can penetrate deeply and damage underlying tissue. **Note that hydrofluoric acid spills require special response procedures. If you work with hydrofluoric acid, you must have a site specific safe work procedure, that includes spill and emergency response procedures.**

A spill of more than 1 quart (1 liter) of liquid or 500g of solid acid is an emergency that requires area evacuation and notification of the **University Police (765-285-1111 or 911). All spills of concentrated hydrofluoric acid are emergencies** and require outside assistance. Spills of most other acids of less than 1 liter / 500g can be cleaned up by Department personnel who are adequately trained and have the proper spill response equipment available. If this is the case, proceed as follows for a **liquid acid spill**:

1) If spill absorbent is available in the immediate area, dike around the spill (**see Step 7 below**) if it is safe to do so. This will prevent the spill from spreading further. Spill absorbents are available that are specifically designed for acid and caustic spills. Also, powder and liquid neutralizers are commercially available to neutralize the spilled chemical and reduce the hazards of cleanup.

2) Isolate & evacuate the spill area.

3) If the spilled chemical is volatile, and the area's ventilation system recirculates the air throughout the building, call the **University Police (765-285-1111 or 911)** to have the ventilation shut down to prevent the spread of vapor throughout the building. In addition, close any open doors to also help prevent the spread of vapors.

4) If it can be done without exposure to the spilled substance, plug or cover any open sink or floor drains that may allow escape of the spilled substance.

5) Assemble other Department spill team members, or other assistance, and the spill response kit outside the spill area. **Obtain and read the MSDS** for the substance to determine the hazards associated with it and any special precautions that will need to be taken.

6) Don the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
    a. Gloves **as recommended by MSDS or glove manufacturer.**
    b. Splash goggles or face shield.
    c. Shoe covers or rubber boots.
    d. Lab coat or Tyvek^{TM} coveralls.
    e. Half mask air-purifying respirator with **acid gas or combination** cartridges, or **as otherwise recommended by the MSDS or respirator manufacturer – if personnel are trained under the BSU Respiratory Protection Program**.

7) If not already done, dike around the spill using spill absorbent or spill pillows. Ideally, use spill absorbent that contains a mild neutralizing agent such as sodium carbonate (soda ash)

8) Carefully cover the spill area with spill absorbent or spill pillows, starting at the outside and working inward.

9) Sweep up the residue using spark-proof tools and place the residue into a labeled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). Contact the EHS Office for proper removal and disposal of the spilled material and contaminated cleanup articles

10) Check the pH of the spill area. If it is less than pH6, then neutralize with a dilute solution of 5% sodium bicarbonate (baking soda).

11) Mop the affected area using detergent and water. Dispose of this water to the sanitary sewer.

12) Remove and bag personal protective equipment for cleaning or disposal. Contact the EHS Office for pickup and disposal of the spilled material and residuals and to verify the adequacy of the cleanup.

13) If the ventilation system has been shut down, contact **University Police (765-285-1111 or 911)** to have it restarted.

Once the spill has been cleaned up, the area should be free of any acid fumes or vapors. However, if odors or irritation is still noted, isolate the area and wait at least **1 hour** before reentering.

For a **solid acid spill**;

1) Isolate the spill area, and assemble spill team members and the spill response kit outside the spill area. **Obtain and read the MSDS** for the substance to determine the hazards associated with it and any special precautions that will need to be taken.

2) Don the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
    a. Gloves **as recommended by MSDS or glove manufacturer.**
    b. Safety glasses or goggles.
    c. Lab coat.
    d. Half mask air-purifying respirator with **N95 or greater protection** particulate filter, or **as otherwise recommended by the MSDS or respirator manufacturer**.

3) Spill absorbents are available that are specifically designed for acid and caustic spills. Also, powder and liquid neutralizers are commercially available to neutralize the spilled chemical and reduce the hazards of cleanup. If necessary, slightly moisten the solid, to minimize dust production. Use water, or if the material is water reactive, another inert liquid (e.g. ethylene glycol).

4) Sweep up the residue using spark-proof tools and place the residue into a labeled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). Contact the EHS Office for pickup and disposal of the spilled material and residuals and to verify the adequacy of the cleanup.

5) Remaining solid acid residue may be neutralized using a dilute solution of sodium bicarbonate (baking soda). Check the pH of the spill area; the final pH should be between pH 6 and pH 10. Use spill absorbent or spill pillows to absorb the neutralized residue.

6) Mop the affected area using detergent and water. Dispose of this water to the sanitary sewer.

7) Remove and bag personal protective equipment for cleaning or disposal. Contact the EHS Office for pickup and disposal of the spilled material and residuals and to verify the adequacy of the cleanup.

Spill Response Guide No. 4:
Alkali & Base Spills

Like acids, the principal concern is the corrosive effect of these substances. Dilute solutions irritate the skin, while concentrated solutions can result in burns. Concentrated alkali compounds can penetrate deeply and damage underlying tissue.

A spill of more than 1 quart (1 liter) of liquid or 500g of solid alkali or base is an emergency that requires area evacuation and notification of the **University Police (765-285-1111 or 911).** Spills of less than 1 liter / 500g can be cleaned up by Department personnel who are adequately trained and have the proper spill response equipment available. If this is the case, proceed as follows for a **liquid alkali or base spill**:

1) If spill absorbent is available in the immediate area, dike around the spill (**see Step 6 below**) if it is safe to do so. This will prevent the spill from spreading further. Absorbents and neutralizing liquids and powders are available for alkali and base steps. These materials can aid in both recovery of the spilled caustic, as well as ameliorate the associated hazards of the chemical.

2) Isolate and evacuate the spill area.

3) If the spilled chemical is volatile, and the area's ventilation system recirculates the air throughout the building, call the **University Police (765-285-1111 or 911)**to have the ventilation shut down to prevent the spread of vapor throughout the building. In addition, close any open doors to also help prevent the spread of vapors.

4) Assemble spill team members and the spill response kit outside the spill area. **Obtain and read the MSDS** for the substance to determine the hazards associated with it and any special precautions that will need to be taken.

5) Don the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
    a. Gloves **as recommended by MSDS or glove manufacturer.**
    b. Splash goggles or face shield.
    c. Shoe covers or rubber boots.
    d. Lab coat or Tyvek™ coveralls.
    e. Half mask air-purifying respirator with cartridges/filters **as recommended by the MSDS or respirator manufacturer**.

6) If not already done, dike around the spill using spill absorbent or spill pillows. Ideally, use spill absorbent that contains a mild neutralizing agent such as sodium carbonate (soda ash). Cover or dike any sink or floor drains that are in the spill area.

7) Carefully cover the spill area with spill absorbent or spill pillows, starting at the outside and working inward.

8) Sweep up the residue using spark-proof tools and place the residue into a labeled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). Contact the EHS Office for pickup and disposal of the spilled material and residuals and to verify the adequacy of the cleanup.

8) Check the pH of the spill area. If it is greater than pH10, then neutralize with a dilute solution of 5% citric acid or other acidic material.

9) Mop the affected area using detergent and water. Dispose of this water to the sanitary sewer.

10) Remove and bag personal protective equipment for cleaning or disposal.

11) If the ventilation system has been shut down, contact **University Police (765-285-1111 or 911) or BSU Work Control (5-5081)** to have it restarted.

Once the spill has been cleaned up, the area should be free of any alkali fumes or vapors. However, if odors or irritation is still noted, isolate the area and wait at least **1 hour** before reentering.

For a **solid alkali or base spill**;

1) Isolate the spill area, and assemble spill team members and the spill response kit outside the spill area. **Obtain and read the MSDS** for the substance to determine the hazards associated with it and any special precautions that will need to be taken.

2) Don the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
    a. Gloves **as recommended by MSDS or glove manufacturer.**
    b. Safety glasses or goggles.
    c. Lab coat.
    d. Half mask air-purifying respirator with **N95 or greater protection** particulate filter or **as recommended by the MSDS or respirator manufacturer**.

3) If necessary, slightly moisten the solid, to minimize dust production. Use water, or if the material is water reactive, another inert liquid (e.g. ethylene glycol).

4) Sweep up the residue using spark-proof tools and place the residue into a labeled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). Contact the EHS Office for pickup and disposal of the spilled material and residuals and to verify the adequacy of the cleanup.

5) Remaining solid alkali or base residue may be neutralized using a dilute solution of 5% citric acid. Check the pH of the spill area; the final pH should be between pH 6 and pH 10. Use spill absorbent or spill pillows to absorb the neutralized residue.

6) Mop the affected area using detergent and water. Dispose of this water to the sanitary sewer.

7) Remove and bag personal protective equipment for cleaning or disposal.

Spill Response Guide No. 5:
Mercury Spills

Elemental mercury and mercury compounds are toxic by inhalation and in some cases, absorption through the skin. Although mercury evaporates slowly, in areas of poor ventilation the vapor concentration will increase over time and become a chronic or acute health hazard.

Spills of liquid mercury in any quantity are emergencies that require area evacuation and notification of **University Police (765-285-1111 or 911).** Breakage of four (4) or more fluorescent tubes or bulbs is also considered to be an emergency – **Spill Response Guide No. 6** which follows particularly addresses the cleanup of fluorescent lamp breaks by maintenance and custodial staff. Otherwise, proceed as follows for other mercury spills;

1) Isolate and evacuate the spill area. **Contact University Police at 285-1111 and/or the EHS Office at 285-2807**. Open any windows to the outside. Either the EHS Office or trained Department personnel will do the following:

2) Assemble spill team members and the spill response kit outside the spill area.

3) Don the appropriate personal protective equipment. Depending on the scale of the spill, this can include:
    a. Nitrile gloves.
    b. Safety glasses or splash goggles.
    c. Shoe covers or rubber boots.
    d. Lab coat or Tyvek™ coveralls.
    e. Air-purifying respirator with **mercury vapor** cartridges.

4) Using a razor blade, scraper, cardboard, heavy bond paper, or similar tools, gently push small droplets of mercury together and remove them using a hand-held mercury aspirator or disposable pipette. If an aspirator or pipette is not available use the card stock or scraper to pick up the mercury. Do not use a household vacuum cleaner since this will disperse mercury vapor throughout the room.

5) Pipette or otherwise place the mercury into a labeled glass waste container. Shine a flashlight on the surface to identify small mercury droplets that escape into cracks and crevices.

6) Spread a commercial mercury amalgam (should be in the spill kit if mercury is present in the work area or lab) mix over the contaminated surface after all visible mercury droplets have been removed. Allow contact time and *lightly* moisten the

amalgam if necessary. Sweep up mercury amalgam using a small brush and dispose of it into a labeled glass waste container. Take care not to break up any mercury droplets. Alternately, wipe the surface using a mercury absorbent cloth (e.g. Mercon wipes) or suppressant and dispose of it into a labeled clear, plastic bag.

7) Apply a powdered mercury indicator (sulfur-bearing chemical) on and around the spill area and allow it to sit for 24-48 hours. The dark areas will indicate any mercury residues on the surfaces. Repeat the above cleanup procedures any areas or spots showing residual mercury contamination.

8) The spill area and room or area ambient atmosphere will be tested using a Jerome meter to ensure that air quality levels are acceptable prior to allowing re-occupancy of the room or location.

9) The EHS Office will collect and send all mercury and contaminated material, including cleanup equipment, for disposal as hazardous waste.

10) Remove and bag personal protective equipment for cleaning or disposal.

Spill Response Guide No. 6:
Broken Fluorescent Lamps and CFL Breakage / Cleanup

All fluorescent lights, compact or otherwise, contain small amounts of mercury, which is toxic, persistent, and bio-accumulative if released into the environment. A typical 4 foot tube contains 20 micrograms (mg) of mercury. Most CFL manufacturers have agreed to reduce the amount of mercury contained in compact fluorescent lights (CFL) to 5 mg or less per bulb. Even so, a broken CFL can still release enough mercury vapor to be toxic, especially to children. Depending on circumstances such as age of the bulb and heat energy, one or more broken bulbs can allow mercury emissions that exceed the recommended exposure limits in air within a room or other enclosed area.

The following guidance provides instructions for Ball State University maintenance and custodial staff for cleaning up a broken fluorescent light bulb or compact fluorescent lights (CFLs) on hard (wood, linoleum or vinyl tiles) and carpeted surfaces. Following these steps will protect the worker and others from getting cut by broken glass, and from potential exposure to mercury that is released when a bulb breaks.

Materials Needed

- String, tape, or other material to delineate the spill area
- Disposable gloves – nitrile, PVC, or butyl rubber – shoe covers, if available.
- Index cards, business cards, cardboard, other stiff paper or thin plastic
- The smallest possible sealable container that the broken bulb pieces will fit in. A glass jar with a metal screw-on lid or a rigid plastic container with a tight-fitting lid, such as a lidded one or five-gallon pail, are preferable. A zip lock bag can be used with care.
- Sticky tape, such as duct tape
- Damp paper towels, wet wipes, or a water spray bottle and absorbent pads
- Flash light (for angling light across surface to detect glass and mercury particles)

Cleanup Procedures for Hard Surfaces

DO NOT USE A VACUUM OR BROOM TO CLEAN UP A BROKEN BULB!

1. Cordon off or mark the area where breakage occurred so that nobody steps in broken glass, phosphor powder or mercury. This should be done as soon as possible to prevent tracking of the debris or mercury.

2. If there are windows that open to the outside, open them to ventilate the area and wait about 30 minutes. Turn off or cover any return air ductwork, if possible, to prevent the entry of any mercury vapors to the building HVAC system. If there is no HVAC system or window to the outside do not wait to clean up.

3. Wearing disposable gloves, use stiff paper to carefully push the glass and powder to a central point where you can scoop it up, being careful not to get it on your clothing. Place the collected fragments into the container. If you need to further break the glass to fit it into the container, do this outside, being careful not to cut yourself.

4. Use sticky tape, such as duct tape, to pick up any visible glass shards, powder or mercury and place it in the container. Be thorough in picking up the broken glass and visible powder.

5. Then, using wet wipes or moist paper towels, wipe the area thoroughly. Place used towels and disposable gloves into the container and close it tightly. Once closed, do not re-open it to put more material in.

6. Label the container "Universal Waste – Broken fluorescent lamp", date it, and get it to Central Stores or the EHS office for proper storage and off-site recycling.

Cleanup Procedures for Carpeted Surfaces

1. Even after standard cleanup procedures, some residual mercury will likely remain on carpet or other "soft" or absorbent surfaces.

2. If the carpet or material is in an area where children or pregnant women may be exposed, it is advisable to cut out and replace the section of the carpet where the breakage occurred in order to remove any residual mercury.

3. If carpeting is not removed, follow the previous cleanup steps 1 through 6.

4. After completing these steps, ventilate the area to the outside to the best of your ability, using a fan if possible. Keep foot traffic off the immediate area of breakage for several days.

5. Ventilate the area when it is next vacuumed and remove and dispose of the vacuum bag or empty and wipe out the canister immediately afterwards. If possible, vent the area to the outside the next few times the area is vacuumed.

Clean-up Steps for Clothing, Upholstery, Bedding, and Other Soft Materials

1. If clothing or upholstery materials come in direct contact with broken glass or mercury-containing powder from inside the bulb that may stick to the fabric, the clothing or material should be thrown away. Do not wash such clothing or fabrics because mercury fragments in the clothing may contaminate the machine and/or

pollute wastewater. By "direct contact," we mean that mercury was (or has been) spilled directly onto the clothing.

2. You can, however, wash clothing or other materials that have been exposed to the mercury vapor from a broken CFL, such as the clothing you are wearing when you cleaned up the broken CFL, as long as that clothing has not come into direct contact with the materials from the broken bulb.

3. If shoes come into direct contact with broken glass or mercury-containing powder from the bulb, wipe them off with damp paper towels or disposable wet wipes. Place the towels or wipes in the glass jar or plastic bag for disposal. It is best to wear disposable shoe covers.

Things <u>Not</u> To Do

1. Never use a vacuum cleaner to clean up mercury. The vacuum will put mercury into the air and increase exposure.

2. Never use a broom to clean up mercury. It will break the mercury into smaller droplets and spread them.

3. Never pour mercury down a drain. It will lodge in the plumbing and cause future problems during plumbing repairs. If discharged, it will cause water pollution.

For Larger or Major Spills (Four or more broken lamps, or any thermometers, barometers, mercury switches, etc.)

1. Contact the EHS Office (5-2807) or through Work Control at 5-5081 for large spills, or for assistance whenever you are concerned about the effectiveness of the cleanup, or for any other mercury exposure or environmental concerns;

2. Evacuate, ventilate, and secure the room or area.

3. Contact Environmental Control (5-1204) or through Work Control (5-5081) to shut down the HVAC system to the room or zone; and,

4. Avoid walking through the spill or breakage area to avoid tracking or aerosolizing the mercury contamination.

Spill Response Guide No. 7:
Oxidizer Spills

Oxidizing agents can ignite organic solvents and combustible materials. They are also skin and respiratory irritants. Examples include concentrated hydrogen peroxide, and permanganate, chlorate, nitrate and dichromate compounds. **Spills in excess of 1 quart (1 liter) of liquid or 500 grams of solid oxidizer are emergencies** and require area evacuation and notification of the **University Police (765-285-1111 or 911).** Spills of less than 1 liter / 500g can be cleaned up by local personnel who are adequately trained and have the proper spill response equipment available. If this is the case, proceed as follows for a **liquid oxidizer spill**:

1) If spill is available in the immediate area, dike around the spill (**see Step 5 below**) if it is safe to do so. This will prevent the spill from spreading further.

2) Isolate and evacuate the spill area.

3) Assemble spill team members and the spill response kit outside the spill area. **Obtain and read the MSDS** for the substance to determine the hazards associated with it and any special precautions that will need to be taken.

4) Don the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
    a. Gloves **as recommended by MSDS or glove manufacturer.**
    b. Splash goggles or face shield.
    c. Shoe covers or rubber boots.
    d. Lab coat or Tyvek™ coveralls.
    e. Half mask air-purifying respirator with cartridges and/or filters **as recommended by the MSDS or respirator manufacturer**.

5) If not already done, dike around the spill and any nearby sink or floor drains using spill absorbent or spill pillows. Remove or moisten with water any combustible materials or surfaces affected by the spill.

6) Carefully cover the spill area with spill absorbent or spill pillows, starting at the outside and working inward.

7) Sweep up the residue using spark-proof tools and place the residue into a labeled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). Contact the EHS Office for pickup and disposal of the spilled material and residuals and to verify the adequacy of the cleanup.

8) Mop the affected area using detergent and water. Dispose of this water to the sanitary sewer.

9) Remove and bag personal protective equipment for cleaning or disposal.

For a **solid oxidizer spill:**

1) Isolate the spill area, and assemble spill team members and the spill response kit outside the spill area. **Obtain and read the MSDS** for the substance to determine the hazards associated with it and any special precautions that will need to be taken.

2) Don the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
    a. Gloves **as recommended by MSDS or glove manufacturer.**
    b. Safety glasses or goggles.
    c. Lab coat.
    d. Half mask air-purifying respirator with **N95 or greater protection** particulate filter or **as recommended by the MSDS or respirator manufacturer**.

3) Sweep up the residue using spark-proof tools and place the residue into a labeled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). Contact the EHS Office for disposal of the recovered and contaminated articles as hazardous waste.

4) If there is still oxidizer residue left in the spill area, neutralize with dilute 5% sodium thiosulfate solution. Use spill absorbent or spill pillows to absorb the neutralized residue.

5) Mop the affected area using detergent and water. Dispose of this water to the sanitary sewer.

6) Remove and bag personal protective equipment for cleaning or disposal.

Spill Response Guide No. 8:
Highly Toxic Materials Spills

Highly toxic chemicals include those with high acute systemic toxicity, and substances with chronic toxic effects such as carcinogens, reproductive or developmental (embryotoxins, teratogens) toxins, and mutagens. Also included in this category are compounds that can easily produce toxic products. For example, cyanide and sulfide salts produce toxic hydrogen cyanide and hydrogen sulfide, respectively, in the presence of acids. **In general, spills of more than 100mL (6 Tablespoons) of liquid or 50g (1 ¾ oz) of solid of these substances are emergencies** and require area evacuation and notification of the **University Police (765-285-1111 or 911).** Spills of less than 100mL / 50g can be cleaned up by Department personnel who are adequately trained and have the proper spill response equipment available. **These chemicals, however, should always be evaluated on an individual basis.** Proceed as follows for a **liquid spill**:

1) If spill absorbent is available in the immediate area, dike around the spill (**see Step 5 below**) if it is safe to do so. This will prevent the spill from spreading further.

2) If the spilled chemical is volatile, and the area's ventilation system recirculates the air throughout the building, call the **University Police (765-285-1111 or 911)** to have the ventilation shut down to prevent the spread of vapor throughout the building. In addition, close any open doors to also help prevent the spread of vapors.

3) Isolate the spill area and assemble spill team members and the spill response kit outside the spill area. **Obtain and read the MSDS** for the substance to determine the hazards associated with it and any special precautions that will need to be taken.

4) Don the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
    a. Gloves **as recommended by MSDS or glove manufacturer.**
    b. Splash goggles or face shield.
    c. Shoe covers or rubber boots.
    d. Lab coat or Tyvek™ coveralls.
    e. Half mask air-purifying respirator with cartridges and / or filters **as recommended by the MSDS or respirator manufacturer**.

5) If not already done, dike around the spill using spill absorbent or spill pillows

6) Cover the spill area with spill absorbent or spill pillows, starting at the outside and working inward.

7) Sweep up the residue using spark-proof tools and place the residue into a labeled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). Contact the EHS Office for proper removal and disposal of the spilled material and contaminated cleanup articles.

8) Remove any remaining residue using minimal detergent and water. Absorb this wash water using spill absorbent or spill pillows, and dispose as in **Step 7 above**.

9) Mop the affected area using detergent and water. Dispose of this water to the sanitary sewer.

10) Remove and bag personal protective equipment for cleaning or disposal.

11) If the ventilation system has been shut down, contact **Work Control (5-5081)** to have it restarted.

For a **solid spill:**

1) Isolate the spill area, and assemble spill team members and the spill response kit outside the spill area. **Obtain and read the MSDS** for the substance to determine the hazards associated with it and any special precautions that will need to be taken.

2) Don the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
    a. Gloves **as recommended by MSDS or glove manufacturer.**
    b. Safety glasses or goggles.
    c. Lab coat.
    d. Half mask air-purifying respirator with **N95 or greater protection** particulate filters, or cartridges and/or filters **as recommended by the MSDS or respirator manufacturer**.

3) Slightly moisten the solid, to prevent the spread of dust. Use water, or if the material is water reactive, another inert liquid (e.g. ethylene glycol).

4) Sweep up the residue using spark-proof tools and place the residue into a labeled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). Contact the EHS Office for proper removal and disposal of the spilled material and contaminated cleanup articles.

5) Remove any remaining residue using minimal detergent and water. Absorb this wash water using spill absorbent or spill pillows, and dispose of as hazardous waste as in **Step 4 above**.

6) Mop the affected area using detergent and water. Dispose of this water to the sanitary sewer.

7) Remove and bag personal protective equipment for cleaning or disposal.

Spill Response Guide No. 9:
Low Hazard Material Spills

Low hazard materials are those with no appreciable health hazard when encountered in quantities typical for University work sites or laboratories. These include such solid materials as sodium chloride, calcium chloride, and liquids such as ethylene glycol, oils, and most paints. **In general, all spills of these materials may be cleaned up by local personnel unless there are other mitigating circumstances** that require outside assistance, area evacuation and notification of the **University Police (765-285-1111 or 911).** If this is not the case, proceed as follows for a **liquid spill**:

1) If spill absorbent is available in the immediate area, dike around the spill (**see Step 4 below**) if it is safe to do so. This will prevent the spill from spreading further. Dike or cover any sink, floor, or yard drains in the vicinity that the spilled material may otherwise drain to and enter.

2) Move outside the spill area. **Obtain and read the MSDS** to confirm that the material is of low hazard and can be cleaned up safely following this procedure.

3) Don the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
    a. Gloves **as recommended by MSDS or glove manufacturer.**
    b. Safety Glasses or Splash goggles.
    c. Shoe covers or rubber boots.
    d. Lab coat, Tyvek™ coveralls, or other work clothes.

4) If not already done, dike around the spill using spill absorbent or spill pillows. Loose absorbents and absorbent pads, pillows and socks are available specific to spill types – oil only (retains oil allowing water to pass), acid/caustics, and oil, water, and solvents. General clay-based absorbents, soil, or kitty litter are also suitable for general spills of low hazard materials.

5) Cover the spill area with spill absorbent or spill pillows, starting at the outside and working inward.

6) Sweep up the residue using available tools and place the residue into a labeled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). Contact the EHS Office for proper removal and disposal of the spilled material and contaminated cleanup articles

7) Mop the affected area using detergent and water. Dispose of this water to the sanitary sewer.

8) Remove and bag personal protective equipment for cleaning or disposal.

For a **solid spill:**

1) Move outside the spill area. **Obtain and read the MSDS** to confirm that the material is of low hazard and can be cleaned up safely following this procedure.

2) Don the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
    a. Gloves **as recommended by MSDS or glove manufacturer.**
    b. Safety glasses or goggles.
    c. Lab coat.

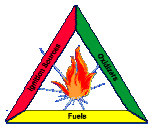
3) If necessary, use water to lightly moisten the solid, to minimize the spread of dust. Do not add sufficient water to make the material mobile.

4) Sweep up the residue using available tools and place the residue into a labeled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). Contact the EHS Office for proper removal and disposal of the spilled material and contaminated cleanup articles

5) Mop the affected area using detergent and water. Dispose of this water to the sanitary sewer.

6) Remove and bag personal protective equipment for cleaning or disposal.

Spill Response Guide No. 10:
Air & Water Reactive Material Spills



These materials are particularly hazards, since they will rapidly react with water and/or air to produce toxic products, and in many cases are also pyrophoric and may spontaneously ignite in the presence of water and/or air. Typical examples of water and air reactive materials include the alkali metals, metal hydrides and strong reducing agents such as sodium borohydride. **All spills of air & water reactive materials are emergencies** and require area evacuation and notification of the **University Police (765-285-1111 or 911).** If a spill of a **liquid reactive material** occurs;

1) Isolate the spill area.

2) If an inert spill absorbent such as dry sand or kitty litter is available in the immediate area, dike around the spill if it is safe to do so. This will prevent the spill from spreading further. Cover or dike any nearby sink, floor, or yard drains if it is safe to do so.

3) Evacuate the area and, if not already done so, contact the **University Police (765-285-1111 or 911).** Meet emergency responders and provide information on the nature, extent and exact location of the spill.

For a **solid spill:**

1) Isolate the spill area.

2) If an inert spill absorbent such as dry sand or kitty litter is immediately available in the area, immediately smother the spilled material if it is safe to do so. For reactive metals (e.g. sodium, potassium), a Class D fire extinguisher may be used.

3) Evacuate the area and, if not already done so, contact the **University Police (765-285-1111 or 911).** Meet emergency responders and provide information on the nature, extent and exact location of the spill.

Spill Response Guide No. 11:
Compressed Gas Leaks

Compressed gas leaks can be roughly divided into two categories. The first are those leaks which occur away from the cylinder in gas lines, tubing, or apparatus. These, once detected, can generally be stopped by closing the main cylinder valve. The second are those leaks that occur in the cylinder itself, and that cannot be stopped by closing the cylinder valve. Similarly, in some cases, it may not be possible to close a cylinder valve due to age or poor condition of the valve. **All leaking gas cylinders are an emergency if the leak cannot be stopped by closing the cylinder valve.** Leaks of oxygen, flammable gas, or toxic gas are especially dangerous.

For a **major compressed gas leak**, the following procedure should be followed:

1) If a leak is suspected, perform a leak test with a commercial leak detection solution or a non-reactive, detergent solution. If the leak is detected or is obvious, proceed to **Step 2.**

2) If the leak cannot be stopped by closing the cylinder valve, and it is **an inert atmospheric gas** (e.g. nitrogen, carbon dioxide, etc) clear the affected area and/or floor. If the leak is of a **flammable, toxic, or corrosive gas** and is outside of a ventilated enclosure that will contain the gas--immediately activate the building fire alarm system and evacuate the building.

3) If not already done so, contact the **University Police (765-285-1111 or 911).** Meet emergency responders and provide information on the nature, extent and exact location of the leak.

A **minor compressed gas leak** is considered to be a small, slow, controllable release of a gas that poses a low risk of personal injury or exposure. Perform the following steps for minor compressed gas leaks.

1) Notify people in the area of the detected leak.

2) Wear appropriate personal protective equipment matched to the hazard, such as safety goggles, face shield, gloves, aprons, etc.

3) If the leak is in the gas supply system, close cylinder valve and tighten leaking connections.

4) If the leak is at the cylinder valve stem, attempt to tighten the packing nut. Be careful not to over tighten. If the leak cannot be stopped, move the cylinder into a fume hood, under a local exhaust canopy, or to an isolated, well-ventilated area to vent cylinder contents.

5) If the leak is at other areas on the cylinder (e.g., valve seal, valve threads, pressure safety device, etc.), move the cylinder into a fume hood, under a local exhaust canopy, or to an isolated, well-ventilated area to vent cylinder contents.

6) If it is necessary to move a leaking cylinder through populated portions of the building, secure a plastic bag, rubber shroud or similar device over the top of the cylinder to confine leaking gas.

7) Keep flammable or oxidizing gases away from combustible materials.

8) If possible, direct corrosive and toxic gases into an appropriate chemical neutralizer.

9) Evacuate the immediate area and post warning signs to prevent access by others.

10) Notify shop or laboratory supervisor and EH&S of the incident.

11) Remain outside the immediate area until cylinder contents have been exhausted.

12) Return cylinder to supplier for needed repairs.

Spill Response Guide No. 12:
Oil and Petroleum Spills

Oil spills are among those with no immediate appreciable human health hazard when encountered in quantities typical for most University work sites or laboratories. These include such solid materials as lubricating oils, vacuum pump oils, elevator oils, transformer dielectric fluids, vegetable oils, and synthetic oils that are not flammable or combustible. **Flammable and combustible oils** (fuels such as gasoline) should be handled in accordance with **Spill Response Guide Numbers 1 and 2**. **In general, all spills of these materials may be cleaned up by local personnel unless there are other mitigating circumstances** that require outside assistance, area evacuation and notification of the **University Police (765-285-1111 or 911).** Assistance will be needed if a release of an oil (fuel, lubricating oil, vegetable oil) is of a quantity and in a location that it may drain to a waterway or to a sink, floor, or yard drain that leads to the sanitary or storm sewer. If this is not the case, proceed as follows for a small **liquid spill**:

1. If spill absorbent is available in the immediate area, dike around the spill (**see Step 4 below**) if it is safe to do so. This will prevent the spill from spreading further. A major concern with oils is preventing their reaching waterways either over the surface or via storm or sanitary sewers.
2. Use drain covers or develop a berm around any drains using absorbent socks or loose absorbent to prevent escape of the oil to a waterway.

3. Move outside the spill area. **Obtain and read the MSDS** for the particular oil to confirm that the material is of low hazard and can be cleaned up safely following this procedure.

4. Don the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
    d. Gloves **as recommended by MSDS or glove manufacturer.**
    e. Safety Glasses or Splash goggles.
    f. Shoe covers or rubber boots.
    g. Lab coat or Tyvek™ coveralls.

5. If not already done, dike around the spill using spill absorbent or spill pillows.

6. Cover the spill area with spill absorbent or spill pillows, starting at the outside and working inward.

7. Sweep up the residue using spark-proof tools and place the residue into a labeled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). Contact the EHS Office for proper removal and disposal of the spilled material and contaminated cleanup articles.

8. Mop the affected area using detergent and water. Dispose of this water to the sanitary sewer.

9. Remove and bag personal protective equipment for cleaning or disposal.

Note: Spills of oil above approximately 1-gallon, or at such locations that may reach a waterway, sanitary, or storm sewer are to be addressed through the **BSU Spill Prevention Control and Countermeasures (SPCC) Plan.**


SPILL PREVENTION, CONTROL, AND COUNTERMEASURE (SPCC) PLAN

BALL STATE UNIVERSITY

2000 West University Avenue
Muncie, Delaware County, Indiana 47306

July 2011 version

Prepared by the:

Environmental Health and Safety Office
BSU Facilities Planning and Management
3401 North Tillotson Avenue (SV 203)
Muncie, Indiana 47306

Spill Response Guide No. 13:
Chill Water

Chill water spills are among those with no acute human health hazard but where action must be taken to prevent drainage to waterways, sanitary, and storm sewers. Chill water is water in the subsurface chill water mains and piping throughout the campus and buildings. This water is amended with sodium molybdate in concentrations from 50-100 mg/liter as an anti-corrosion and biocide to maintain the water integrity and prevent fouling of the mains, piping, and air handling equipment. This material can be toxic to aquatic organisms at relatively low concentrations. The majority of releases occur from construction work (trenching or excavations) that break the buried chill lines. **In general, all spills of these materials may be cleaned up by utility or Department personnel unless there are other mitigating circumstances** that require outside assistance, area evacuation and notification of the **University Police (765-285-1111 or 911).** Assistance will be needed if a pipe break releases a quantity of chill water and in a location that it may drain to a waterway or to a sink, floor, or yard drain that leads to the sanitary or storm sewer. If this is not the case, proceed as follows for a small **liquid spill**:

1. **Contact Work Control directly (765-285-5081) or through the University Police (765-285-1111 or 911)** to turn off or isolate the chill water line.

2. Move outside the spill area. **Obtain and read the MSDS** for sodium molybdate to confirm that the material is of low hazard and can be cleaned up safely following this procedure.

3. If spill absorbent is available in the immediate area, dike around the spill (**see Step 4 below**) if it is safe to do so. If on the campus grounds, soil may be used to form a diversion dike to prevent the chill water from draining to waterways or sewers. This will prevent the spill from spreading further. A major concern with chill water is preventing it from reaching waterways either over the surface or via storm or sanitary sewers. Cover any storm sewer drains with a drain cover.

4. Don the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
    a. Gloves **as recommended by MSDS or glove manufacturer.**
    b. Safety Glasses or Splash goggles.
    c. Shoe covers or rubber boots.
    d. Lab coat or Tyvek™ coveralls.

5. If necessary, the chill water released to an excavation can be pumped to the soil surface, or a temporary impoundment area, in order to prevent its migration to a waterway or sewer.

6. If necessary, a vacuum truck can be brought in through a spill contractor to recover the released chill water.

7. For minor and interior spills, and if not already done, dike around the spill using spill absorbent or spill pillows.

8. Also for minor interior spills, cover the spill area with spill absorbent or spill pillows, starting at the outside and working inward.

9. Sweep up the residue and place the residue into a labeled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). Contact the EHS Office for proper removal and disposal of the spilled material and contaminated cleanup articles.

10. Mop any interior affected areas using detergent and water. This water may be discharged to the sanitary sewer.

11. Remove and bag personal protective equipment for cleaning or disposal.

Note: Large releases are normally handled by personnel from BSU Environmental Control and water samples are to be taken to verify that the sodium molybdate concentrations are not such that could harm aquatic organisms.

Spill Response Guide No. 14:
Biological Releases

Biological releases most often occur relative to one of two sources: (1) the BSU Bloodborne Pathogen (BBP) Exposure Plan (human blood and other potentially infectious materials (OPIM); or, (2) other sources of other potentially hazardous or infectious biological agents from biological or human research, educational, or clinical sources. **In general, BBP incidents may be cleaned up by Department or shop personnel who have been trained to do so under the BSU Bloodborne Pathogen Exposure Plan.** Such incidents can be handled by Department personnel who are adequately trained and have the proper response equipment available. Care must be taken to minimize exposure to the fluids involved and to ensure that the affected persons are referred for immediate medical follow-up if an actual exposure of an employee has occurred. Blood or other OPIM that covers an area of over 2 square feet, or that occurs in common areas (hallways, lobbies, etc.) may require the immediate assistance of the BSU EHS Office for cleanup, disinfection, and waste removal.

BBP Spill Cleanup Procedures:

1. Clear the area of non-essential personnel and isolate the room or area. The room should remain vacant until the response is completed.

2. Put on gloves and appropriate personal protective equipment (PPE). Appropriate PPE may include:
    a. Safety glasses or splash goggles,
    b. Lab coats,
    c. Masks and face shields.

    If disposable gloves are used, it is suggested that two pair of gloves be donned. Outer glove can then be readily removed if soiled with hand protection still provided by inner glove.

3. Remove any broken glass or sharp objects from the spill using mechanical means – forceps, hemostats, needle-nose pliers, broom and dust pan. Never remove sharps/broken glass by hand. Any sharps should be placed in a rigid “sharps” container for safety and proper disposal.

4. Contain and disinfect the spill by covering with paper towels and carefully pour appropriate disinfectant solution (e.g. 1:10 to 1:20 freshly prepared dilution of household bleach) around and on the spill. Cover an area twice the size of the spill, but centered on the spill. Take care not to splash disinfectant solution or create aerosols while pouring. Bleach solutions must be freshly prepared (within

24 hours) to provide acceptable disinfection. Other EPA approved tuberculocidal disinfectants with a longer shelf life may be used (e.g Lysol and a number of others). Most of these products have an extended shelf life.

5. Wait a minimum of 20 minutes for the disinfectant to work.
6. Remove the paper towels or absorbent sheets and repeat the process until all visual soilage is removed.
7. Re-wet cleaned area with disinfectant and air dry or let stand for 10 minutes before wiping dry.
8. Place all contaminated paper towels in a "red bag" for appropriate disposal. All contaminated sharps must be placed in a sharps container.
9. Remove all PPE and immediately wash hands. Disinfect splash goggles and any other items/tools that are not disposable (e.g. needle-nose pliers, dust pans, etc.).
10. Contact the BSU Environmental Health and Safety Office for removal and disposal of the Red Bag.

Other Biological or Research Material Spills:

Each Principal Investigator/laboratory director must develop specific spill cleanup methods tailored to the biological agent(s), quantities, and procedures being implemented in their respective laboratories, and ensure that the appropriate spill response material is immediately accessible and that adequate persons are trained in responding to releases regardless of their location – centrifuges, biosafety cabinets, etc. The following procedures shall be utilized as a basis for cleaning spills of biological materials.

Minor Biological Spills

Biological spills, other than those addressed above and through the BSU Bloodborne Pathogen Exposure Plan, are most likely to occur in a laboratory setting. A Minor Biological Spill is one that the laboratory staff is capable of handling safely without the assistance of EHS Office or external emergency personnel. *Minor biological spills* involve BSL 1 materials or releases of a small volume of material inside a biological safety cabinet or other primary containment device.

1. If the spill occurred inside a biological safety cabinet, close the sash and allow the cabinet to operate for at least 15 minutes before proceeding with the spill cleanup.
2. Alert people in area of spill and secure the affected area.
3. If any material has been splashed on you, follow the Procedure for Exposure to Potentially Infectious Material that follows:

a. Remove and disinfect any contaminated clothing.

b. If you have not been exposed, don the appropriate personal protective equipment for the cleanup operation, which include at a minimum liquid barrier gloves, safety glasses, and lab coat.

c. Cover the spill with paper towels or other absorbent material to prevent further aerosol formation.

d. Pour an approved disinfectant gently over the covered spill, working from the outside inwards.

e. Wait at least 20 minutes for the disinfectant to penetrate through the contained spill and achieve the required contact time for disinfection.

f. Do not utilize hands if glass or other sharps are involved in the spill. Use a tool (e.g. shovel or forceps) to remove the absorbent material and debris. Place all materials in a biohazard bag for autoclaving and subsequent disposal.

g. Clean the original spill area with detergent.

h. Notify your supervisor and the BSU EHS Office of the incident.

Major Biological Spill

A *Major Biological Spill* is one that requires assistance of the EHS Office and/or external emergency personnel. Major Biological Spills involve releases of BSL 2 materials outside of a biological safety cabinet, or spills of such materials that involve excessive splashing or aerosol formation.

1. Alert personnel in the laboratory of the spill, and eliminate entrance of additional personnel via notification or posting of area.

2. If any material has been splashed on you, if you have been exposed to the agent, or if any of your personal protective equipment has been breached, follow the Procedure for Exposure to Potentially Infectious Material that follows:

    1. Remove and disinfect any contaminated clothing.

    2. Notify your supervisor and the Environmental Specialist at (5-2807) or through BSU Work Control (5-5081)of the incident.

    3. If the situation involves an imminently life-threatening injury or a release outside the building; or has other catastrophic potential, call **University Police (765-285-1111 or 911).**

3. Have persons knowledgeable of the incident and laboratory available to assist EHS Office and/or emergency personnel.

Procedure for Worker Exposure to Potentially Infectious or Biological Materials

If you are exposed to any potential bloodborne pathogens or biological infectious materials, you should immediately:

1. Wash the exposed area thoroughly with soap and running water. Use non-abrasive, antibacterial soap if possible.
2. If blood is splashed in the eye or mucous membrane, flush the affected area with running water for at least 15 minutes.
3. Remove any contaminated clothing and cover with clean clothing.
4. Report the exposure to your supervisor and the EHS Office (765-285-2807) as soon as possible.
5. You must also go to the Student Health Center to request blood testing or the Hepatitis B vaccination if you have not already received it. Additional treatment or prophylaxis may be suggested depending on the exposure and the potentially infectious agent.
6. The Student Health Center has a specific set of procedures they will follow for all post-exposure cases.
7. If the Health Center is not open at the time of the incident, your supervisor will direct you to an occupational health center or the I.U. Ball Memorial Hospital emergency room.
8. Fill out an exposure report form, if you desire. This form will be kept in your personnel file for 30 years so that you can document workplace exposure to hazardous substances. This report is available from your supervisor or from BSU EHS.

Spill Response Guide No. 15:
Radiological Releases

Every effort should be made to avoid radioactive spills, inhalation, or ingestion of radioactive materials, or exposure to large doses of radiation. However, the possibility of such an event, possibly fire related, is always present. In the event of a minor mishap, the procedures to be followed are as follows:

Minor Spills

1. Notify persons in the area that a spill has occurred.
2. Prevent the spread of contamination by covering the spill with drop-absorbent paper.
3. Mark off contaminated area. Do not allow anyone to leave the contaminated area without being monitored.
4. Promptly notify and report the incident to the Radiation Safety Officer (765-285-8066, 286-1974).
5. Clean up the spill, wearing disposable gloves and using absorbent paper; ideally, this is to be performed by RSO and/or RSO's staff.
6. Put contaminated gloves and any other contaminated disposable material in bag.
7. Survey spill area with appropriate survey meter or technique. Also, check hands, clothing and shoes for contamination.
8. Allow no one to return to work in the area unless approved by the RSO.
9. Cooperate with and follow the instructions of the RSO and/or RSO's staff.

Personnel Decontamination

If personnel contamination is suspected, first identify contaminated areas with survey meter. Do not use decontamination methods that will spread localized material or increase penetration of the contaminate into the body (e.g., by abrasion of the skin). Irrigate any wounds profusely with tepid water and clean with a swab. Follow with soap or detergent and water (and gentle scrubbing with a soft brush, if needed). Decontamination of wounds should be accomplished under the supervision of a physician.
Use the following procedures on intact skin:

1. Wet hands and apply detergent.
2. Work up good lather, keep lather wet.

3. Work lather into contaminated area by rubbing gently for at least 3 minutes. Apply water frequently.
4. Rinse thoroughly with lukewarm water (limiting water to contaminated areas).
5. Repeat above procedures several times, gently scrubbing residual contaminated areas with a soft brush, if necessary.
6. If the radiation level is still excessive, initiate more powerful decontamination procedures after consultation with the Radiation Safety Officer.
7. In the unlikely event of major releases of activity through fire, explosion, etc., the following more drastic procedures are necessary.

Major Releases of Activity

1. If possible, cut off the release of radioactive materials from the source to the environment, but avoid breathing in high concentrations of radioactive material. Close windows and hood front.
2. Evacuate people from room and close doors. Remove contaminated shoes and laboratory coats at laboratory door to avoid tracking or the spreading of radioactive material.
3. Report incident as soon as possible to the Radiation Safety Officer, or if he/she is not available, to the alternate Radiation Safety Officer and to the Office of the Provost 285- 1333.
4. Report incident as soon as possible to University Police (765-285-1111 or 911)
5. If there is any possibility of airborne contamination, steps should be taken to shut off hoods and ventilation equipment of the area affected. This is done by locating the Building Mechanic, or, if that fails, the campus police will locate the appropriate building maintenance supervisors.
6. Seal doors with tape if airborne material is involved and if there is no net flow of air into room (i.e., as a result of exhaust through hoods).
7. Lock or guard the doors and post appropriate signs warning against entry.
8. Assemble in nearby room with other personnel suspected of being contaminated.
9. Wash off suspected exposed areas of the skin, if there is a delay in performing a survey.
10. Do not leave the control area until you have been thoroughly surveyed for contamination.
11. Major decontamination procedures should be attempted only by personnel experienced in radiation protection.
12. If a person should inhale, ingest, or otherwise be exposed to large doses of radiation, that individual should be taken to the Health Center and the RSO is notified.

Spill Response Guide No. 16:
Pesticide/Herbicide Releases

Pesticide spills can pose serious threats to human health and cause significant environmental contamination. A thorough knowledge of the appropriate steps to take in the event of a spill will minimize the potential for adverse effects and expensive cleanup costs. A spill kit should be maintained in storage and mixing areas. The spill kit should contain hydrated lime, activated carbon, bleach, absorbent materials, tools (shovel, scoops) and personal protection equipment (PPE). Environmental contamination and personnel exposure can greatly increase when delaying response to a pesticide spill.

Spills may be relatively minor, involving one or a few leaking containers. However, major spills, such as when a sprayer overturns spilling its contents, can and do occasionally occur. Regardless of the magnitude of the spill, the overall objectives of a proper response are the same as for any chemical spill – using the three steps, or the **"Three C's"** of spill management"

CONTROL *the spill.*
CONTAIN *the spill.*
CLEAN IT UP*.*

Control

When attempting to control the flow of the chemical, do not expose yourself unnecessarily. Always carry protective clothing and equipment when transporting pesticides. Use this equipment when pesticide emergencies occur.

1. **Stop the Spill**. Turn off the pump, pinch the hose closed, place a leaky container inside a larger container -- do whatever you need to do to limit the size and duration of the initial release. Stopping the spill is usually simple, but occasionally is best left to experts; for example, when a spray rig overturns—call for assistance while taking initial actions.

2. **Isolate the spill area.** Rope, cordon, or mark off the contaminated area; keep people at least 30 feet away from the spill. Avoid contact with any drift or fumes that may be released. Do not use road flares if you suspect the leaking material is flammable. At times, evacuating people that are downwind from the spill may be necessary. Do not leave the spill site until someone relieves you. Someone should be present at the spill site continuously until the danger is removed, the chemical is cleaned up, and the area is decontaminated.

3. **Stop the Spread.** The spread of spilled products formulated as dusts, wettable powders, or granular materials can be reduced by lightly misting the material with water or covering the spill with some type of plastic cover. However, if a plastic cover is used, it will be contaminated and should be discarded according to the disposal instructions on the product label.
4. **Identify the chemical.** If it can be accessed safely, read the container label for the product physical and health hazards and spill control measures. Otherwise, refer to the Material Safety Data Sheet (MSDS) for the product.

5. **Decontaminate and Give First Aid.** The safety of people in the spill site is your first priority. Anyone contaminated by the spilled pesticide should remove the contaminated clothing, wash down, and receive first aid as appropriate (check the label for first aid instructions).

Contain

After the source of the leak has been controlled as well as possible, contain the spilled material in as small an area as possible.

1. With liquid spills, construct a dam to prevent the chemical from spreading or from moving into other occupied areas. It is particularly important not to allow any chemical to get into any streams, ditches, or other bodies of water, including storm or sanitary sewers. Do not hose down the area; this will cause further spread of the chemical. Create dams and dikes with sand, sorbent snakes, kitty litter, special spill control absorbents; or, as a last resort, rags or paper towels.

2. If floor drains, or catch basins, are in the spill area they should be covered or a berm created around them using absorbents, soil, or another media in order to prevent the spilled pesticide from escaping through the drainage way.

3. Liquid spills can be further contained by spreading absorbent materials such as fine sand, vermiculite, sawdust, or clay over the entire spill. For absorbing small spills and minor leaks, kitty litter or clay based absorbents, are particularly useful. (NOTE: Avoid the use of sawdust or sweeping compounds if the pesticide is a strong oxidizer. Such a combination presents a possible fire hazard.)

4. For spills of liquids outdoors you can also create a trench in the soil around the spill area and/or build a dike of soil in order to capture the spilled material.

5. Dry spills (wettable powders, dusts, granules) should be gently covered with a tarpaulin pending recovery. The spillage may be lightly misted with water to prevent air dispersion, but the minimum amount of water should be used so as not to further contaminate the soil, encourage runoff, or increase the amount of material that will need removal and disposal.

Clean Up

With pesticides, all attempts should be made to recover the spilled material so that it may be used in accordance with the labeled directions for the product.

1. After the spill has been contained, if possible, pump or vacuum up as much of the liquid as possible into a tank designed for this purpose or another empty spray tank or one with the same material or a compatible pesticide, so that it may be applied to a labeled site.

2. After the material is picked up, spread absorbent material over the contaminated area, if not done so previously. Sweep up the absorbed pesticide and place it into a heavy duty plastic bag. Continue to add absorbent material until all the liquid has been soaked up.

3. After these preliminary stages of cleanup have taken place, it may be necessary to further decontaminate and neutralize the area. This is particularly recommended if highly hazardous pesticides are involved. Often either a bleach solution or hydrated lime is effective for pesticide decontamination. *Do not use bleach and lime together as this is a hazardous combination.* Work the decontamination reagent into the spill area with a coarse broom. Add absorbent material to soak up the now contaminated cleaning solution. Sweep and dispose of the contaminated material. Repeat the procedure until the area is thoroughly decontaminated.

4. When large amounts of pesticides are spilled on soils, effective decontamination is often not possible. In these instances, the top 2-3 inches of soil should be removed and disposed of. Cover the remaining soil with at least 2 inches of lime, then cover with fresh topsoil.

5. Soils contaminated as the result of application errors or minor spills can sometimes be cleaned by applying activated charcoal to the contaminated surface immediately after the misapplication or spill. The charcoal can adsorb or tie up enough chemical to avoid significant plant injury and long-term contamination. However, applying activated charcoal to areas where large spills have occurred will do little to reduce soil contamination and subsequent plant damage.

6. Clean any vehicles and equipment that were contaminated either as a result of the original accident or during the clean-up procedure. Before you begin, however, be sure you are properly clothed and protected to avoid contact with the chemical. Use ordinary household bleach in water (approximately 30 percent bleach) or an alkaline detergent (dishwasher soap) solution to clean your equipment. *Do not mix bleach and alkaline detergent together as this is a hazardous combination.*

7. Porous material and equipment such as brooms, leather shoes, and cloth hats cannot be effectively decontaminated and must be discarded or destroyed. Also, do not save disposable garments and gloves or badly contaminated clothing. These items should be properly disposed of immediately after completing the cleanup.

A pesticide spill kit should be available wherever pesticides are stored or handled. A list of common items comprising a pesticide spill kit may be found in **Appendix B**.

Spill Response Guide No. 17:
Wastewater or Potentially Infective Releases

The following are recommended procedures for cleaning up untreated or inadequately treated human sewage (wastewater), spilled to, or deposited inside, structures or on the exterior ground or other surfaces surface. The procedures apply to both sanitary wastewater and gray water (from showers, sinks, lavatories, and laundry areas).

The risk to health depends on the microbes present, duration of exposure and method of exposure. Microbes in raw sewage can enter the body via the nose, mouth, open wounds or by inhalation of aerosols or dusts. The most common modes of infection are through drinking contaminated water or hand to mouth transmission. Skin contact alone does not pose a health threat unless you have an open wound. Protective clothing (at a minimum, rubber or latex gloves and rubber boots) should be worn when cleaning up a sewage spill. (Dispose of gloves and wash rubber boots when leaving spill site). Eye and respiratory protection may be advisable.

Indoor Spills, Backups, or Overflows

1. Restrict the affected room or area to authorized personnel.
2. Remove any gross contamination and dispose to a sanitary sewer or drain and not into storm drains or landfill. Dehumidifiers should be used when available.
3. Open all windows and use fans where available to increase ventilation and reduce humidity.
4. Excess water should be removed by pumps, wet vacs or mopping, empty into sewage system and not into storm drains.
5. Discard all potentially contaminated food, food containers, cosmetics, medicines and medical supplies, stuffed toys, mattresses and pillows, upholstered furniture, carpet padding, cardboard and other objects that are porous or difficult to clean.
6. Where possible discard large carpets, foam rubber and books and paper products. Otherwise professional cleaning is required.

7. Place discarded contaminated materials in plastic bags for later cleaning or disposal.

8. Plasterboard, wooden paneling, baseboards, coving, and other absorbent materials should be discarded if they have absorbed contaminated water.

9. Wash affected areas and furnishings with a detergent solution to remove contamination, then disinfect with an approved disinfectant or solution (see disinfection principles below), rinse with clean water and allow to dry thoroughly, preferably outside where UV light aids decontamination.

10. Avoid spreading contamination when moving furniture etc. by placing plastic sheeting on the floor of clean areas.

11. Rinse fabrics with clean water then wash in a hot wash cycle with bleach added. Note that non-colorfast items may fade or change color. Dry-cleaning or steam-cleaning are also effective, however cleaning agencies may refuse to deal with contaminated items.

12. Clean all equipment used and personal protective equipment with a detergent then disinfect (or use a combined product) or discard if possible (eg. mop heads).

13. Ensure surfaces are completely dry before replacing carpeting, plasterboard etc. to prevent mold growth occurring. This may take up to 30 days.

Outside Spills, Releases, or Overflows

1. If the area in which the spill occurred is accessible to the public or domestic pets, the contaminated area must be clearly marked or cordoned off to restrict access. Keep students and interested bystanders away from cleanup activities. Remove any gross contamination and arrange disposal at the City of Muncie wastewater treatment facility or drain into a nearby sanitary sewer if in a liquid form.

2. Clean hard surfaces such as paving, concrete and tarmac with a detergent solution then disinfect. Use only approved disinfectants or solutions.

3. Do not allow wastewater to enter the storm drains. For large spills it may be necessary to construct an impervious embankment of earth, sandbags, absorbents, or other suitable material to retain liquid. This is known as "bunding". Liquid should be disposed to sewer or a suitable temporary collection pit or vessel.

4. If the spilled material can’t be recovered using hand tools, a commercial vacuum / pump (vactor) truck should be called to remove all visible liquid and solid material.

5. When the area is visibly clean, either a chlorine / water solution (using Clorox or

an equal bleach) or hydrated lime should be applied to the spill area to disinfect.

6. Please note that both hydrated lime [$Ca(OH)_2$] and bleach solutions are caustic materials and can be dangerous to handle and apply. Lime should only be used or applied by people experienced in using this material. Do not mix cleaning / disinfecting products or chemicals. Cleaning products can react with one another to produce toxic vapor or liquid substances.

7. If the spill occurred in a populated area and odor may be an issue or within 100 feet of surface water, hydrated lime should be applied to the area in place of chlorine bleach. Enough hydrated lime should be applied to raise the pH to at least 12. The amount of lime added should only be enough to solidify or remove the liquid fraction of the wastewater spillage. By raising the pH to 12 for at least 1 hour, the area will be disinfected. The pH by can be testing using litmus paper obtained at a chemical supply facility. Because lime is a caustic material, <u>access to the area treated with lime must be restricted during the disinfection period.</u>

8. After the spill area has been cleansed (24 hours after the chlorine solution or hydrated lime has been applied), the barriers may be removed and access to the area restored.

9. Contaminated soil, sand or turf should be allowed to degrade naturally as microbes will be inactivated within several days of exposure to UV radiation from sunlight. Bacterial numbers on grass are generally reduced to background levels within 20 days. Place barriers and signs to restrict access during this time.

Disinfection Principles

Types of common disinfectants include:

- Household Bleach (5% chlorine) – 1:10 dilution in water ~ 5,000 ppm (e.g., add 1 ounce of bleach to 9 ounces of water) for disinfection of sewage, blood, and potentially infective substances. Use a 1:100 dilution in water ~ 500 ppm for disinfecting surfaces.
- Ammonia - Add six ounces to one gallon of water – ammonia cuts grease better than chlorine solutions, but is less effective as a disinfectant.
- Quaternary (Quaternary ammonium compounds or QACs) Sanitizers and Alcohols are other effective disinfectants that are readily available – follow the manufacturer directions. These are often available in convenient spray containers
- A number of other commercial disinfectants are available– glutaraldehyde, chlorine dioxide, etc., but these have specific applications and precautions for use.

- Hydrated lime may be used where solidification and deodorization of the wastewater or sludge is necessary. This material works by raising the pH of the mixture to levels that destroy microorganisms or retard their growth.

Do not mix bleach with ammonia cleaners or acidic (aqueous cleaners). The chlorine fumes are highly toxic and can be flammable depending on the mixture concentrations. All of the above are caustic (corrosive to metal and skin) and skin and eye protection; and often, respiratory protection is needed.

1. Chemical disinfectants kill or inhibit the growth of microbes. Many household products are useful disinfectants and can be used in accordance with the manufacturers label directions. Chlorine bleach (sodium hypochlorite) is the most commonly used emergency disinfectant. Do not use undiluted bleach as this can cause severe skin and respiratory problems. Quaternary ammonium compounds and alcohols are also effective disinfectants. Suitable disinfectants will bear an EPA registration number as a microbicide and directions for their use.

2. Note that normal household detergents do not necessarily kill microbes. Use only products that are disinfectants, although detergents should often be first used to clean the surfaces to be disinfected. The term anti-bacterial means that it kills bacteria but is not necessarily effective against viruses and parasites.

3. Chemical detergents and disinfectants can have varying degrees of reactivity, depending upon the active chemicals. The chemical can affect the skin, eyes and mucous membranes of the user and may affect the airways and lungs. Read the disinfectant labels and MSDSs.

4. Wash surfaces first with warm soapy water and rinse with clean water – most disinfectants are only marginally effective if organic material remains on the surfaces.

5. Wear rubber or nitrile gloves and splash goggles when working with any cleaning products.

6. Only use the disinfectant in well-ventilated areas, and be aware of the handling precautions and first aid procedures.

7. For disinfection of sewage, blood, or biological materials, apply the disinfectant to all areas of the affected surface and allow for sufficient contact time before rinsing and allow to dry thoroughly. 15-30 minutes contact time is a good guide.

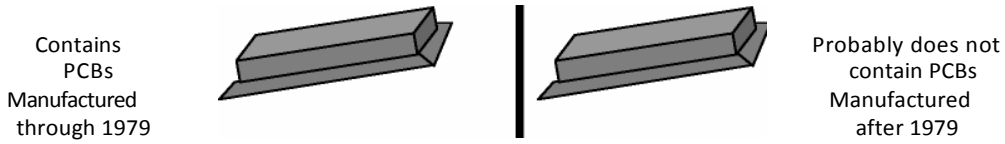
8. For surficial disinfection, at a minimum, surfaces of articles should remain moist with the disinfectant for 1-2 minutes. Allow to air dry or wait at least that long before wiping.

Spill Response Guide No. 18:
PCB Containing Light Ballasts

The primary concern regarding the disposal of used fluorescent lamp ballasts is the health risk associated with polychlorinated biphenyls (PCBs). Human exposure to these possible carcinogens can cause skin, liver and reproductive disorders. Fluorescent and high-intensity discharge lamp ballasts contain a small capacitor that may hold high concentrations of PCBs (greater than 90 percent pure PCBs or 900,000 parts per million). The chemical compounds were widely used as insulators in electrical equipment such as capacitors, transformers, switches, and voltage regulators through the late 1970s.

Use the following guidelines to identify fluorescent light fixture ballasts that contain PCBs:

- All ballasts manufactured through 1979 contain PCBs.
- Ballasts manufactured after 1979 that do not contain PCBs are labeled "**No PCBs**."
- If the ballast is not labeled "**No PCBs**", *assume* it contains PCBs.



Lamp ballasts may develop leaks over time, become physically damaged due to impacts, or overheat and cause a release of the contents including PCB containing capacitor fluid or contaminated components of the ballast.

Procedures for Leaking PCB Ballasts

1. Vacate the room or area immediately and open any windows to ventilate the room to the outside.
2. Turn off the light fixture at the switch and disconnect electricity at the fuse or breaker box. Let the ballast cool for 20 to 30 minutes before proceeding. If the room is fully ventilated, the amount of PCB contaminated particulate matter in the air should decrease significantly enough to make it negligible and decrease the risk of inhalation exposure.

3. If the incident occurred in a room that cannot be vented, the person replacing the failed ballast and cleaning up can reduce exposure by wearing a chemical cartridge respirator equipped with an organic vapor cartridge.

4. Wear rubber gloves that will not absorb PCBs (e.g. neoprene, butyl, or nitrile). Further, if you will be working directly under the fixture, consider using additional protective gear such as goggles (or a face shield) and rubber apron to help guard against possible exposure from leaking or cleanup activities. Exercise caution to avoid personal contamination (e.g. from touching your face with a contaminated glove).

5. Remove the fluorescent lamp.

6. Recheck that the power is off at the fuse or breaker box. Remove the metal cover over the wiring and ballast unit, loosen the ballast unit by taking out the metal screws that hold it to the end of the fixture; cut the electrical wires going to the ballast and remove the ballast.

7. Proceed to clean up leaks using the following guidelines:

    a) PCBs that leak onto nonabsorbent surfaces such as table tops and uncarpeted floors should first be cleaned up by wiping with a rag or paper towel or by scraping with a putty knife, if hardened. Avoid smearing the PCBs around. This would only contaminate a larger area.

    b) Surfaces should then be thoroughly cleaned twice using an appropriate solvent or detergent. Only certain solvents are effective in cleaning up spilled PCBs. These include mineral spirits, deodorized kerosene, diesel fuel, turpentine, hexane, and rubbing alcohol. Certain detergents containing trisodium phosphate (such as Soilex or Spic 'n Span) may be used. However, they should be used only at full strength and applied with a damp rag rather than diluted in a bucket. The cleanup solvent solution will become contaminated and can only be disposed by being placed in an appropriate container and characterized for proper disposal by the EHS Office.

    c) For leaks onto absorbent material such as drapes and carpets, there is no reliable way to clean and decontaminate the material. In the case of rugs and fabrics, the material should be cut away in a six-inch radius around the contaminated point(s). In areas where foot traffic has spread contamination, the entire carpet should be disposed.

    d) Proper disposal procedures for all such materials are described in the following item. Associated surfaces, such as flooring under contaminated carpeting, should be thoroughly cleaned with a solvent or detergent as previously described. (One should discard the entire light fixture instead of decontaminating the unit. This will eliminate the chance of skin coming into direct contact with the PCBs while cleaning the inside of the light fixture.)

8. Contaminated materials (ballasts, rags, clothing, gloves, drapes, carpets, etc.) should be packed into crumpled newspapers or other absorbent materials (sawdust, kitty litter, vermiculite, soil, etc.) and placed in a double thickness plastic bag. It will then be packed in 55-gallon drums for transportation according to PCB regulations. When the cleanup process is completed, and contaminated materials and protective clothing have been packed for disposal, personnel should wash their hands thoroughly with detergent. Continue to ventilate the room for 24 hours before reentry.

9. Depending on the circumstances and location of the spill, the EHS Office may perform wipe tests to ensure that contaminated surfaces have been adequately cleaned and any residual surface PCB concentrations are within acceptable contact limits.

7. Reporting Spill Incidents

All chemical and biological spills or exposures and gas releases must be reported verbally, in writing, or via email to the Environmental Specialist (5-2807, tlrussell@bsu.edu), or if no answer, through BSU Work Control (5-5081). All radiological releases must be immediately reported to the BSU Radiation Safety Officer (5-8066). The report should include the date, time, location, description of the spill (e.g. type and quantity), personnel injuries or exposures, equipment damage, any escape of material (e.g. into sewers or bodies of water), witnesses, and persons involved in supervision and clean-up of the spill. The report should be submitted to EHS as soon as possible following the spill--regardless of whether or not the **University Police (765-285-1111 or 911)** were notified.

The purpose of this reporting procedure is not to place blame, but to allow all required reporting to be completed, to ensure that the spill response and cleanup were adequate, and to identify measures that may prevent similar incidents in the future.

Depending on the chemical or material released, its quantity and location, any injuries or exposures that may have occurred, the environmental media affected, and a number of other factors, reporting to one or more regulatory agencies may be required under local, state, or federal regulations. Failure to make the required reports within the necessary timeframes, and to ensure that the necessary cleanup procedures were completed, can subject the University to significant penalties and corrective actions. Many times, a follow-up written report must be submitted regarding the spill or release.

Reporting can be triggered by even small amounts (less than 1 pound) of certain chemicals, or by any release that is not promptly and effectively cleaned up. The University Police or EHS Office may notify any of the following agencies or entities for assistance or to satisfy regulatory reporting requirements:

Muncie Fire Department
Muncie Bureau of Water Quality
Delaware County Emergency Management Agency
Indiana State Department of Health
Indiana Department of Natural Resources
U.S. Environmental Protection Agency, Region 5
National Response Center
BSU Crisis Management Team

An emergency telephone listing follows. Contact with these entities in the event of a spill or release is restricted to the University Police, the EHS Office, or other authorized BSU representatives.

BSU Emergency Phone List

University Police	**285-1111 or 911**
Fire Department	**285-1111 or 911**
EMS	**285-1111 or 911**
IU Ball Memorial Hospital (Switchboard)	**765-747-3111**
Vectren (gas supplier)	**800-227-1376**
National Response Center (NRC)	**800-424-8802**
IDEM Emergency Response	**888-233-7745**
Delaware County Sheriff	**765-747-7878**
Indiana State Police (Pendleton District)	**800-527-4752**
Delaware County Emergency Management Agency	**765-747-4888**
BEST Environmental (contractor)	**888-561-BEST**
Poison Control	**800-222-1222**

	Campus Phone	After Hours
Campus On-Call Personnel		**748-3802**
Facilities Planning & Management	**28(5-5082)**	**285-1111***
Environmental Health and Safety	**28(5-5081)**	**285-1111***
Emergency Coordinator – EHS	**28(5-2807)**	**285-1111***
University Health Center	**28(5-8431)**	
BSU Crisis Management Team	**28(5-8000)**	**285-1111***
Campus Operator (weekends)		**289-1241**

University Police will contact appropriate personnel after normal working hours.

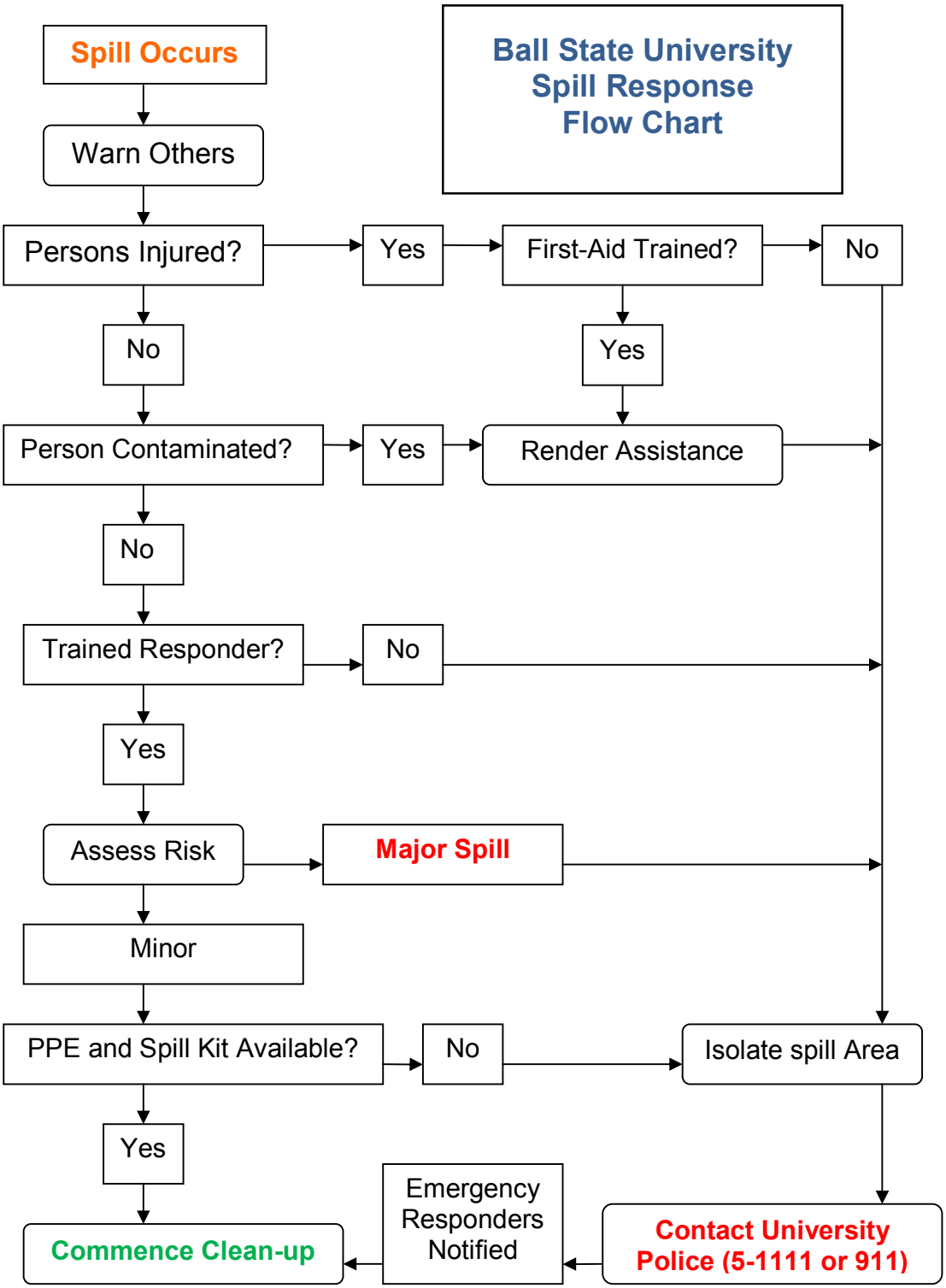
Acknowledgements / Bibliography

Much of this document and format is based on a Plan developed by the University of Alberta Office of Environmental Health and Safety.

The Compatible Storage Group Classification System in Appendix C was developed by Stanford University.

The Spill Response Procedure summary in Appendix D was modified from a chart originated by the Department of Environmental Health & Safety at Stony Brook University.

Appendix A: Ball State University Spill Response Flowchart.



Appendix B: Chemical Spill Kits

Spills kits can be assembled from individual parts or suitable spill kits may be purchased from most chemical or safety supply companies. If you do chose to purchase a commercial kit, however, ensure that it contains all the necessary items as listed below. In addition, note that most commercial spill kits and the lists below are generic; it is important that spill kits be tailored to meet the specific spill control needs of each lab, work area, or department.

1) Small Chemical Spill Kit

A small chemical spill kit should be available in each lab or work area that uses chemicals. It can be used for immediate response to most spills, and to clean up small, low hazard spills that may occur and do not require specialized personnel protective equipment or spill control supplies. Although most small spill kit components are common items found throughout laboratories, and several shops, there must be a consolidated spill kit for emergency use. The spill kit should be prominently labeled and located for ease of access in an emergency.

a) Personal Protective Equipment
   - Chemical Splash Goggles.
   - Lab Coat or Coated Tyvek.
   - Heavy Nitrile or Neoprene Gloves.

b) Spill Clean Up Equipment
   - Plastic Dust Pan & Brush.
   - Heavy Plastic Bags (at least 3 mil thickness).
   - Universal Spill Absorbent (1:1:1 mix of sodium carbonate: kitty litter: sand), Spill pillows, socks, or other suitable spill absorbent (enough to absorb a spill of the largest container in the work area).
   - Other absorbents / neutralizers as required for the chemicals in the work area or lab.
   - Drain covers (if floor, sink, or yard drains are in the vicinity)

The above may be conveniently stored in a labeled plastic container that can also be used for containment and disposal of the spill cleanup wastes. Other chemically resistant gloves or clothing may be necessary depending on the particular chemicals used or stored in the worksite, laboratory, or area.

2) Large / Departmental Chemical Spill Kit

Every department that has significant quantities of chemicals should have one or more large chemical spill kits containing PPE and spill cleanup supplies to complement (in addition to) the above described smaller worksite kits, and as backup supplies for outside responders (i.e. EHS). The number and location of these kits will depend on the size of the Department, whether the department is located on several floors, the number of chemicals in use, etc. In general, it is recommended that there be a large spill kit for at least each floor of each building.

a) Personal Protective Equipment (potential responders must be PPE trained)

- Half-mask air purifying respirator (2)
- Multigas Type Respirator Cartridges (6)
- Safety goggles (2)
- Face-shield (1)
- Disposable coveralls (Tyvek™) (6) – coated if necessary for the chemicals used
- Gloves
  - Neoprene (4)
  - PVC (4)
  - PVA (4)
  - Nitrile (4)
- Plastic shoe covers (box)
- Duct tape (roll)
- Alcohol swabs (box) or respirator disinfectant

b) Spill Clean Up Equipment

- Chemical absorbents (0.5 cubic foot)
- Specific absorbent/neutralizers for acids/caustics, formaldehyde, hydrofluoric acid, etc., as needed)
- Plastic pail (5-gallon) with lid (2)
- Felt marking pen (2)
- Heavy Plastic Bags; at least 4 mil thickness (12)
- Plastic bucket with handle (1)
- Long handle sponge mop (1)
- Extra sponges (4)
- Plastic dust pan (1)
- Broom (1)
- Duct tape (roll)
- Detergent (Alconox or equivalent - box)
- Citric Acid (500g)
- Sodium Bicarbonate (500g)
- Sodium Thiosulfate (500g)
- Spill Response Guideline

3) Pesticide/Herbicide Spill Kit(s)

A spill kit for pesticides can be purchased or easily assembled and should contain the following items:

1. Personal protective clothing and equipment--gloves, footwear, and apron that are chemically resistant; disposable coveralls; protective eyewear; and a respirator (if trained in its use and in the BSU Respiratory Protection Program).
2. Containment “snakes” or “tubes” or “spill pillows” to confine the leak or spill to a small area.
3. Loose absorbent materials, such as, absorbent clay, kitty litter, activated charcoal, and vermiculite.
4. Bleach solution
5. Hydrated lime--$Ca(OH)_2$
6. Alkaline detergent (Alconox® or household dish detergent)
7. Plastic cover for dry spills
8. A spray bottle filled with water to mist dry spills
9. “Caution” or “Hazardous Material” tape to isolate the area
10. A shovel, broom, and dustpan
11. Heavy duty disposal bags with ties
12. Duct tape—a universal tool
13. “Leak Stop” epoxy and/or drum repair kit
14. Sturdy plastic container that will hold the entire volume of the largest pesticide container being handled and that can be tightly closed (can also be used to store the contents of the spill kit).

Most of the above items may be found in any spill kit, perhaps with the exception of the bleach, alkaline detergent, and hydrated lime.

4) Fuel / Oil / Waste Area Response Spill Kits

BSU maintains spill response containers adjacent to all significant fuel and oil storage locations, and at major utility or physical plant locations on the campus. These are located as follows and contain the indicated spill response supplies and PPE equipment:

<u>Vehicle Fueling Locations</u> (SV Bus Garage, North Grounds, North and South Landscape Buildings, Heath Farm)

Number	Item	Description
1	Container (Drum)	55-gallon steel, open-top, 3-ring waste container, or, preferably, a 65-gallon poly overpack drum, yellow, with lid and with signage as follows: "*Fuel Spill Response Kit*"
3	Absorbent Socks*	3" diameter x 10" length oil sorbent (blue)
1 roll	Absorbent Sheets*	14" x 150' (serrated) petroleum sorbent (on bottom of drum)
6	Absorbent Pillows*	10" x 10" oil absorbent pillows
1	Bag of Absorbent (granular)	40 pound bag of oil dry (on bottom of drum)
1	Drain Seal	24"x24" synthetic seal for drain cover (in cardboard box)
1	Shovel	Polypropylene - 2 piece (~14"x11" blade)
4	HM Disposal Bags	6 mil, 38"Wx68"L (fits 55 gal drum)
1	Pail	5-gallon yellow/black pail with lid (holds gloves, suits, etc.)
4	Pairs of Gloves	Ultraflex II Neoprene Gloves – 14" length 2 pair large and 2 pair of extra-large
2	Pairs of Work Gloves	Rubber coated palm/fingers work gloves – 1 large, 1 X Large
6	Coveralls	Tyvek coveralls – 2 Large, 2 X Large, and 2 XX Large
2	Pairs of Overboots	Black over boots – 1 Large, a X-Large
2	Pairs of Goggles	Chemical Splash Goggles (over prescription glasses) type
3	"Stop Leak" tubes	Epoxy stop leak putty** (to be kneaded for application)
1 roll	Duck Tape	Silver Duck (Duct) Tape

***** These absorbents are "oil only" – they will absorb oil, solvents, and fuels – but not water.

****** Mix desired amount of putty to uniform color – apply to leak – hardens in minutes even if wet.

<u>Heat Plant, Coal Yard, North CSA and Waste Shed</u>

Heat Plant -1 Oil Only and 1 MRO (oils, solvents, coolants, and water) Wheeled Overpack Spill Kit
Chill Plant - 1 Oil Only, 1 MRO, and 1 HazMat (acids and bases) Wheeled Overpack Spill Kit
Coal Yard – 1 Oil Only Wheeled Overpack Spill Kit
Waste Shed – 1 MRO Wheeled Overpack Spill Kit; 1 HazMat Refill Kit ,and 1 Oil Only Refill Kit

Oil Only (no water abs.)	MRO (oil, water, solvents, coolants)	HazMat (acids and bases)
(3) 5"x10' booms	(16) 3"x48" socks	(12) 3"x46" socks
(3) 3"x10' booms	(10) 3"x10' socks	(6) 3" x 10' socks
(60) 20"x15" absobents	(60) 15"x20" pads	(2) 5"x10' socks
(10) Disposal bags and ties	(8) 21"x17" pillows	(75) 20"x15" pads
ERG Guidebook	(50) wipers	(7) 16"x17" pillows
Instructions	(10) Disposal bags and ties	(10) Disposal bags and ties
	ERG Guidebook	ERG Guidebook
	Instructions	Instructions

Note: *The above kits are contained in 95-gallon wheeled overpack containers that can then be used for disposal purposes.*

Cooper Science Building Waste Accumulation Room

Number	Item	Description
1	Container (Drum)	30-gallon plastic drum with screw lid
2	Absorbent socks - blue	For oils, coolants, solvents, and water
2	Absorbent socks - pink	For acids and bases
1	Absorbent pillows - blue	For oils, coolants, solvents, and water
1	Absorbent pillows - pink	For acids and bases
1	Epoxy putty	Tube of Stop-leak
1	Trash Bag	Yellow hazardous waste bag
6	Absorbent pads - blue	For oils, coolants, solvents, and water
6	Absorbent pads - pink	For acids and bases
10	Absorbent pads- gray/white	For any liquids or unknowns
1	Pair of overboots	Nitrile boots for over shoes
1	Tyvek suit	Particulate resistant coveralls
2	Pairs chem resistant gloves	"Silver Shield" chemically resistant gloves
1	Pair goggles	Chemical splash protective goggles
3	Corrosive neutralizers	Containers for hydrofluoric, formaldehyde neutralization

Other Supplies and Locations: North Grounds Building, Heath Farm, and/or Waste Shed

Number	Item	Description
2	Container (Drum)	30-gallon plastic drum with screw lid
5	55-gallon drums	Open and closed head steel and plastic drums
50	Absorbent sheets	For oils, coolants, solvents, and water
40	Absorbent pillows	Oils, coolants, and solvents
25	Tyvek suits	Particulate resistant coveralls – assorted sizes
4	Drain covers – 30 inch	Liquid tight sealing drain covers for drains
10	Bags of absorbent	40-pound bags of absorbents and oil dry
36	Oil booms	8-inch x 10 foot oil-only absorbent booms -12 gal capacity (North Grounds)

Appendix C: Chemical Compatibility Chart and Chemical Storage Array Pictorial

1	Inorganic Acids	1																						
2	Organic Acids	X	2																					
3	Caustics	X	X	3																				
4	Amines & Alkanolamines	X	X		4																			
5	Halogenated Compounds	X		X	X	5																		
6	Alcohols, Glycols, and Glycol Ethers	X					6																	
7	Aldehydes	X	X	X	X		X	7																
8	Ketone	X		X	X			X	8															
9	Saturated Hydrocarbons									9														
10	Aromatic Hydrocarbons	X									10													
11	Olefins	X			X							11												
12	Petroleum Oils												12											
13	Esters	X		X	X									13										
14	Monomers and Polymerizable Compounds	X	X	X	X	X	X								14									
15	Phenols			X	X			X							X	15								
16	Alkylene Oxides	X	X	X	X		X	X							X	X	16							
17	Cyanohydrins	X	X	X	X	X		X									X	17						
18	Nitriles	X	X	X	X												X		18					
19	Ammonia	X	X					X	X					X	X	X	X	X		19				
20	Halogens			X			X	X	X	X	X	X	X	X	X	X				X	20			
21	Ethers	X													X						X	21		
22	Phosphorus, Elemental	X	X	X																	X		22	
23	Sulfur, Molten									X	X	X	X				X						X	23
24	Acid Anyhdrides	X		X	X		X	X							X		X	X	X	X				24
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

Chemical Storage Compatibility Chart

X Represents Unsafe Storage Combinations

☐ Represents Safe Storage Combinations

Stanford University Compatible Storage Group Classification System
Should be used in conjunction with specific storage conditions taken from the manufacturer's label and MSDS.

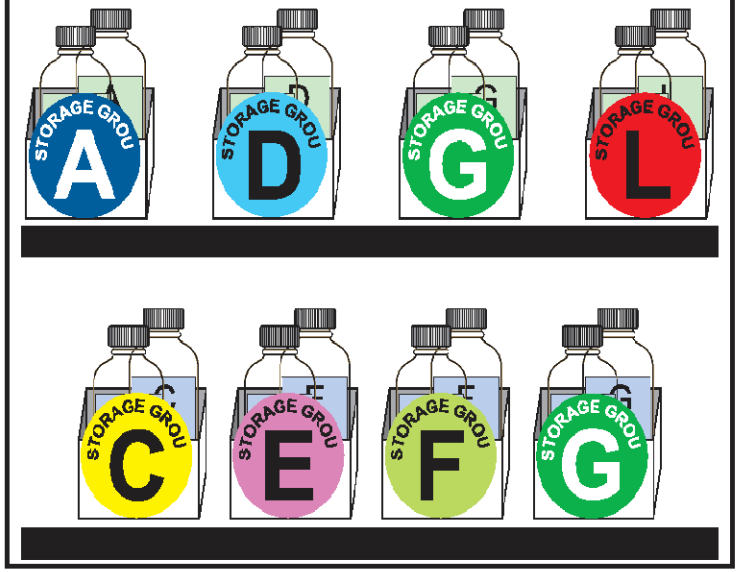
STORAGE GROUPS

Store chemicals in separate secondary containment and cabinets
Find Storage Group information in Chemtracker:
https://chemtracker.stanford.edu/chemsafety

A	Compatible Organic Bases
B	Compatible Pyrophoric & Water Reactive Materials
C	Compatible Inorganic Bases
D	Compatible Organic Acids
E	Compatible Oxidizers including Peroxides
F	Compatible Inorganic Acids not including Oxidizers or Combustible
G	Not Intrinsically Reactive or Flammable or Combustible
J*	Poison Compressed Gases
K*	Compatible Explosive or other highly Unstable Material
L	Non-Reactive Flammable and Combustible, including solvents
X*	Incompatible with ALL other storage groups

***Storage Groups J, K and X: Contact EH&S @ 3-0448**
For specific storage - consult manufacturer's MSDS

If space does not allow Storage Groups to be kept in separate cabinets the following scheme can be used with extra care taken to provide stable, uncrowded, and carefully monitored conditions.



Storage Group X must be segregated from all other chemicals.

Storage Group B is not compatible with any other storage group.

Last updated 04/17/09

Appendix D: Spill Response Procedures and Sign

BSU SPILL RESPONSE PROCEDURES

REMEMBER: DO FIRST AID FIRST, THEN ASSESS THE SPILL – Is the Spill Major or Minor?

Minor Spill - Definition

If Department, shop, lab, or local staff have the training, protective equipment, and spill response supplies to control and cleanup the release, the spill is incidental to their work, and the spill is:

- Less than 1 gallon spill of a low toxicity chemical
- Less than 1/2 quart (500 ml) of a highly hazardous chemical (carcinogen, reproductive hazard, or has NFPA/HMIS health or physical hazard rating of 3 or 4)
- Blood and/or body fluids or class 1 or 2 biological material,
- Not a likely release to a waterway or drain, **and:**
- **Without an injury, chemical or biological exposure, and no fire or explosion has occurred!**

Minor Spill Response

1. Notify fellow workers or students in vicinity of spill.
2. Secure area, by restricting access and posting signs.
3. Remove any potential ignition sources, unplug nearby electrical equipment, and ventilate the area if safe and possible.
4. Gather and review safety information on spilled chemical. Review chemical's Material Safety Data Sheet (MSDS) for a hazard assessment and other pertinent information.
5. Refer to the *BSU Spill Preparedness &Response Guide*
6. Locate an appropriate Spill Kit, if available.
7. Don appropriate personal protective equipment (PPE) which usually includes chemical splash goggles, gloves, apron, coveralls, or lab coat. If high splash potential exists, also wear a face shield and protective clothing.
8. Confine and contain spill. Cover spill with appropriate absorbent material. Neutralize acid and base spills prior to cleanup. Protect any sink, floor, or yard drains.
9. Clean up spill using a scoop or other suitable item and place material in appropriate disposal container.
10. Decontaminate spill surface with mild detergent and water, as appropriate. Carefully remove PPE, place non-reusable items in disposal container and thoroughly wash hands.
11. Label the cleanup waste container. Contact EH&S Office to arrange for waste disposal.
12. Investigate cause of spill and review with EHS Office. Document spill, response, and follow-up with staff.
13. Replenish spill kit or supplies.

Major Spill - Definition

A chemical or biological spill or release involving any of the following:

- Injury, fire, explosion, or exposure to hazardous chemical
- More than 1 gallon spill of a low toxicity chemical
- Over 1/2 quart (500 ml) of a highly hazardous chemical
- Unknown chemical, product, or material
- Biological spill of a quantity or location needing assistance.
- Mercury, hydrofluoric acid, reactives or pyrophorics
- Beyond training or capability of Department or local staff

Major Spill Response

1. **Notify and evacuate fellow workers to a safe area. Post the attached sign or isolate the area.**

DO NOT ATTEMPT TO CLEAN A MAJOR SPILL ON YOUR OWN!

2. If spill poses a fire hazard--activate nearest fire alarm. Call BSU University Police at 911 (765-285-1111) and give details of spill including specific location, chemical, quantity, and if anyone is injured.

3. In case of an **injury or chemical contamination**:
   a. Wear PPE and move victim from spill area.
   b. If first aid trained, administer first aid as appropriate. Assist person to Health Center or Emergency Department (after hours) for treatment. If possible, bring chemical label or MSDS.
   c. Locate nearest emergency safety shower or eyewash. Remove contaminated clothing and flush affected areas (eyes or skin) with copious amounts of water for 15 minutes. Use soap on skin surfaces.

4. University Police will contact EH&S and either EHS staff or outside personnel will respond to the spill.

5. Staff knowledgeable about the spill should provide responders with all pertinent information and MSDS.

6. The responders or designee will inform staff when it is safe to re-enter spill area.

7. Investigate cause of spill. Complete Incident Report, response and follow-up with staff and contact EHS Office.

For further information contact:
Office of Environmental Health & Safety
Ball State University
Muncie, Indiana 47306
Phone: 765-285-2807
FAX: 765-285-6607
tlrussell@bsu.edu

CAUTION

SPILL HAZARD

AUTHORIZED PERSONNEL O N L Y

[Contact BSU EHS Office at 765-285-2807]