



**NORTHEAST STATE**

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# **CHEMICAL HYGIENE PLAN**

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## CHEMICAL HYGIENE PLAN

Purpose .....	1
Responsibilities .....	1
Policy.....	2
Program Administration.....	2
Procurement.....	2
Chemical Storage.....	3
Flammable and Combustible Liquids.....	3
Water Reactive Chemicals.....	3
Shock Sensitive Chemicals.....	3
Compressed Gases .....	4
Transporting Chemicals .....	4
Engineering Controls.....	4
Chemical Hoods.....	4
Glove Boxes.....	5
Local Exhaust Ventilation.....	5
Air Balance.....	5
Administrative & Work Practice Controls .....	5
Protective Clothing and Equipment.....	6
Information and Training .....	7
Personal Hygiene.....	8
First Aid .....	8
Medical Surveillance .....	9
Chemical Waste Disposal .....	9
Chemical Spills Emergencies.....	10
Fires .....	10
Ventilation Failure .....	11
Housekeeping .....	11
Special Procedures for Handling Acutely Toxic Compounds, Chemical Carcinogens and Reproductive Toxins.....	11
Engineering Controls.....	12
Administrative and Work Practice Controls.....	12

## **Purpose**

The purpose of the Northeast State Community College Chemical Hygiene Plan (CHP) is to protect employees and to reduce the risk of injury from chemical hazards associated with particular laboratories. This is accomplished by establishing responsibilities, policies, and procedures for handling hazardous chemicals and through the development and implementation of work practices and control measures expressly tailored to the various laboratories present at the college. Additionally, this plan serves as a guide for the various departments as they develop their specific Chemical Hygiene Plans.

## **Responsibilities**

The President of Northeast State Community College is ultimately responsible for the safety of all employees. The President oversees the administration of safety policies through the normal chain of authority within the institution.

The vice president for Academic Affairs is responsible for laboratories, which utilize hazardous chemicals.

The vice president for Business Affairs is responsible for overseeing the director of Police and Safety in developing and implementing the overall safety program for the college. Additionally, the vice president for Business Affairs is responsible for all administrative support departments, which may generate or store hazardous chemicals.

The director of Police and Safety will:

- Conduct periodic inspections of all laboratories and facilities where hazardous chemicals are used or stored.
- Assist Supervisors, Directors, and Division Chairs in the development of their SOP's.
- Investigate all reported accidents that result in exposure to hazardous chemicals.
- Provide guidance on hazardous waste handling and disposal.

Supervisors, Directors, and Division Chairs that work with hazardous waste shall:

- Develop and implement steps for handling hazardous chemicals in their designated laboratory in accordance with established hazardous waste manuals.
- Review their Chemical Hygiene Plan (CHP) at least annually and recommend changes to the director of Police and Safety.
- Review Standing Operating Procedures (SOPs) for all laboratory operations using hazardous chemicals.
- Maintain a master hazardous chemical list for their respective laboratories.
- Report hazardous conditions, exposures, or abnormal circumstances associated with an operation to the director of Police and Safety.
- Ensure that a SOP is prepared for all laboratory or administrative operations using hazardous chemicals.
- Ensure employees who use or handle hazardous chemicals have received training as specified in the Hazardous Waste Management Manual.

- Ensure that employees are provided and have received adequate training in the use of protective clothing and equipment necessary for the operation.
- Perform regular inspections of laboratory operations using hazardous chemicals to ensure compliance with the SOP, the CHP, and applicable regulations.
- Ensure their laboratories maintain a current Hazardous Chemical List. Provide a copy of the list to the director of Police and Safety.
- Report hazardous conditions, exposures, or abnormal circumstances associated with an operation to the director of Police and Safety.

Laboratory workers and other individuals shall:

- Plan and conduct laboratory operations using hazardous chemicals in accordance with established procedures.
- Report hazardous conditions, exposures, or abnormal circumstances associated with an operation to their supervisor.
- Manage laboratory waste in accordance with applicable SOPs.

### **Policy**

Supervisors, Directors, and Division Chairs establish compliance procedures for the safe use of hazardous chemicals in the laboratory. Chemical exposure shall be minimized through the use of engineering controls, work practices, and protective equipment and clothing.

Laboratory personnel shall not be exposed to airborne concentrations, which exceed the more stringent of either the Permissible Exposure Limit (PEL) or Threshold Limit Value (TLV) for a specific compound or mixture.

Acutely toxic compounds, carcinogens, and reproductive toxins shall be handled using necessary special procedures.

### **Program Administration**

Standard Operating Procedures shall be prepared for each laboratory operation using hazardous chemicals. A copy of the SOP will be provided to the director of Police and Safety.

The director of Police and Safety shall conduct periodic safety inspections in each laboratory. Any deficiencies will be reported to the appropriate vice president for corrective action.

### **Procurement**

Personnel should order the smallest quantity necessary to complete the work.

Personnel who initiate purchase requests should review health and safety data on chemicals prior to ordering to determine any special requirements for handling, storage, or disposal. Staff and faculty should substitute non-hazardous chemicals whenever possible.

Material Safety Data Sheets (MSDS) for chemicals used at Northeast State must be readily available for review in the area they are used. Departments should do an annual inventory of all MSDS in June to determine all MSDS are on hand. If a department cannot obtain an MSDS they should contact the director of Police and Safety immediately.

All containers of chemicals received for use should:

- Be clearly labeled as to contents.
- Identify appropriate hazard warning.
- List the name and address of the manufacturer/importer/or responsible party.
- Be inspected upon receipt to ensure they are intact and not leaking. Damaged or unlabelled containers should not be accepted.

Note: Under no circumstances are marked bottles to be filled with any chemicals other than what is on the label.

### **Chemical Storage**

Chemical storage inside the laboratory should be limited to those chemicals necessary for work in progress. Central storerooms shall be used when they are available.

Chemicals shall be stored according to the compatibility categories.

Chemicals shall be inspected at least semiannually to determine their condition. Corroded or leaking containers should be turned in as hazardous waste.

### **Flammable and Combustible Liquids**

The quantity of flammable and combustible liquids stored in a laboratory shall not exceed 60 gallons or one month's supply, whichever is less.

Flammable and combustible liquids shall be stored in glass, metal, or plastic containers that meet the requirements of NFPA 30.

Flammable and combustible liquids shall be stored in approved cabinets designed in accordance with NFPA 30. Cabinets should not be located adjacent to an exit or in a stairwell.

Refrigerators and freezers used to store flammable liquids shall be explosion-proof or "laboratory safe" in accordance with NFPA 45.

### **Water Reactive Chemicals**

Water reactive chemicals shall be segregated from other chemical storage. These chemicals should be stored in approved cabinets designed in accordance with NFPA 30. If approved cabinets are not available, containers should be over packed in a metal can during storage.

Water reactive chemicals shall not be stored with flammable or combustible liquids. Cabinets used for storage of water reactive chemicals shall be posted "CAUTION - WATER REACTIVE CHEMICAL. DO NOT USE WATER TO EXTINGUISH FIRE."

### **Shock Sensitive Chemicals**

Unless the manufacturer has added an inhibitor, unopened containers of shock sensitive chemicals should be turned in after 12 months of storage. Once opened, shock sensitive chemicals should be turned in as hazardous waste after 6 months of storage.

Shock sensitive chemicals shall be prominently noted on the inventory.

## **Compressed Gases**

### General Requirements.

- Gas cylinders shall be properly labeled.
- Gas cylinders shall be properly secured.
- When gas cylinders are in storage, hand valves shall be tightly closed and the valve protector cap shall be in place.
- Compressed gas from cylinders shall be reduced through the use of a regulator specifically designed for that purpose.
- Reduction valves, gauges, and fittings used for oxygen shall not be used for other gases. Likewise, valves, gauges, and fittings used for other gases shall not be used for oxygen.

### Storage Requirements.

- Gas cylinders stored outdoors shall be protected from the elements. Gas cylinders shall not be stored near sources of ignition, heat, or open flames.
- Full and empty gas cylinders shall be stored in separate locations. Empty gas cylinders shall be appropriately marked.
- Gas cylinders shall not be stored in the laboratory. The number of cylinders should be limited to the number necessary to complete work in progress.

## **Transporting Chemicals**

Toxic, flammable, or corrosive chemicals should be placed in a carrying bucket or other unbreakable container when moved between rooms or through the laboratory corridors.

Wheeled carts should be used to move larger quantities of chemicals, which cannot be hand carried. Freight elevators, where available, should be used to move chemicals between floors. Passenger elevators shall not be used when personnel are on-board.

Compressed gas cylinders shall be moved using a suitable hand truck. The gas cylinder shall be strapped in place with the valve protector cap installed. Only one cylinder shall be moved at a time.

## **Engineering Controls**

Engineering controls including hoods, glove boxes, inhalation chambers, gas cabinets, local exhaust ventilation and substitution of less toxic chemicals should be used to minimize exposure to all hazardous chemicals in the laboratory.

Laboratory operations, which involve chemicals with a PEL or TLV of 100 ppm or less (gas or vapor) or 0.1 mg/m<sup>3</sup> or less (aerosol) shall be planned and conducted using appropriate engineering controls. High-risk operations shall be conducted inside primary containment including chemical hoods, glove boxes, or inhalation chambers. Low risk operations where the potential for generation of gas, vapor, or aerosol contamination is remote may be conducted on the open bench.

## **Chemical Hoods**

Hoods shall have an average face velocity of 80 to 120 feet per minute (fpm) with the sash in the marked open position. Hoods will have a red arrow indicating the proper open operating position. Individual velocity readings should be within 20 fpm with the exhaust on and the hood raised 18 inches.

Hood performance shall be evaluated at least annually and after any repair or modification to the ventilation system. Ganged systems shall be evaluated together to determine the overall system performance.

Prior to each day's operation, hoods used for toxic compounds, carcinogens, or reproductive toxins shall be evaluated to ensure they are operating at the proper face velocity.

### **Glove Boxes**

Glove boxes shall be maintained at a negative pressure of at least 0.25 inches water gauge. A manometer or magnehelic gauge shall be installed to monitor differential pressure.

Glove boxes shall have an inward velocity of at least 50 fpm through all open ports or doors. Total makeup air volume shall be adequate to prevent explosive concentrations of gas, vapor, or dust inside the enclosure.

Glove box performance shall be evaluated annually and after any repair or modification to the ventilation system.

### **Local Exhaust Ventilation**

Design/performance criteria for local exhaust ventilation should be in accordance with the Industrial Ventilation Manual (latest edition).

System performance shall be evaluated annually and after any repair or modification.

### **Air Balance**

Laboratories should be maintained under negative pressure with respect to corridors and administrative areas. In areas where local exhaust systems such as hoods are used as the primary means of control, general ventilation should provide 4 to 12 air changes per hour. Laboratories not under negative pressure should be evaluated and a plan of corrective action developed.

Adequate conditioned make-up air shall be provided to ensure safe operation of the ventilation system.

### **Administrative and Work Practice Controls**

#### Handling Chemicals

- Working quantities of hazardous chemicals outside of storage during an operation shall be as small as practical. Containers shall be closed when not in use.
- Care should be taken to minimize aerosol formation during complex manipulations. Electrostatic powders and other solid materials shall be handled in solution whenever feasible.
- Mouth pipetting shall be prohibited.

#### Laboratory Glassware

- Handle and store laboratory glassware with care to avoid damage. Damaged glassware should not be used.
- Glassware used for pressure or vacuum service shall be designed specifically for that purpose.

#### Chemical Hoods

- Work with the hood sash closed as much as possible during the operation.

- Keep all apparatus and containers at least 6 inches behind the face to minimize spillage from the hood.
- Keep the slot in front of the lower hood baffle free from obstructions. Elevate all necessary apparatus and equipment.
- Minimize the storage of chemicals or hazardous waste inside the hood. Use approved cabinet or satellite storage locations.
- Minimize foot traffic past the open face of the hood.
- If the hood sash is supposed to be partially closed for operation, the hood should be so labeled and the appropriate closure point clearly marked.

### **Protective Clothing and Equipment**

#### Eye Protection

- Eye protection shall meet the requirements of ANSI Standard Z87.1 (latest edition).
- Eye protection suitable for the operation being conducted shall be worn in all laboratories where hazardous chemicals are handled or stored.
- Chemical goggles shall be worn during operations where a splash hazard exists or where corrosives are used.
- Face shields shall be worn when additional eye/face protection is necessary against splash or projectiles.
- Face shields shall be used in combination with approved eye protection. Contact lenses should not be worn in the laboratory.
- Visitors shall comply with the above requirements.

#### Gloves

Gloves shall be worn to minimize potential skin contact with hazardous chemicals.

- Selection of gloves should be based on the potential and severity of liquid contamination as well as their suitability for the operation performed.
- Nonstandard butyl rubber gloves can be used for operations where the potential for liquid contamination is minimal. If a high degree of manual dexterity is required surgical latex gloves may be used, but only if the potential for liquid contamination is minimal.
- Insulated gloves shall be used to prevent contact with hot or cold surfaces. Asbestos containing gloves shall not be used.
- The following glove discipline shall be followed:
  - Gloves shall be visually inspected for cuts, tears and degradation before each use. A leak test shall be performed to identify pinholes. Damaged or leaking gloves shall be discarded.



- Gloves shall be decontaminated and removed as soon as practical if contaminated during an operation. Once contaminated, gloves shall be discarded.
- Personnel should become proficient at doffing gloves to prevent cross contamination. Employees shall wash their hands with soap and water after gloves have been removed.

#### Clothing

- Lab coats or smocks shall be worn over street clothes inside all laboratories where hazardous chemicals are handled or stored. These shall be removed before exiting to non-laboratory areas. Personnel shall remove and launder or dispose of these garments once contamination has occurred.
- Laboratory personnel shall wear closed toe shoes. The use of sandals or sneakers is prohibited.

#### Eyewash/Safety Showers

- Design and installation of new equipment shall comply with ANSI Standard Z358.1 (latest edition).
- Equipment shall be inspected by the user periodically to determine if it is functional. Safety showers shall be inspected at least semiannually.
- Signs should be used to post the location of each eyewash and safety shower in the laboratory.
- Equipment shall be accessible at all times. Personnel shall not store equipment, apparatus or containers in front of eyewash or safety showers.

#### Air Monitoring

When there is a reasonable probability that employee exposure exceeds the action level for a chemical, the Police and Safety Office should be contacted to arrange for any necessary air monitoring.

### **Information and Training**

Personnel shall be provided with information and training to ensure they are apprised of chemical hazards in the laboratory. The following health and safety information shall be provided:

- Contents of the OSHA Laboratory Standard and its appendices.
- Location and availability of the Chemical Hygiene Plan.
- Signs and symptoms associated with exposure to hazardous chemicals used in the laboratory.
- Location and availability of reference material including MSDSs.
- Personnel handling hazardous chemicals shall be trained and able to answer verbally the following questions:
  - What is the objective of the Occupational Exposure to Hazardous Chemicals in the Laboratory Standard?

- What hazardous chemicals they work with, and what are their long and short-term effects?
- How can they detect the presence, concentration, and/or release of the hazardous chemicals they work with?
- What measures are or can be taken to protect themselves from overexposure and in the event of an emergency?
- What are the medical provisions of the standard?
- Where is the information, such as MSDS and the Chemical Hygiene Plan, located, and has it been explained?

### **Personal Hygiene**

Personnel shall wash their hands after handling hazardous chemicals.

Personnel shall shower after abnormal circumstances, which result in chemical contamination to the neck, arms, legs or body.

Mouth pipetting is prohibited.

### **First Aid**

Laboratory personnel and supervisors shall have adequate first aid training and be certified in basic first aid and CPR by the American Red Cross or other recognized agency.

For severe injury or illness dial 911, report the nature and extent of the emergency, and await medical support. Render the appropriate first aid.

The following general first aid procedures should be followed in the event of chemical contamination or acute exposure.

- Eye contact: Immediately flush eyes with water for at least 15 minutes. Hold eyelids apart to ensure adequate irrigation. Seek prompt medical attention.
- Skin contact: Immediately flush the affected area with water and remove contaminated clothing. Wash the area with hand soap or mild detergent to remove any residual contamination. Seek prompt medical attention.
- Noncorrosives: If the victim is conscious and not having convulsions, dilute by drinking a glass of water or milk. Discontinue dilution if it makes the victim nauseous. Seek prompt medical attention.
- Caustics: Indications of ingestion of strong acids, alkalis, or petroleum products include burns around the victim's lips or mouth or a characteristic odor. Tissue damage in the mouth and throat is immediate (within 30 seconds) and progressive. When liquid caustics, especially strong alkalis, have been swallowed, the value of diluting is questionable. Stimulating the victim to vomit will cause more damage. Seek prompt medical attention.
- Inhalation: Move employee away from the exposure to fresh air. Begin rescue breathing if breathing has stopped. Use CPR if the heart has stopped.

## **Medical Surveillance**

Medical examinations and consultation shall be performed by or under the direct supervision of a licensed physician at a reasonable time and place without cost or loss of pay to the employee.

Employees shall be provided an opportunity to receive medical attention, including any follow-up examinations, which the examining physician determines to be necessary under the following circumstances:

- When an employee develops signs or symptoms associated with occupational exposure to a hazardous chemical.
- When air sampling reveals exposure levels routinely above the action level or, in its absence, the PEL for an OSHA regulated substance. Medical surveillance shall comply with the requirements of that particular standard.

Medical consultation shall be provided whenever an abnormal event such as a spill, leak, or explosion takes place in the laboratory. Its purpose shall be to determine whether subsequent medical examination is necessary.

For required medical examinations and consultations, the examining physician shall provide a written opinion, which includes the following:

- Any recommendations for further medical follow-up.
- Results of the medical examination and diagnostic tests.
- Any medical condition that may be revealed in the course of the examination that places the employee at increased risk as a result of exposure to a hazardous chemical found in the workplace.
- A statement that the employee has been informed by the physician of the results of the consultation or medical examination and any medical condition that may require further examination.

## **Chemical Waste Disposal**

Laboratory wastes shall be handled and disposed of in accordance with Northeast State Hazardous Waste Management Manual.

Chemicals shall be handled and stored in such a way that their identity is retained from initial receipt or production to use or ultimate destruction whenever feasible. When chemicals are combined and become part of a laboratory waste mixture, a record of all chemicals in the mixture shall be maintained.

Personnel shall minimize the generation of hazardous waste whenever feasible. Common methods of waste minimization include substitution of less hazardous chemicals, process changes, recycling, or reuse.

Non-hazardous chemical waste shall be disposed of according to existing guidance. If guidance is not available, request assistance from the director of Police and Safety.

## **Chemical Spills**

Personnel shall not attempt to clean-up large spills. Evacuate the laboratory and contact the Physical Plant and the office of Police and Safety immediately.

Laboratories shall maintain supplies and equipment to handle small spills. These include adsorbents, neutralizers, mops, buckets, dustpans, paper towels, sponges, and waste containers.

Spill trays shall be used for all complex operations where there is a reasonable probability a spill could occur.

All waste resulting from a spill shall be handled in accordance with the Northeast State Hazardous Waste Management Manual.

### **Liquid Spills**

- Spills should be confined using trays, adsorbents, or paper towels whenever feasible.
- Neutralize inorganic acids with an appropriate chemical or use an absorbent mixture (i.e., soda ash or diatomaceous earth). Other liquids should be adsorbed with a nonreactive material such as sand or vermiculite and placed in suitable containers.
- Flammable liquids: Turn off or remove all ignition or heat sources. Continuously ventilate the area. Absorb the liquid with a non-reactive material and place in a suitable container.
- Solid Spills: Low toxicity materials should be swept into a dustpan and placed in a suitable container. Wet methods or HEPA filtered vacuum shall be used to clean up toxic chemicals.

## **Emergencies**

Laboratories should develop an emergency plan which includes the following elements:

- An Emergency Alarm System to alert personnel in the event of an emergency that may require evacuation. Personnel should be familiar with the location and operation of the alarm system and evacuation routes.
- Evacuation procedures including primary and alternate evacuation routes.
- Instructions for shutting down equipment or apparatus in the event of an emergency.
- Procedures to ensure personnel do not re-enter the laboratory before the emergency is over.

## **Fires**

Laboratory personnel shall not attempt to extinguish large fires. The following steps should be taken:

- Confine the fire by closing the hood sash or laboratory doors and fire doors as appropriate.
- Immediately evacuate the fire area and call extension 3255 and 911.
- Implement the Laboratory Emergency Plan.
- Designated laboratory personnel trained in the use of portable fire extinguishers may extinguish incipient stage fires. At least two persons shall be available when the fire is extinguished. The following steps should be taken:

- Alert other personnel and have them call extension 3255 and 911, if you have not already done so.
- Extinguish the fire by directing the discharge at the base of the flames.
- If the fire cannot be controlled, evacuate the area and implement the Laboratory Emergency Plan.

### **Ventilation Failure**

Operations shall be terminated in a safe manner in the event of a low flow condition or complete ventilation failure. Personnel shall:

- Close the hand valve on all compressed gas cylinders.
- Turn off laboratory air, vacuum, and propane gas systems to equipment and apparatus.
- Close containers of volatile chemicals.
- Close the chemical hood sash.
- Evacuate the laboratory room.

Personnel shall not re-enter the laboratory until ventilation has been restored for at least 30 minutes.

In cases where the operation could not be terminated and there is a reasonable probability that the laboratory atmosphere is unsafe, air monitoring may be necessary before re-entry. Supervisors, Directors, and Division Chairs shall be contacted for guidance.

### **Housekeeping**

Laboratories shall be kept clean and free from obstructions. Personnel shall cleanup work areas at the end of each day's operations.

Hazardous waste should be stored in the satellite accumulation area in closed containers. Non-hazardous solid and liquid waste should be stored in appropriate receptacles or containers.

Equipment, apparatus and chemical inventories should be properly stored. Excess equipment and chemicals should be turned-in to minimize clutter in the laboratory.

Stairways and halls shall not be used as storage areas. Access to exits and emergency equipment shall not be blocked.

### **Special Procedures for Handling Acutely Toxic Compounds, Carcinogens and Reproductive Toxins**

General: In addition to the hygiene practices covered in the previous paragraphs, the following special procedures are to be used for laboratory operations involving acutely toxic compounds, carcinogens, and reproductive toxins.

#### **Storage and Distribution**

- Acutely toxic compounds, carcinogens, and reproductive toxins should be segregated from other chemicals and stored in a well-ventilated area. When available, ventilated cabinets shall be used for storage.

- Cabinets shall be posted "DANGER - CHEMICAL CARCINOGEN", "CAUTION - CANCER SUSPECT AGENT" or "CAUTION - TOXIC AGENTS", as appropriate.
- Storage of unopened containers presents no special hazards. Once opened, volatile chemicals shall be sealed with parafilm or tape, or over packed in an unbreakable container.
- Acutely toxic compressed gases shall be stored in a chemical hood or gas cabinet. Storage shall be kept to the minimum required to complete the work in progress.
- Acutely toxic compounds, carcinogens, or reproductive toxins shall be placed in an unbreakable secondary container prior to transport through the laboratory. The secondary container should contain absorbent material to cushion the primary container and absorb the contents in the event of a spill. Secondary containers shall be appropriately labeled.

### **Engineering Controls**

Laboratory operations which involve acutely toxic compounds, carcinogens or reproductive toxins, shall be planned and conducted using appropriate engineering controls. High-risk operations shall be conducted inside chemical hoods or glove boxes. Low risk operations where the potential for generation of gas, vapor, or aerosol contamination is remote may be conducted on the open bench.

House vacuum shall be provided with in-line filters or traps to prevent contamination. Vacuum pumps shall be vented into a chemical hood or local ventilation system.

Analytical instrumentation which generates vapor or aerosol contamination shall be vented into a hood or operated using local exhaust ventilation to capture air contaminants.

### **Administrative and Work Practice Controls**

Two Person Rule. High-risk operations may require that there be two people present in the area at all times.

#### Designated Area

- Laboratory operations shall be conducted in a "designated area" where access to unauthorized personnel is restricted. The area may be the entire room, an area within the room or the primary containment. Doors leading to the designated area shall remain closed at all times.
- Each designated area shall be posted, "DANGER - CHEMICAL CARCINOGEN", "CAUTION - CANCER SUSPECT AGENT" or "CAUTION - TOXIC AGENTS" AUTHORIZED PERSONNEL ONLY, as appropriate.
- Working Surfaces: Working surfaces shall be non-porous and covered with absorbent, plastic backed paper. Spill trays should be used when complex manipulations are conducted.

Decontamination: Contaminated equipment, apparatus, and glassware shall be decontaminated before removal from the designated area. Working surfaces shall be decontaminated prior to beginning new operations. Acetone, methanol, or water is recommended for solvent washing when chemical decontamination is not feasible.

