Incident Safety and Health Management Handbook, 2nd edition

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Foreword

In response to the multi-jurisdictional responses associated with the September 11, 2001, terrorist attacks at the World Trade Center and the Pentagon, the National Institute for Occupational Safety and Health (NIOSH) and the RAND Corporation developed a joint report assessing the issues related to protecting emergency responders (NIOSH Publication No. 2004-144). One of the major recommendations from this report was the need for an integrated incident-wide safety management program. To implement this, the report recommended the following actions:
1) building an integrated safety function into the Incident Command System;
2) coordinating plans for implementing safety management;
3) developing a group of highly trained safety managers to facilitate coordination at major incidents;
4) improving joint exercises and training by incorporating realistic safety and health issues; and
5) developing a common terminology for disaster safety and health issues and processes for use during response operations.

Industrial hygienists and safety and environmental health professionals have been heavily involved in emergency incident preparation, response, and recovery. The Incident Preparedness and Response Working Group (IPRWG) is duty-bound to provide general guidelines for these professionals to respond effectively to an all-hazards threat environment. The Incident Safety and Health Management Handbook’s (ISHMH) intended audience includes: 1) safety, industrial hygiene, and environmental health professionals with a good working knowledge of the indicated principles of their profession, and 2) professionals trained in the National Incident Management System/Incident Command System at the 100-, 200-, and 300-levels.

The purpose of the ISHMH is to provide:
1) a field-expedient guide to Safety Officers (SOFRs) and their staffs;
2) a structured safety and health planning and execution process to integrate safety functions into an established incident command structure; and
3) concise reference information for SOFRs and their staff on issues such as air monitoring, respiratory protection, and personal protective equipment selection to develop safety and health plans. By design, this Handbook does not specify all the hazardous conditions that may be encountered during a response; many other reference materials present more thorough details on aspects of specific industrial hygiene, safety, and environmental health issues that may arise. Rather, the goal of this Handbook is to provide general information and guide users on tailoring safety and health plans to their incident using the core steps of anticipation, hazard identification, risk assessment, control design and development, and communication during the accelerated pace of a response. As a “living document,” updates will be made as the fields of emergency response and safety and health advance.

Preparation and training are key. This Handbook is intended to be one tool in a safety professional’s arsenal to be used in conjunction with incident- and hazard-specific training, exercises, and drills. Over time, SOFRs and their staff will know the types of hazards to anticipate, ways to recognize those hazards and evaluate their risks, and how to recommend control measures. Although experience is a great teacher, professionals who establish their knowledge based on techniques and scientific concepts will better analyze the facts presented and make informed courses of action to an Incident Commander and associated staff.

This publication is not the end, of course, in improving safety and health functions during response and recovery operations. As recommended in the NIOSH/RAND report, safety and health professionals, regardless of their current organizational employment, need to inject safety and health functions during all aspects of emergency preparedness and response. Local, state, and federal government entities should develop lessons learned, including health and safety lessons-learned, from various training, drills, and exercises. Organizations need to build a culture that integrates safety and health into day-to-day operations prior to an emergency; safety and health professionals can make that happen.
The IPRWG will continue to design professional development courses to train professionals to use their skills in an emergency response and recovery framework. Additionally, using this publication and other sources, the IPRWG working alongside AIHA will educate and train the emergency response community and inform the public on what safety, industrial hygiene, and environmental health professionals do during emergency response and recovery operations. SOFRs maintain the big picture while also covering the details to ensure the overall response and recovery operations are performed in a safe and healthy environment. Responders and recovery workers can, at the end, also become victims of the incident, particularly in large incidents like Superstorm Sandy, the Hokkaido Tsunami and associated Fukushima melt down, Deepwater Horizon, Hurricane Katrina, and the events of September 11, 2001. SOFRs focus on the protection of these essential people, without whom no life-saving, environmental protection, or recovery from devastation could occur.
Chapter 1
Keys to Successful Incident Safety and Health Management

Essential Skills
The Safety Officer coordinates and oversees the safety and health efforts for the entire response organization. As a result, Safety Officers (SOFRs) are called upon to be leaders, managers, and team players—sometimes discretely, sometimes concurrently—to perform their duties effectively. Therefore, SOFRs need to develop and hone seven essential skills:

1. Leadership – the ability to direct activities, stimulate personnel to work together, and provide constructive feedback to others.
2. Communication – the ability to send and acknowledge clearly and accurately information, instructions, and commands.
3. Assertiveness – the ability to participate actively, state and maintain a position using facts, and act when necessary.
4. Decision making – the ability to make critical decisions, under pressure, with limited information.
5. Adaptability and Flexibility – the ability to alter willingly a course of action to meet changing demands and to maintain constructive behavior under pressure.
6. Situational Awareness – the ability to identify, process, and comprehend the critical elements of information about what is happening.
7. Analysis – the ability to study something in a methodical way and organize and break down complex information into smaller parts to gain a better understanding.

Safety Officers are vital to the response organization when they combine at least a basic understanding of safety and health principles to these seven skills. The best SOFRs are not necessarily experts in any one area; rather, they are able to lead teams, make important decisions under pressure, and know when to ask for assistance. Successful SOFRs also do not have the same background—they draw their strength from their diverse professional networks and their safety teams. Therefore, safety and health professionals who focus on these skills while maintaining professional proficiency can integrate more seamlessly into the Incident Command organization during emergency response operations.

Although there is a myriad of different ideas on how to best approach safety and health in an incident, there are basic tenets to follow regardless of the size and scope of a response:

1. Maintain professionalism, always.
   - Focus at the tasks at hand.
   - Be courteous, yet decisive and clear on recommended actions to implement.
   - The SOFR works for the Incident Commander (IC) and the Unified Command (UC). Tell them the hazards and the risks associated with those hazards. Focus on the top three to five issues. Then give them a prioritized list of recommended control measures. Although the IC/UC may disagree, the SOFR’s job is to advise and recommend. Don’t take things personally, particularly in an incident.
   - Early on, the SOFR must earn the trust and respect of the IC/UC, fellow Command and General Staff, and the response and recovery workers. To accomplish this, the SOFR should give respect to everyone with whom he/she meets and works.
   - Work as a team with the safety staff.
   - SOFR and safety staff may get assigned an aspect of safety and health with which they are not completely familiar. Ask questions, read up on any available field books, and if possible, access the internet. The SOFR may need to bring in a Technical Specialist (THSP) or an assistant with experience in that area.

2. Communicate clearly and concisely.
   - Use bulleted statements to convey the information.
   - Use plain language. Explain unfamiliar concepts and terms.
   - Keep briefings and written words short, simple, and to the point.
   - Generally, lengthy Site Safety and Health Plans (SSHPs) and safety messages will not be read thoroughly. Time is limited, stay on message.
3. Triage safety and health risks.
   • Remember, the Incident Command staff’s sole purpose is to support field operations.
   • Focus on Operational Risk Management (ORM) and high priority controls that will:
     – Prevent immediate death; and
     – Prevent or mitigate immediate serious and debilitating injury.
   • Remember that the SOFR manages an entire incident response or recovery operation from the health and safety perspective. Request subject matter expert support to perform specialized tasks (e.g., air monitoring, fit testing, or occupational medical surveillance).

4. Be decisive.
   • Decide on the hazards, their risks, and the controls necessary to prevent or minimize their occurrence.
   • Avoid lengthy, philosophical discussions until meal breaks or off-shift hours.
   • Remember, the SSHP is a key component to an Incident Action Plan (IAP). Develop the SSHP in concert with the IAP.
   • Ensure safety staff know that if they see an imminent, life threatening hazard, to stop the operation. That is the safety staff’s job and why the IC/UC depends on them to do it.

5. Keep improving the program.
   • The biggest mistake is to stop with the “low-hanging fruit” when it comes to advising and preventing health and safety hazards and their risks.
   • Address these issues and fix them early on but also ensure that all hazards are addressed.
   • For example:
     – Using the skillset of an industrial hygienist, consider executing a more thorough exposure assessment strategy looking at chronic exposures through both dermal and inhalational routes;
     – Using the skillset of a safety engineer, consider conducting a more thorough engineering and structural analysis; and
     – Using the skillset of an environmental health professional, consider developing an on-site hazard analysis critical control point program, particularly when dealing with large food-service operations serving hundreds of responders and support staff.
   • Don’t ever settle for just enforcing safety and health recommendations.
   • Continually update and improve the SSHP. Operations will change as will the environment. Update the plan regularly and verify for accuracy frequently.

Common Steps for an Incident Response

Receipt of Assignment from Organization or Government Agency

All SOFRs and their support staffs should follow this checklist to assist them in successfully deploying to and being a part of the safety and health team.

   • Obtain or confirm:
     – Designated job assignment (e.g., position);
     – Brief overview of the type and magnitude of the incident;
     – Scope of assignment;
     – Travel instructions, including reporting location and time;
     – Any special communications instructions (e.g., cell phone numbers of persons to contact at the incident);
     – Incident-related information from the media, internet, or other sources;
     – Personal protective equipment (PPE) and training readiness;
   • Ensure Incident Command Post (ICP) is in a safe area, free of hazards (e.g., chemical, biological, environmental, and radiological), as much as practicable;
   • Provide travel information to supervisor, family members, and friends, as appropriate;
   • Review this Handbook; and
   • After preparations are complete, breathe and mentally prepare.

Arrival at the Incident

   • Determine where the check-in locations are. They may be located at the:
     – Base Camp (e.g., lodging location);
     – Incident Command Post or
     – Staging Area.
   (Note 1: If instructed to report directly to an on-scene assignment, check in with the IC or SOFR.)
   (Note 2: Always check-in. Incident Command and General Staff need to know of arrivals.)
   • Receive a briefing from the IC or Deputy IC. Assistant Safety Officers (ASOFs) should receive the briefing from the SOFR. Technical Specialists should receive the briefing from the Planning Section Chief or his/her Deputy;
   • Read and, if possible, get a copy of the IAP and the SSHP;
   • Acquire other necessary work material;
   • Know the organizational chart and the agencies/parties involved;
   • Participate in meetings and briefings as required;
• Report unsafe conditions that may have been noticed upon arrival;
• If designated as the SOFR, verify locations of all personnel on safety staff. Implement a sign-in/sign-out board if necessary. Have a contact roster for cell phone numbers or radio frequencies;
• Verify that a personnel accountability system has been implemented;
• Verify personnel have been trained to perform their assigned tasks (i.e., in accordance with the Hazardous Waste and Emergency Response Operations (Hazwoper) Standard, 29 CFR 1910.120);
• If assigned as the SOFR, verify locations of all personnel on safety staff. Implement a sign-in/sign-out board if necessary. Have a contact roster for cell phone numbers or radio frequencies;
• Verify that a personnel accountability system has been implemented;
• Verify personnel have been trained to perform their assigned tasks (i.e., in accordance with the Hazardous Waste and Emergency Response Operations (Hazwoper) Standard, 29 CFR 1910.120);
• If assigned as the SOFR, ensure that the safety staff is fully staffed. Request additional safety and health professional support if needed or anticipated;
• When communicating, always use clear text and Incident Command System (ICS) terminology in all radio communications;
• Maintain a unit log for entire length of the operation. Ensure Documentation Unit Leader receives a copy;
• Report any signs/symptoms of extended incident stress, injury, fatigue, or illness for oneself or co-workers;
• Brief shift replacements on ongoing operations when relieved at end of shift or before rotating out; and
• Carry out all assignments, as directed, within the legal, ethical, and health/safety standards. Use good judgment. Ask for assistance when unsure.

Getting Organized

• SOFRs need sufficient workspace depending upon the number of ASOFs and THSPs assigned. Ensure the safety staff’s workspace is co-located with the ICP and is available for use by each work shift. Consider, however, assigning some ASOFs to work with division or group supervisors in the field versus working out of the ICP;
• Paperwork files should be kept in either an accordion-type folder or filing cabinet. Electronic files should be maintained as per the Incident Commander’s instruction. It is recommended that the following files be indexed, as a minimum:
  – Incident Action Plans
  – Site Safety and Health Plans (Note: approved versions with appendices)
  – Unit logs (Consolidate from the staff at the end of each operational period)
  – Contact lists
  – Air monitoring logs
  – Accident reports
  – Hazard and risk analysis worksheets
  – Other indexed files as appropriate

• Office and information technology (IT)-support requirements (see also Appendix III):
  – Dedicated telephone for safety staff. If staff increases, request additional telephone lines as needed.
  – Pens – 1 box
  – Pencils (mechanical) – 1 box
  – Field notebooks – 1 packet
  – Writing easel with permanent markers – 1 each
  – Laptop or desktop computers – 1 per SOFR staff
  – Shared printer
  – Shared Fax machine
  – Safety display board – refer to Appendix XII
  – Two-drawer filing cabinet or two accordion-type folders for filing
  – Shared copy machine
  – Flash memory – 1 each
  (Note: Safety personnel should arrive, if able, with the PPE needed to enter the incident location in accordance with the current SSHP.)

People to Meet

Very early into the arrival, SOFRs should begin to identify and work with key stakeholders whose jobs will be directly impacted by safety personnel during the response. At a minimum, the following people should be met early on:

• IC(s) and all members of the Command Staff (if assigned as SOFR for the overall response operation)
• Deputy IC (Note: Deputy IC typically performs duties of a chief of staff)
• Operations Section Chief and his/her Deputy
• Members of one’s own safety staff
• Planning Section Chief
• Situation Unit Leader
• Division/Group Supervisors
• Logistics Section Chief
• Finance Section Chief
• Medical Unit Leader

Eventually, you will meet their respective staff as you and your staff members move through the planning cycle.

Demobilization

• Respond to demobilization orders and brief subordinates regarding demobilization.
• Brief replacements on ongoing operations when rotating out.
• Prepare personal belongings for demobilization.
• Return all issued equipment before departing.
• Follow the check-out procedures, which should have been implemented. Ensure all records, including electronic copies, are provided to your replacement or the Documentation Unit Leader.
• Participate in after-action meetings and file the appropriate reports for lessons learned.
• Upon demobilization, notify the Resource Unit Leader and the home organization/agency of a safe return.

References
2. U.S. Coast Guard: Safety Officer Job Aid, 2015.
Chapter 7
Decontamination Guidelines

Introduction
Decontamination should only be done by properly equipped and trained personnel. Every incident response will be unique, requiring or not requiring decontamination and/or adjustment to current standard operating procedures.

Although there is a myriad of considerations to developing specific decontamination procedures, this Handbook attempts to provide an all-hazards approach for a SOFR to assess and evaluate the appropriateness and adequacy of a decontamination operation. It does not discuss in detail mass decontamination, building decontamination, forensics decontamination, and other forms of decontamination. Specific decontamination procedures may be required for these types of operations.

Basic Terminology

- Contamination: The physical contact of a hazardous substance to humans or to equipment.
- Secondary or Cross-Contamination: The physical transfer of hazardous materials from an individual or object to another individual or object.
- Decontamination Levels:
  - Mass decontamination is a commonly used term referring to the rapid reduction of contaminant from the skin of many contaminated victims. Mass decontamination is performed as quickly as possible while also practicing contamination avoidance. Other terms associated with the mass decontamination process are emergency, gross, and immediate decontamination.
  - Technical decontamination commonly refers to the deliberate decontamination of responders, equipment, and evidence. Technical decontamination can also be performed on a mass contaminated populous if conditions allow. Technical decontamination is performed with the emphasis on neutralization of the contaminant. Speed is not a factor. Terms that are commonly associated with technical decontamination are detailed, thorough, deliberate, definitive, and responder decontamination.
  - Emergency decontamination can occur at any point during a decontamination operation. Like mass decontamination, it commonly refers to procedures taken for the rapid reduction of agent from the skin. However, when an emergency arises during the decontamination process (e.g., the responder runs out of air during a technical decontamination), quick steps must be taken to alleviate or mitigate the emergency while also practicing contamination avoidance.

- Methods of Decontamination:
  - Physical Removal. Physical removal is the relocation of the contamination from one surface to another less important location. Physical removal generally leaves the contamination in toxic form. It often involves the subsequent neutralization of the contamination. For example, if soap and water are used to remove the contaminant, the runoff may be drained into a pit containing bleaching powder. However, depending on operational requirements, physical removal can be an effective technique without subsequent neutralization.
  - Neutralization. Neutralization is the most widely used method of decontamination. Neutralization is the reaction of the contaminating agent with other chemicals to render the contaminant less toxic or nontoxic. When mixed with a reactive decontaminant, the contaminant is converted into another substance (i.e., reaction products). The reactive decontaminant may be a commonly available material (e.g., household bleach) or a specifically designed decontamination agent.
  - Weathering. Weathering involves such processes as evaporation and irradiation to remove or destroy the contaminant. The contaminated item is exposed to natural elements (e.g., sun, wind, heat, precipitation) to dilute or destroy
the contaminant to the point of reduced or negligible hazard. This may be as simple as letting a vehicle sit in the hot desert sun to bake off the contaminant. Natural weathering is the simplest and most often preferred method of decontamination, particularly for terrain and nonoperational essential equipment.

**Exposure Factors to Consider When Evaluating the Level of Contamination**

- Physical state of the chemicals: gas, vapor, solid or liquid, or a combination of any of the states mentioned.
- Temperature: Both environmental temperature and the temperature of the hazardous substance involved. Typically, an increase in temperature may increase the permeation of the hazardous substance through PPE.
- Concentration: Exact concentration of a hazardous substance is not important at the time of discovery. Instead, understand that chemicals will tend to migrate from an area of high concentration to an area of low concentration. General qualitative assessment of the levels should be attained early, but immediate stopping of the release is more important than determining the exact exposure concentrations.
- Identity of the substance: Although the chemical’s specific Chemical Abstract Service (CAS) number may likely not be determined unless a transporter’s manifest or other documentation identifies the released substance, efforts by either the responsible party or a local hazardous materials response unit should be focused on identifying the substance as soon as possible.

**Emergency Decontamination**

Emergency decontamination should be planned for early in a response phase. If the presence of a hazardous substance remains, even though emergency-type response operations have ceased, emergency decontamination should still be planned and ready for employment. Depending upon the size and scope of a response and recovery operation, at any time, a fully manned decontamination set-up or a very simple unmanned set-up may be required. The big concept is **keeping it simple**.

In an emergency, the primary concern is to prevent the loss of life or severe injury to response 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 responder has been contaminated with an extremely toxic or corrosive material that could cause severe injury or loss of life, decontamination must be performed immediately. In emergency decontamination planning, provisions must be made for protecting medical personnel.

**Decontamination Procedures**

**Physical Removal**

This is the fastest method of decontamination, whereby contaminants are physically removed from protective or street clothing or the skin. Typically, this method is more appropriate when dealing with liquids, aerosols or particulates. Water is the most commonly used decontaminant.

When applied, small hose lines of approximately ¾ inch or 1 inch diameter, with a maximum 30 pounds per square inch (lbs/in²) at the nozzle should be used. A 30-degree fog pattern (30 degrees up and down from center line of the nozzle) is recommended (see Figure 7.1). This will prevent injuries and make hose line management easier. Larger hose lines that use a stream of water are dangerous as they may cause personnel to fall backwards.

If large numbers of victims require immediate mass decontamination, larger hose lines can be used and set-up in a fashion that will not cause injury. Figure 7.2 is one example of how such an expedient system can be
established. Commercial units are also available for mass decontamination.

**Clothing Removal**

- Considerations include the following:
  - It is a slower process for decontamination
  - There are levels of clothing removal
    - Shoes and/or outer garments, trousers, or shirts/blouse
    - Complete clothing removal
  - Process of clothing removal may contaminate other body areas that were protected by the clothing
  - Depending on the weather conditions and privacy issues, supplemental cover should be planned for (e.g., blankets, patient gowns, etc.)
  - Non-ambulatory (i.e., litter-bound victims) will not be able to remove their own clothing
- Clothing removal may be more appropriate when dealing with gas or vapor releases. In these cases, considerations for simply removing outer garments versus all the clothing should be reviewed.

**Neutralization/Chemical Removal**

**Decontamination Solutions**

Decontamination solutions will very seldom be employed except in an industrial facility or for use on equipment. The range of the solutions runs from hot, soapy water solutions to neutralizing agents such as a hypochlorite solution.

**Hypochlorite Solution**

- Full strength, 5 percent bleach solution from the bottle should only be applied to equipment and never to skin. A 0.5 percent bleach solution followed by a complete flushing is the maximum bleach concentration used for skin and clothing. The rule of thumb is 10:1, or 10 parts water to 1 part bleach.

Consider the following factors when deciding on a decontamination agent:

- Use of incompatible decontaminants with the hazardous substance being removed from personnel and equipment.
- Incompatible clothing and equipment being decontaminated with either the decontaminant or the hazardous substance(s) involved in the response. Clothing and equipment compatibility should have been identified during the risk analysis.
- Vapor, liquid, flammability, and explosion issues associated with the hazardous substance involved in the response. Note that the same hazards encountered with the entry team will be faced in the decontamination line.

**Chemical Removal**

After physical removal of gross contamination, employ a wash/rinse process using the appropriate cleaning solutions. Categories of decontamination solutions run parallel to the types of physical removal methods. There are solidifying solutions, surfactants, rinsing solutions, solutions that can dissolve the contaminant, disinfection solutions, and neutralization solutions.

**Verification of Decontamination Effectiveness**

The SOFR should verify the method used to decontaminate personnel and equipment was effective. The decontamination method is obviously affected by the type and state of the hazardous contaminant involved.

**Visual Observation**

By using natural light, artificial light, or ultraviolet light, this method can be used to detect remaining dirt, stains, discolorations, or clothing fabric alterations indicative of contaminant residual. If the decontamination solutions pose harmful characteristics, visual observations could also be used to verify that no remaining decontaminant exists on personnel, clothing, and equipment.

**Wipe Sampling**

Various methods can be used to either identify residue contaminants by colorimetric changes on the wiping media or analysis in a laboratory. If the response or recovery operation could be harmed by the delay, methods requiring laboratory analysis are the least desirable. On-site field monitoring methods could be used, but the SOFR should still verify the validity of the instrumentation for accuracy and acceptability of false positives or negative results.

**Cleaning Solution Analysis**

Cleaning solution analysis entails testing for elevated levels of contaminants in the final rinse solution. High levels of contaminants may indicate that additional cleaning and rinsing are needed. One way to perform this task is to test the pH of the final rinse solution. If there is a significant change in pH for this final rinse, contamination may still exist.

Analysis of the decontamination solution to verify effective decontamination may be hazardous due to the nature of the contaminant in solution. Use of this method requires greater attention to detail in the decontamination procedures and set-up to prevent cross-contamination. Cross-contamination may occur from earlier decontamination stations or from decontamination personnel manning the contamination reduction zone. Depending upon the contaminant, either laboratory or on-site direct reading instrumentation may be used.
Permeation Testing
Testing the protective clothing just decontaminated to determine if there is permeation normally requires laboratory testing. Also, this method may require destructive testing, so the issue of availability of additional protective clothing may decide if this method is viable for response and recovery operations.

This type of testing is certainly valuable for determining the effectiveness of decontamination methods or solutions. SOFRs should work with the chemical protective clothing manufacturer to determine if previous laboratory testing has been performed for the contaminant in question.

Decontamination Plan

In hazardous material response operations, an ASOF-HAZMAT individual should be designated to work with the appropriate group supervisor. This individual is responsible for developing a hazmat entry plan as part of the SSHP (see Chapter 5, Site Safety and Health Plan).

Aspects of the decontamination plan should include the following:

- Graphic layout of the decontamination and work zones, including:
  - Boundaries of the exclusionary zone.
  - Boundaries of the contamination reduction zone (CRZ).
- Control decontamination runoff as best as possible.
  - Know where it is going and ensure that it will not flow into clean areas.
  - Notify the proper authorities downstream if responders cannot confine the runoff to the incident scene.
- Location of access control points from the support zone and from the exclusion zone.
- Identification and location of each decontamination stations.
  - Determine the distance between stations of the corridor in minimizing the vapor hazard and cross contamination. The distance is most critical at the last station, where personnel remove their respiratory protection and move into the cold zone. This distance is based on the weather conditions, the numbers of personnel being decontaminated, space available, the type of contaminant, and time restraints.
  - Determine arrangement and directional flow of the decontamination corridor (note the current or predicted wind speed and direction during the operation). Select an area upwind and uphill of the exclusionary zone.
- Accessibility of decontamination station to needed vehicles, equipment, and personnel.
- Decontamination equipment required.

- PPE level of the decontamination personnel is based on:
  - The risk assessment including the toxicity of the contaminant.
  - The extent of contamination of the responders proceeding through the CRZ.
  - The environmental conditions.
  - Note: if the contaminant is unknown, Level B PPE is the minimum required protection. Generally, decontamination personnel may be sufficiently protected by wearing one level lower protection from the entry team.
- Testing for the effectiveness of decontamination.
  - The effectiveness of the decontamination method should be assessed at the beginning and periodically throughout the decontamination process.
  - If contaminants are not being removed or are penetrating protective clothing, the decontamination method must be revised.
  - There is no reliable test to immediately determine the effectiveness of decontamination.
  - Effectiveness can be estimated by using visual observation, wipe sampling, and cleaning solution analysis.
  - Monitoring may be performed using direct reading instruments with the ability to detect the contaminant in levels well below the concentration of concern for health hazards.
- Decontamination method for the decontamination team and equipment after the operation is completed.
  - Change-out procedures for breathing bottles, entry team personnel, or equipment for the entry team.
  - Contingency plans to perform rapid decontamination for entry team personnel in a nonambulatory or ambulatory manner.
- Medical aid support available. Medical Plan should cover the entry and decontamination teams.
- Collection of decontaminants and waste products and their disposal.
  - If the decontamination plan will be used for an upcoming operational period, SOFR should determine if the current plan requires updating based on changes in environmental conditions, monitoring and sampling results, or other factors.

General Decontamination Layout

Variation in the layout, to include decontaminants used, should be reflected in an incident response decontamination plan. Figure 7.3 is an example of a general deliberately planned decontamination set-up for an entry team(s).
Health and Safety Hazards

The chemical and physical compatibility of the decontamination solutions or other decontamination materials must be determined before they are used. Any decontamination method that permeates, degrades, damages, or otherwise impairs the safe functioning of the PPE is incompatible with such PPE and should not be used. If a decontamination method does pose a direct health hazard, measures must be taken to protect both the decontamination personnel and the responders being decontaminated. Figure 7.4 provides a decision aid for evaluating the health and safety aspects of decontamination methods.
Figure 7.4 — Decision Aid for Evaluating Health and Safety Aspects of Decontamination Methods

Appendix XII
Safety Display Board

Introduction
SOFRs should have a separate safety display board in a very conspicuous location where field personnel, as well as Command and General Staff, are able to see important safety and health items. The number and location of these boards will vary depending upon the incident size and work site characteristics. If technologically feasible, an electronic display board and/or touch screen computer may be used to disseminate information.

Location Guidance
Locations to consider:
• Rest/break areas;
• ICP adjacent to the SOFR staff section;
• ICP adjacent to the situation board;
• Briefing area where the operations brief is provided; and
• Site itself immediately after the authorized entry point.

Items to Post
• Current site safety plan;
  - Have copies for personnel to take or review away from the board
• Contact information for the SOFR and staff;
• Latest or consolidated air monitoring results;
• Site diagram from the entry plan (See Chapter 7 – Decontamination Guidelines);
• Brochures or pamphlets from OSHA, NIOSH, or other credible websites discussing health and safety issues directly involved in the operation; and
• Latest safety general messages issued or safety alerts.

Keys for a Successful Display Board
• Enlarge and bold titles, preferably with letters printed 8-12 inches in height.
  - “SITE SAFETY PLAN”
Incident Safety and Health Management Handbook, 2nd edition

Edited by Edward Primeau, CIH and Laura H. Weems, CIH, CSP, CHMM
Written by the Incident Preparedness and Response Working Group

Industrial hygienists and environmental health professionals are provided key safety and health planning and execution steps to follow during various disaster response operations. It provides technical information on air monitoring, respiratory protection and personal protective equipment and offers guidelines for an effective response to an all-hazards threat environment.

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