

Suit up and Decon

To prevent exposure, the integrity of the protective gear must be documented just prior to use and the gear must be donned properly; proper doffing techniques will limit contact with contaminated Personal Protective Equipment (PPE) and limit damage to the gear for future use.

In this exercise, you will be given an exposure scenario, plan a decon line, suit up in Level B or C and perform decon. Decontamination procedures are required for site workers, TSD workers, and emergency responders covered by 29CFR1910.120.

Objectives

When you have completed this exercise, you will be better able to:

- Demonstrate ability to inspect provided PPE
- Set up decontamination zones for a hazard
- Demonstrate ability to dressout in Level B or C
- Demonstrate ability to perform decon

Chemical-Protective Clothing

Chemical-Protective Clothing (CPC) consists of special clothing worn to prevent chemicals from coming into contact with the body. CPC generally includes eye/face protection, aprons, boots, gloves, and suits/coveralls. CPC is used to protect employees from both chemical and physical hazards that they are likely to encounter while working. The proper use of CPC can prevent or reduce exposure to a harmful substance. CPC is an important part of a worker's PPE.

Chemical-protective clothing is made of special materials. These special materials provide chemical resistance, which means they act as a barrier to keep chemicals from coming in contact with the skin. Different materials provide protection from different types of chemicals. It is important to select CPC which is designed to protect against the specific chemical or type of chemical that may be encountered during work. Otherwise, you might not be protected, even when you think you are.

Types of Chemical-Protective Suits

Chemical-protective suits are of two general types, totally encapsulating and partially encapsulating.

- **Totally Encapsulating Chemical-Protective Suit (TECP):** Provides head-to-toe coverage to protect the wearer from chemicals. These suits have special seams and zippers to prevent chemicals from leaking into the suit. These suits have a face shield which is made as part of the hood. They are very bulky to wear, and the wearer can become very hot while working. TECPs are the only vapor-resistant suits. TECP suits protect workers from hazards which are identified during hazard evaluation. TECP suits must pass specific positive-air pressure tests and be capable of preventing inward test gas leakage of more than 0.5%. Specific information about pressure tests can be found in OSHA 1910.120, Appendix A.
- **Partially Encapsulating Chemical-Protective Suit (PECP):** Provides less protection from chemicals and may or may not have face shields. These suits are used when less skin protection is needed. The hood can either be part of the suit or detached.

Disposable suits, which provide limited protection from chemicals, can be used in conjunction with these chemical-protective suits. These disposable suits can be worn either on top of other suits to protect them or inside of protective suits to protect the wearer from chafing.

The type of chemical-protective suits used will depend on the type and nature of the potential exposure. Generally, the level of protection provided will be re-evaluated as additional information is gained. Guidelines for selection of CPC follow:

CPC Selection Guidelines

Always follow manufacturers recommendations

Levels of PPE (see 29CFR1910.120, Appendix B)

Chemical resistance: Different materials are resistant to different chemicals. Management should provide CPC which will provide protection against the chemicals that are likely to be encountered. This rule is true for whole-body as well as hand and foot protection.

Physical integrity: Construction of the suit is important for the proper functioning of the CPC. Seams and zippers should provide solid barriers to chemicals and should be constructed to provide some flexibility.

Resistance to temperature extremes: Heat and cold can adversely affect CPC. Clothing which will be worn in cold temperatures could crack or become ineffective against chemicals. Likewise, heat may destroy the chemical resistance of clothing or even melt it.

Ability to be cleaned: Clothing must be able to be cleaned and decontaminated after each use. If this is not possible, the clothing must be disposed of after use.

Cost: Initial and ongoing costs of purchasing PPE can be important considerations for management. However, buying less expensive, inferior products which do not adequately protect employees can be more expensive in the long run due to medical costs, lost work time, or, at worst, loss of human life.

Flexibility: Materials need to be flexible enough for the wearer to move and work safely. Overly rigid suits can result in unnecessary accidents from slips, trips, and falls. Gloves which are too rigid may create gripping problems that may lead to other hazards.

Size: CPC should be available in a variety of sizes to accommodate the height and weight of the worker. Suits that are too small will tear easily and provide no protection. Suits that are too large will make walking and/or working difficult. Safety boots that are too big will create both tripping and comfort problems.

Design: CPC should be designed so that all required respiratory PPE can be used at the same time.

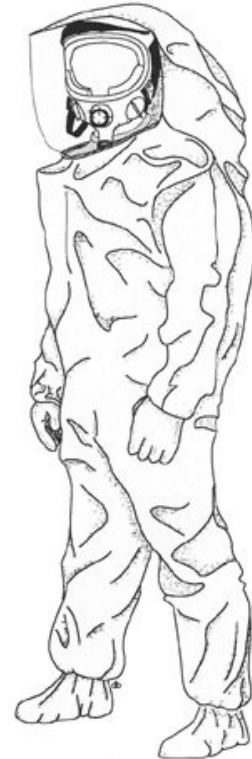
Level A

Level A is the highest level of protection which can be worn.

What Is Level A Protection?

The following list constitutes Level A equipment; it may be used as appropriate:

- Positive-pressure, pressure-demand, full-facepiece SCBA or positive-pressure, supplied-air to full-face piece with escape SCBA (NIOSH-approved)
- Totally encapsulating chemical-protective suit (TECP) (gas tight or vapor tight)
- Inner and outer chemical-resistant gloves
- Disposable protective suit, gloves, and boots (depending on suit construction, may be worn over totally encapsulating suit)
- Coveralls*
- Long underwear*
- Hard hat (under suit)*
- Chemical-resistant boots with steel toe and shank.
- Cooling system (ice vest, water/air circulation)*



*Optional as applicable

Note: Suit must be properly equipped with a pass-through air-line connection, referred to as an air-line egress if using a Supplied Air Respirator (SAR).

When Is Level A Protection Needed?

Level A protection is required when:

- The hazardous substance has been identified and requires the highest level of protection for skin, eyes, and respiratory system.
- There is potential for splash, immersion, or exposure to vapors, particulates, or gases that are harmful to the skin or may be absorbed through the skin.
- Confined-space entry may be involved and the need for Level A cannot be ruled out (but explosion hazard has been ruled out).
- The skin absorption hazard may likely result in immediate death or serious illness/injury or impair the ability to escape.

Level B

Level B is used when maximum respiratory protection is desired but the skin/eye hazards do not require Level A.

What Is Level B Protection?

The following constitutes Level B equipment; it may be used as appropriate.

- Positive-pressure, full-facepiece SCBA or positive-pressure pressure-demand, supplied-air to full-face piece with escape SCBA (NIOSH approved)
- Hooded chemical-resistant clothing **OR** total encapsulating chemical suit (not gas tight or vapor tight)
- Inner and outer chemical-resistant gloves
- Outer chemical-resistant boots with steel toe and shank.
- Boot covers: outer, chemical-resistant (disposable)*
- Hard hat*
- Face shield*
- Cooling system (ice vest, water/air circulation)*
- Coveralls*



New Level B chemical-resistant clothing is designed to go over the SCBA. If appropriate for the potential exposures, this CPC should be used to protect the SCBA and prevent its contamination. In this case, the Level B ensemble will resemble a Level A ensemble but the suit is not vapor-tight.

*Optional as applicable

When Is Level B Protection Needed?

Level B protection is required when:

- The highest level of respiratory protection is needed but a lower level of skin protection is acceptable
- The substances have been identified
- An SCBA is required
- Less skin protection is needed. (Vapor and gases are not believed to be present at levels harmful to skin or capable of being absorbed through intact skin.)

Level C

Level C provides less skin and respiratory protection than Level A or B.

What Is Level C Protection?

The following list constitutes Level C equipment; it may be used as appropriate.

- A full-face or half-face air-purifying respirator (NIOSH-approved)
- Hooded chemical-resistant clothing
- Inner and outer chemical-resistant gloves
- Coveralls*
- Boots (outer), chemical-resistant steel toe and shank*
- Boot covers: outer, chemical-resistant (disposable)*
- Hard hat*
- Escape mask*
- Face shield*

*Optional as applicable

When Is Level C Protection Needed?

Level C provides protection when:

- The concentration(s) and type(s) of airborne substance(s) are known and the criteria for using an air-purifying respirator are met.
- Direct contact with the hazardous substance will not harm the skin or the substance will not be absorbed through any exposed skin.
- Air contaminants have been identified, concentrations measured, and an air-purifying respirator is available with an acceptable protection factor.
- An adequate level of oxygen ($\geq 19.5\%$) is available and all other criteria for the safe use of air-purifying respirators are met.



Level D

This level offers no respiratory protection and low skin protection.

What Is Level D Protection?

The following list constitutes Level D equipment; it may be used as appropriate.

- Coveralls (work uniform)
- Chemical-resistant boots or shoes with steel toe and shank
- Hard hat*
- Gloves*
- Outer, chemical-resistant boots (disposable)*
- Safety glasses or chemical splash goggles*
- Escape mask*
- Face shield*

*Optional as applicable

When Is Level D Protection Needed?

Level D is required when:

- Minimal protection from chemical exposure is needed. It is worn to prevent nuisance contamination only.
- The atmosphere contains no known hazards.
- Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.

Typical Uses of Level D

Level D protection is worn by personnel who may be exposed only to nuisance contamination while working with hazardous materials. Typically, workers involved with support activities such as equipment supply, maintenance, off-site vehicle operation, or supervision/management will wear Level D.

Level D may appear similar to “typical work clothes.” Differences include the chemical-resistant boots with steel shank.

A general rule for which level of protection to use is: **“The less you know, the higher you go.”**

Remembering Levels of Protection

A helpful way to remember the levels of protection is:

Level A - "A"ll Covered, gas/mist tight

Level B - "B"reathing Air, splash protection

Level C - "C"artridge Respirator or air purifying respirator

Level D – "D"on't Expect Protection, regular work clothes

Characteristics and Properties of CPC

PPE is effective only if it's properly selected, worn, and maintained. Standard Operating Procedures (SOPs) for these types of PPE are included in the safety and health plan. SOPs are company-specific versions of the more general Standard Operating Guides (SOGs) often used in training. SOGs are written instructions for safe work practices and are a form of administrative control.

- Whenever possible, a variety of suit sizes should be on hand to fit the various sizes of personnel.
- The adhesive on tape not approved by the manufacturer may cause degradation of the suit and the warranty may be voided.
- Materials used to make most suits do not “breathe.” Rapid heat and moisture build-up will occur in the suit during use.
- All suits have limits as to the temperature at which they can be worn without damage. This information may be particularly important for emergency response or hot-work activities. Check the manufacturer's data.
- Most suits offer no fire protection and in some cases increase the possibility of injury because they will melt and may burn.

Penetration, Degradation, and Permeation

Chemicals can reduce the effectiveness of CPC garments through penetration, degradation, or permeation.

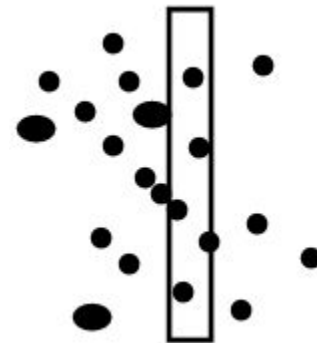
Penetration The flow of a chemical through zippers, stitched seams, or imperfections in the material.



Degradation A reduction in one or more physical properties of a protective material due to contact with a chemical.

Permeation The process by which a chemical moves through a protective material on a molecular level. The rate of permeation is dependent on six major factors:

- Contact time
- Material thickness
- Concentration
- Temperature
- Physical state of chemicals
- Size of the contaminant molecules and pore space

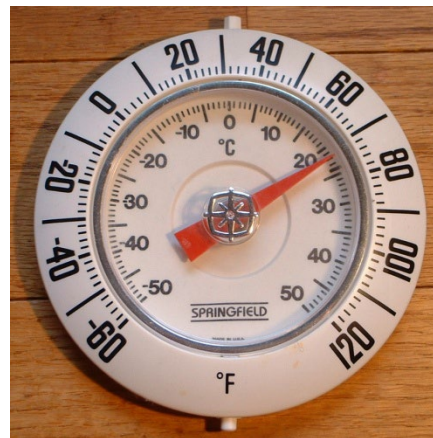


A general rule of thumb is that the permeation rate is inversely proportional to the thickness ($2 \times \text{thickness} = 1/2 \times \text{permeation rate}$). Other important factors are chemical concentration, contact time, temperature, material grade, humidity, and solubility of the material in the chemical. Consult the manufacturer for more information.

Precautions When Wearing CPC

Every level of chemical-protective clothing has limitations. The following precautions should be considered.

- Hearing and speaking are difficult in CPC with respiratory protection. It is important to establish other ways to communicate with each other. Hand signals or audio signals such as horns, sirens, and whistles can be used to communicate. Communication can also be improved by using two-way radios, such as a portable radio with microphone or radio with a microphone and speaker combination attached to the full-face respirator. Remember, any radio must be intrinsically safe to prevent an ignition hazard. Be aware of potential traffic areas.
- Due to the size and weight of some suits, motion is restricted, especially when climbing, working in tight areas, or using hand tools.
- Look for signs of heat stress (dizziness, headache, nausea, perspiration ceases), especially at temperatures over 70°F.



- Always wear the correct size of footwear in order to prevent accidents. You should also make certain that the soles provide a proper grip for the surfaces that you will be encountering. Steel shanks, toes, and shin guards help to prevent puncture wounds and/or crushing injuries.
- Disposable booties may be slippery. Use caution when walking to prevent slips and falls.

- Care should be taken when donning and doffing inner and outer gloves. When donning gloves, make sure that no cracks or tears are present. When doffing gloves, take care not to spread contamination.
- All joints such as suit-to-boots and suit-to-gloves in Levels B and C protection should be secured with tape. Fold the end of the tape back under to make a tab for easy removal. Use special care when removing tape.
- Be sure you are properly hydrated prior to and after use of CPC.



- Goggles and eye/face protection may become clouded due to moisture condensation during use. Use some sort of anti-fog film or spray when needed. When wearing Level A, you may want to keep a cloth inside the suit to wipe fog off the inside face shield.
- Avoid placing your hands or knees on the ground when in the Hot Zone to prevent contamination by chemicals and abrasion to the suit material. Avoid sitting on anything sharp in suits.
- When removing a suit, open and fold into itself as it is removed to prevent contamination of internal clothing.
- Suits have weak seams, especially if they are disposable. Be careful not to strain and split them. If splitting occurs, report it and follow the appropriate SOP (standard operating procedure).
- Use caution when suits are used in potential fire areas. If fire occurs, get out of the area.

- When dressing out with a team be careful to coordinate your dressout at the same speed and level as your team/buddy. The longer you are dressed out, the more stress is being put on your body.
- Completion of dress out should be delayed until ready to enter the work zone.
- Medical clearance is required for use of respirators.

Inspection, Maintenance, and Storage of CPC

It is important to inspect CPC, for evidence of chemical damage. CPC which is torn, degraded, or otherwise non-functional will not offer adequate protection to the wearer. An SOP for CPC inspection, maintenance, and storage assures review whenever:

- Received from the distributor
- Issued to workers
- Put into storage
- Taken out of storage
- Used for training
- Used for work or an emergency response
- Sent for maintenance

An inspection checklist should be developed for each item. Factors to consider are:

- Cuts, holes, tears, swelling, and abrasions in seams of fabric
- Weakness in zipper or valve seals
- Signs of contamination such as discolorations or visible chemical residues
- Signs of malfunctioning exhaust valves

Note: CPC may be contaminated even though it doesn't appear discolored.

Proper **maintenance** can prevent CPC deficiencies and prolong its life. A detailed SOP must be developed by the employer and followed rigorously by trained personnel.

Proper **storage** is important in order to prevent suit failures. The written SOP/SOG should describe storage before the CPC is issued to the wearer (in a warehouse, on-site, etc.), as well as storage after use. Check the manufacturer data, as most CPC used now has specific temperature and humidity storage requirements and a shelf life and an expiration date.

Donning and Doffing PPE

Proper donning and doffing of PPE will preserve the integrity of the PPE and protect the wearer from chemical exposure. An example of an SOG for donning Level B PPE is given below.

Level B Dress Out (Entrant/Decon) SOG

- Receive medical check (Optional)
- Verify that all PPE is ready and in the dress out area
- Perform an operational check of the SCBA
- Remove watches, jewelry, leather shoes and other personal items
- Don inner suit (Optional)
- Inspect suit
- Don Level B suit to waist
- Don chemical resistant boots with boot covers
- Conduct entry briefing
 - Describe Incident
 - Identify Hazards
 - Assign Duties/Jobs
 - Confirm Equipment and Decon Readiness
 - Confirm Primary, Secondary and Emergency Communications
 - Identify Emergency Showers/Decon
- Don inner glove
- Don middle glove
- Insert arms into the sleeves of the suit and pulling it over shoulders
- Gloves will be turned inside out over the thumb and palm of hand, then carefully taped making sure to stretch the elastic as far as possible and folded back over suit
- Don chemical resistant outer gloves, and tape seam between glove and suit leaving a tab
- Don facepiece
- Don attached hood of suit, zip up front zipper, attach zipper flap and tape flap leaving a tab
- Don SCBA
- Conduct a positive and negative pressure check of respirator facepiece
- Don hardhat, if required (tape if needed)
- Assign suit number
- Rapid Intervention Team/Decon people to decon line
- Entrant connects regulator to face piece and enters Hot Zone after Decon line is ready and IC approves
- Ensure wearer is breathing air and indicates readiness with a thumbs-up sign

Decontamination (decon) Introduction

Decontamination is the process of removing and/or neutralizing contaminants that may have accumulated on PPE, personnel, and other equipment. Decon is conducted following set procedures designed to protect workers, other people, and the environment from exposures or contamination resulting from hazardous materials.

Proper decontamination procedures include:

- Controlling hazards
- Protecting workers from exposure to hazardous materials
- Preventing continued contamination and permeation of the hazardous material into PPE, other equipment, and tools
- Protecting personnel outside the contaminated area by minimizing the transfer of harmful materials into clean areas
- Preventing mixing of incompatible materials
- Preventing the uncontrolled transfer of contaminants to the community

See 29CFR1910.120(k).

Pre-Planning for Decontamination

Management must develop a decontamination plan. The plan must be operational before any personnel or equipment enters areas where there is the potential for exposure to hazardous substances. The decontamination plan should include:

- A description of the location and layout of potential decontamination stations for the facility.
- A list of the decontamination equipment needed for the possible hazards (for example, water for removal and brushes for scrubbing).
- The appropriate PPE for persons assisting with decontamination.
- Appropriate procedures for specific materials that may be encountered in the plant.
- Methods and procedures for preventing contamination of clean areas.
- Methods and procedures for minimizing worker contact with contaminants during removal of PPE.
- Safe disposal methods for clothing and equipment which are not completely decontaminated.
- Revisions whenever the type of personal protective clothing or equipment changes, the site conditions change, or the facility hazards are reassessed based on the new information.

Preventing Contamination

It is important to establish a set of Standard Operating Procedures (SOPs) that minimize contact with any spill or release. These written procedures should be understood and practiced by all emergency responders who may become contaminated during an emergency response. SOPs should be established to maximize worker protection. For example, proper procedures for donning PPE will minimize the potential inhalation or absorption of contaminants. Some examples of proper PPE donning procedures include:

- Inspecting PPE to ensure it is in proper working condition before each use.
- Closing zippers, buttons, and snaps fully.
- Tucking gloves under or over the sleeves assuring gloves and sleeves are overlaid to prevent contaminants entering between the two
- Tucking boots under the legs of outer clothing, if necessary
- Wearing hoods, if not attached, outside the collar.
- Wearing a third pair of tough outer gloves over the sleeves.
- Taping all junctures (if tape adhesive is compatible with the suit materials) to prevent contaminants from running inside the gloves, boots, and jackets.

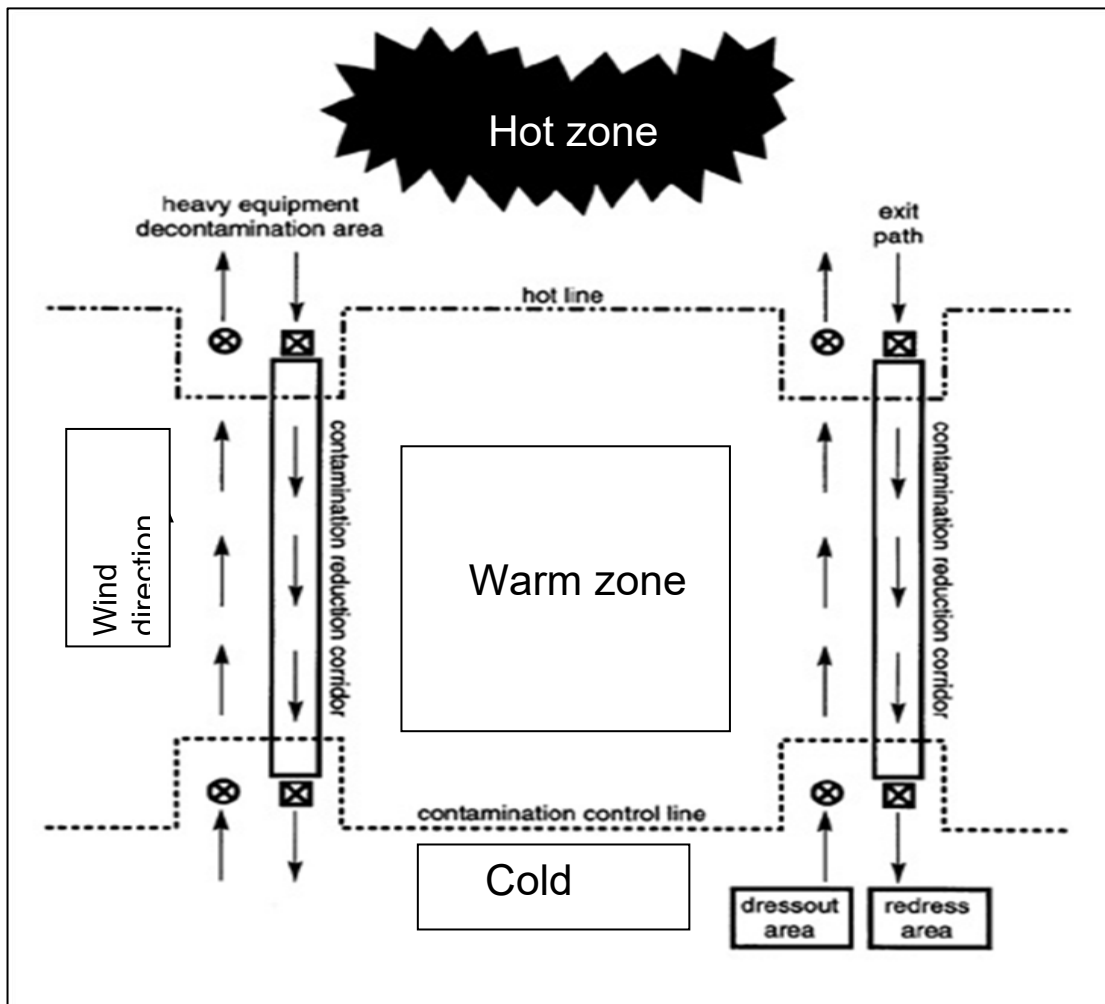
Other precautionary measures can help reduce the amount of contamination during an emergency, such as:

- Following SOPs that minimize contact with hazardous substances.
- Not walking through areas of obvious contamination.
- Not directly touching potentially hazardous substances.
- Using remote-sampling, handling, and container-opening techniques such as drum grapplers and pneumatic-impact wrenches.
- Covering monitoring and sampling instruments. Using plastic bags and making openings for sample parts and sensors that must contact hazardous materials. Covering equipment and tools with a coating which can be stripped away during decontamination.
- Wearing disposable outer garments and using disposable equipment where appropriate.
- Containing the source of the hazardous material.

Work Zones

It is critical to prevent movement of contaminated materials and contaminants from the incident scene. This movement may be prevented by establishing work zones. Three work zones should be established:

- The **Hot Zone**, which is the area contaminated by the spill or release.
- The **Warm Zone** or **Contamination Reduction Zone (CRZ)**, which is the area surrounding the hot zone where decontamination occurs.
- The **Cold Zone** or **Support Zone**, which is the area free of contamination where support activities occur.



Primary Activities in Each Work Zone

Different activities are performed by authorized responders in each zone of the decontamination line. These activities and the personnel required to conduct them should be restricted to the appropriate zones.

Exclusion Zone (also called the Hot Zone)

The Exclusion Zone refers to the area where the hazard is present. The size of the zone is determined by the characteristics of the emergency and access points. The “Hot line” is the outer boundary and should be clearly marked with hazard tape, lines, signs, or ropes. Further subdivision of the area may be necessary depending on the hazard and incompatibility of substances spilled or released. The level of PPE necessary will be determined by type of substance, monitoring, and the Emergency Response Plan. It will usually be Level A or Level B, as Level C is used only when the exposures are known.

Warm Zone (also called the Contamination Reduction Zone)

Decontamination takes place in a designated area called the Contamination Reduction Corridor (CRC). The degree of contamination decreases as the line moves away from the Hot Zone. PPE for Warm Zone workers is usually one level lower than that used in the Hot or Exclusion Zone. Depending on the substance, however, the same level of PPE as used in the Exclusion Zone may be needed.

Cold Zone (also called the Support Zone)

The Cold Zone is the area free of contamination. In the Cold Zone, the worker is made free of all PPE and medically assessed. Final determinations should be made here as to the effectiveness of the decontamination line and the medical status of the responder by physical examination and use of monitoring equipment. This zone is where administrative and other support functions are located that keep the Cold, Warm, and Exclusion Zones running smoothly. No PPE should be needed in this area.

The graphic shown in this exercise illustrates a typical decontamination layout. More detailed graphics can be provided by the facilitator.

Decontamination Procedures

All personnel, clothing, equipment, and sample containers leaving contaminated areas must be decontaminated to remove any hazardous materials that may have adhered to them. Decontamination can be accomplished by:

- Physically removing contaminants
- Chemically removing contaminants
- Rinsing off contaminants
- Disinfecting and sterilizing (infectious materials)
- A combination of the above methods

Physical Removal of Contaminants - Some contaminants stick to the surface of PPE and equipment. These contaminants can be removed by scraping, brushing, washing, and wiping.

Dust and vapors that cling to PPE and equipment may become trapped in small openings, such as the weave of the fabric, and can be removed with water or a liquid rinse.

Volatile liquid contaminants can be removed from protective clothing or equipment by evaporation followed by a water rinse. Care must be taken to prevent inhalation of the vaporized chemicals.

Chemical Removal of Contaminants - Removing contaminants with a chemical requires special planning and training. The solution must be chemically compatible with the clothing and equipment being cleaned.

Rinsing off Contaminants - A soap and water solution is most frequently used to help remove contaminants. Such solutions are called surfactants. Rinsing is an important method. Multiple rinses with clean solutions will remove more contaminants than a single rinse with the same volume of solution. Commercial off-the-shelf decontamination materials are also available. Assure these are nontoxic and safe to use with the PPE.



photo from tools.niehs.nih.gov

Disinfecting and Sterilizing - Chemical disinfectants provide a means of deactivating infectious agents. Disposable PPE is recommended for use with infectious agents.

All equipment and solvents used for decontamination must be decontaminated or neutralized and disposed of properly.

Decontamination Line

The decontamination line is an organized series of procedures performed in a specific sequence to reduce levels of contamination on personnel, PPE, and other equipment. Decontamination must occur before any response personnel enter clean areas from contaminated areas. Decontamination procedures will vary depending on the nature and extent of contamination. Procedures must be specified in the company plan.

If permeation has occurred, the CPC will be discarded. Tools and other materials that cannot be decontaminated are also discarded. Each procedure is performed at a separate station. The stations are arranged in order of decreasing contamination, preferably in a straight line. All decontamination activities are located in the Contamination Reduction Corridor (CRC).

Outer, more heavily contaminated items such as boots, gloves, and suits should be decontaminated and removed first, followed by decontamination and removal of inner, less-contaminated items (inner boots and gloves). Complete decontamination may not be possible if the contaminate has permeated into the protective clothing.



photo from tools.niehs.nih.gov

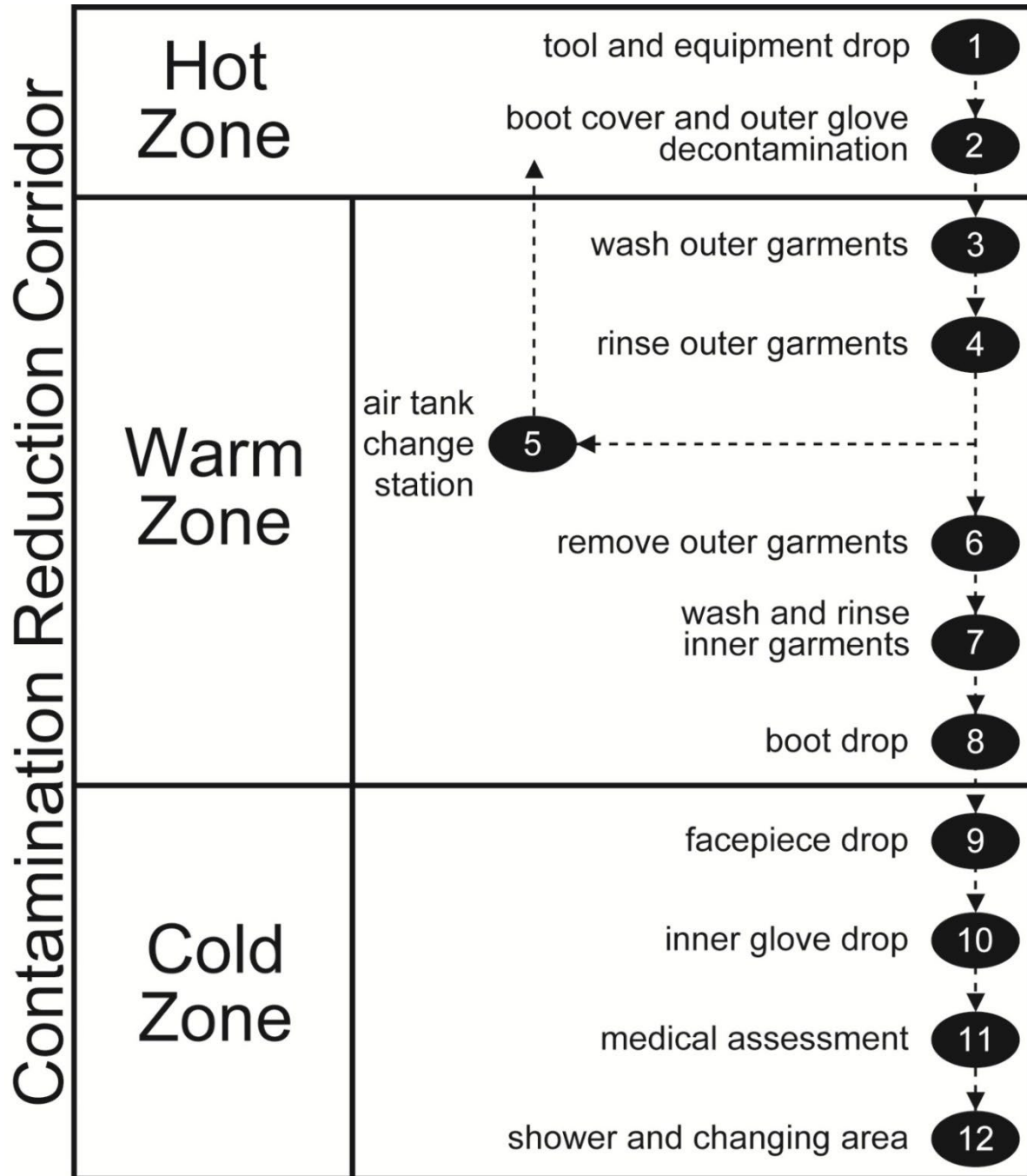
Protecting Decontamination Line Workers

Decontamination workers at the beginning of the line (closest to the Hot Zone) will require more protection from contaminants than decontamination workers who are assigned to the last station in the decontamination line. The workers on the decontamination line generally wear protection, one level below that of personnel in the Hot Zone. For example, if Level B is worn in the Hot Zone, Level C may be appropriate for decontamination workers. In some cases, decontamination personnel should wear the same levels of PPE as workers in the Hot Zone. All decontamination personnel must be decontaminated before re-entering the Cold Zone. The plan should specify the level of PPE to be worn at all positions by decon line workers.

Emergency Decontamination Line

Emergency decontamination procedures must be established. In an emergency, the primary concern is to prevent the loss of life or severe injury to site personnel. If immediate medical treatment is required to save a life, decontamination should be delayed until the victim is stabilized. If decontamination can be performed without interfering with essential life-saving techniques or first aid, or if a worker has been contaminated with an extremely toxic or corrosive material that could cause severe injury or loss of life, decontamination must be performed immediately. If an emergency due to a heat-related illness develops, protective clothing should be removed from the victim as soon as possible to reduce the heat stress. During an emergency, provisions must also be made for protecting medical personnel and disposing of contaminated clothing and equipment. The affected individuals may be unconscious and may need the use of a backboard or Stokes basket to move the individual. Many hospitals and emergency response groups may not assist with a patient until the decontamination process is completed due to need to maintain the integrity of the facility.

Sample Decontamination Line



Decontamination of Equipment and Breathing Apparatus

Decontamination of equipment is an important method of controlling the spread of hazardous substances and preventing deterioration of the equipment.

Monitors - If monitoring equipment becomes contaminated, it will require special cleaning. The manufacturer or local/regional government agencies can provide information on proper decontamination methods.

Tools - Metal tools should be cleaned, as appropriate, by chemical or physical means. EPA regional laboratories may be consulted for specific methods to decontaminate tools. Wooden tools and tools with wooden handles are difficult to decontaminate because they absorb chemicals. Wooden tools should be discarded if contamination is suspected.

Respirators and SCBAs - certain parts of contaminated respirators and SCBAs, such as the harness assembly and leather or cloth components, are difficult to decontaminate. If grossly contaminated, they may need to be discarded. Rubber components can be soaked in soap and water and scrubbed with a brush depending on the contaminant. Regulators must be maintained according to the manufacturer's recommendations. Persons responsible for decontaminating respirators should be thoroughly trained in respirator maintenance. The safety and health plan must detail the methods to be used to decontaminate respirators and SCBAs.

Preventing Spread of Contamination

Contaminated wash and rinse solutions must be contained by using step-in containers to hold spent solutions or other methods of containment. Tools that were used in the Exclusion Zone must not be removed without proper decontamination.

Disposal of Contaminated Materials

All contaminated material and equipment used for decontamination must be disposed of properly. Clothing, tools, buckets, brushes, and any other contaminated equipment must be secured in drums or other containers and properly labeled. The spent solutions must be transferred to drums which are appropriately labeled and disposed of according to local, state, and federal regulations.

Safety Precautions for Decontamination

- Decontamination solutions must be compatible with the hazardous substances being removed to prevent a reaction which could produce an explosion, heat, or toxic products.
- Include adequate personnel to help each person through the line.
- Provide hand-holds while boots are being washed or boot covers removed



Hand-hold (photo from tools.niehs.nih.gov)

- If plastic sheeting is used or other slippery surfaces may be encountered, “gripper” decals or other material should be used to reduce the likelihood of slips.
- Provide stools (not wooden unless they will be disposed of after the job) for personnel to sit on at stations where boots or suits are removed.
- Be sure all areas are cleaned.
- Shower and change rooms provided outside of a contaminated area must meet the requirements of OSHA 29 CFR 1910.141.
- Unauthorized personnel must not remove protective clothing or equipment from change rooms.

Exercise – Suiting up and going through a decon line

During this exercise you will demonstrate proficiency inspecting PPE and donning and doffing one level of protection as part of decon line activities.

Closing

Using gear included in Levels, B or C, did you:

- Inspect PPE prior to use
- Set up decontamination zones for a hazard
- Demonstrate ability to dressout in Level B or C
- Demonstrate ability to perform decon

Based on this exercise, what takeaways do you have as you go back to work?

Please ask any remaining questions.