



40 Hour Program Technician-level Emergency Responder Facilitator Guide

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Midwest Consortium for Hazardous Waste Worker Training

Acknowledgments

The Midwest Consortium developed this course for emergency responders under grant D42 ES07200 and cooperative agreement number U45 ES 06184 from the National Institute of Environmental Health Sciences.

We encourage you to comment on these materials. Please provide any feedback to your Program Director.

Warning

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The material was prepared for use by experienced instructors in the training of persons who are or who anticipate responding to chemical emergencies. Authors of this material have prepared it for the training of this category of workers as of the date specified on the title page. Users are cautioned that the subject is constantly evolving. Therefore, the material may require additions, deletions, or modifications to incorporate the effects of that evolution occurring after the date of this material preparation.

Disclaimer

The Occupational Safety and Health Administration (OSHA) standard to help ensure health and safety during emergency response activities requires specific training for members of the response team, depending upon the duties to be performed. This program is intended to assist the employer in meeting the requirements of the Technician-Level responder at industrial sites. Employees trained at this level are able to approach the point of release of the hazardous material and stop or reduce the flow. According to the regulation 29 CFR 1910.120(q)(6)(iii):

Hazardous materials technicians are individuals who respond to releases or potential releases for the purpose of stopping the release. They assume a more aggressive role than a first responder at the operations level in that they will approach the point of release in order to plug, patch or otherwise stop the release of a hazardous substance.

Additional training may be required to perform specialized tasks following a response activity or as the potential hazards change at the facility. In addition, annual refresher training is required by OSHA for all emergency responders.

Content was updated April 18, 2024 and all web links are active as of that date; if you find an error, please inform the facilitator so that it can be updated.

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Course Overview for Facilitator

This Technician-level Emergency Responder training course was developed to assist employers in certifying the required competencies shown in 29 CFR 1910.120(q).

This Facilitator Guide provides a step-by-step outline for preparing to teach the *40-Hour Technician-level Emergency Responder* course. By following the outlined format and activities in this guide, you will be better able to enhance learning, stimulate class discussion, and maintain the training objectives.

This course complies with the Final Rule, 29 CFR 1910.120(q), and is designed to be taught in 40 hours. Included in the 40 hours are daily presentations, reviews, and hands-on or small groups exercises and activities; a pre- and post- test are required. Breaks and lunch are not included in the 40 hours. An example of a 40-hour agenda is below; any modifications should be consistent with the content shown and provide 40 contact hours. Therefore, an alternative agenda must be carefully prepared so that 40 hours of training is completed by the end of the course; the agenda for the program as presented must be placed in the program documentation.

It is the desire of the Midwest Consortium for Hazardous Waste Worker Training to allow professional instructional freedom yet maintain consistency of training. This course was revised and updated to incorporate the latest revision of the Hazard Communication Standard, and to make the course more customizable. Participant experiences will be incorporated as an integral part of the instruction.

It is recommended that a minimum of two experienced facilitators team-teach this course. Additional experienced station leaders may be required to "pull off" the site simulation activity effectively and assist with workshops. To provide an effective participant /teacher ratio and maximize learning, limit the class to no more than 24 participants.

Recommended Agenda

Day 1	Day 2	Day 3	Day 4	Day 5
Course Introduction, Pretest, local example 1 hour	Review Day 1 0.25 hour	Review Day 2 0.25 hour	Review Day 3 0.25 hour	Review Day 4 0.25 hour
Introduction to Hazwoper Make List 1 hour	Toxicology (cont.) Health Effects, Medical Surveillance, Heat / Cold Stress 1 hour	Monitoring 1.75 hours	Rights & Responsibilities 1 hour	Site Emergency Simulation 3.0 hours
Chemical Properties 2 hours	Level C Dressout 1 hour	Work Practices Demo and Workshop 2.0 hours	Emergency Response Tabletop exercise 3 hours	Clean up and Critique 1.0 hour
Toxicology 1 hour	Material Identification 1 hour	-	-	-
Lunch	Lunch	Lunch	Lunch	Lunch
Intro to Respirators 1.5 hours	Material Identification (cont.), SDS or Electronic Resources Exercise 1.5 hours	Decontamination & Demo and Workshop 2.0 hours	Level A or Level B Simulation with full decon 3.5 hours	Review and Quiz/Game 2.0 hours
RPE Demo & Workshop, CPC, Other 2.5 hours	Level B dressout 1.5 hours	Level A dressout 1.5 hours	Review content, List Review Guide, Prep for simulation 0.50 hour	Examination 1 hour
-	PPE Checkout Demo and Workshop 1.0 hours	Review Content and Interest List 0.25 hour	-	Course Evaluation and Closing 0.5 hour
9 hours	7.25 hours	7.75 hours	8.25 hours	7.75 hours

Facilitator Preparation

The 40-hour course incorporates a variety of teaching methods to meet varied learning styles. Material presentation, discussion, small-group activities, exercises, demonstrations, and site simulations are used. These varied formats are designed to meet the different types of learners who might be present in your courses. The Facilitator Guide provides step-by-step instructions for presenting the material. Each chapter of the Facilitator Guide includes information such as time requirements, teaching methods, required materials, suggested facilitator preparation, minimum content requirements, issues which may arise, and reference materials. Every facilitator should be familiar with the material in the Participant Guide, the Facilitator Guide, the Exercise Manual, and the content being covered. Participants recognize when one facilitator does not know what has already been covered by others; therefore, it is recommended that each facilitator be familiar with the entire program content. In addition, facilitators should be familiar with the OSHA Standard, 29 CFR 1910.120(q) and other applicable standards mentioned in the text. Review the number of participants and ensure that you have sufficient staff to meet the WTP Minimum Health and Safety Training Criteria; see <http://tools.niehs.nih.gov/wetp/> listing in Key Documents, page 18.

Carefully review the section(s) of the Facilitator Guide that correspond to the topics you are teaching. Prepare or ensure that you know the answers to Review Guide questions for your sections. The lead facilitator should have answers to all questions ready for the program. Some may generate discussion and morning facilitators should be prepared to field questions as part of the review session. Review the answers provided for Exercises. Based on experience and additional information (when provided) different answers may be provided by participants; use these occurrences to teach and as needed defer to 'unknowns' or 'in my experience' comments. It is never inappropriate to protect to a level higher than might be shown in an exercise.

Prepare or ensure that you know the answers to Review Guide questions for your sections. The lead facilitator should have answers to all questions ready for the program staff.

Complete this review before preparing your lesson. Lesson plan forms may be helpful when drafting your presentation outline. Examples of lesson plan forms are shown on the following two pages.

Lesson Plan Form 1

Teaching Methods for This Lesson Plan _ Presentation _ Discussion _ Question and answer _ Hands-on simulation _ Team teaching _ Small-group exercises _ Case study _ Other (describe):	Audiovisual Requirements _ Training handbook _ Supplemental handbook material _ Websites: _ Whiteboard _ Hands-on simulation _ Other (describe):
Reference Materials	Special Space or Facility Requirements (List any room size or special facility regulations here, such as set-up areas, equipment storage concerns, etc.)
Suggested Discussion Questions	Suggested Facilitator Preparation

Lesson Plan Form 2

Subject Area or Element	Detail	Reference Number or Citation
Major subject heading or Roman numeral item from outline format.	Detailed breakdown of subject area or element. This area will necessarily occupy more space than the column to the left.	e.g., page number in training notebook, section number of regulation, or audiovisual material.

Instructional Resources

The instructional resources listed below are integral parts of the *40-Hour Technician-level Emergency Responder* course. Many publications are available free from the U.S. Government Printing Office; other resources are available for a minimal cost. Many resources are also available on the internet.

The following instructional resources are useful:

Books - hard copy or online

Dangerous Properties of Industrial Materials, edited by N. Irving Sax

<http://onlinelibrary.wiley.com/book/10.1002/0471701343>

ERG (English and Spanish) <https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg>

Merck Index <https://www.rsc.org/merck-index>

NIOSH Pocket Guide to Chemical Hazards

<http://www.cdc.gov/niosh/npg/>

Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs)

<https://www.acgih.org/science/tlv-bei-guidelines/>

HazMat Organizations - links to access

American Petroleum Institute

<http://www.api.org/>

Association of American Railroads

<https://www.aar.org/>

Chemical Safety Board

<http://www.csb.gov/>

CHEMTREC

<https://www.chemtrec.com/>

Operations Center

<https://www.chemtrec.com/responder/services/Pages/OpCen.aspx>

Chlorine Institute and CLOREP training

<http://www.chlorineinstitute.org/>

Compressed Gas Association

<http://www.cganet.com/>

NFPA (National Fire Protection Association)

<http://www.nfpa.org/>

National Pesticides Information Center

<http://npic.orst.edu/>

The following resources are used during the program

- *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*. October 1985. NIOSH/OSHA/USCG/DHHS (NIOSH) Publications No. 85-115, <https://stacks.cdc.gov/view/cdc/5827>
- *NIOSH Pocket Guide to Chemical Hazards*. NIOSH, <http://www.cdc.gov/niosh/npg/>
- ERG (English and Spanish) <https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg>
- Hazardous Waste Operations and Emergency Response. (29 CFR 1910.120). http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=9765.
- Hazard Communication. (29 CFR 1910.1200), 2012. <http://www.osha.gov/dsg/hazcom/ghs-final-rule.html>
- Technical terms defined or acronyms spelled out at: use an SDS dictionary such as <http://www.ilpi.com/msds/ref/index.html>

Presentation of Material

15 minutes of review sessions are shown on the agenda, to reinforce key points and objectives. As chapters or sections of chapters are covered, you may want to refer participants to the Review Guide pages.

Graphics and Audiovisuals

Graphics are available and should be used to assist with in-class instruction.

Graphics appear throughout the Participant Guide to illustrate chemical properties, monitoring instruments, respiratory protective equipment, and protective clothing.

Refer participants to these illustrations as you discuss the material.

Photographs, sketches, charts, posters, short videos, and PowerPoint slides are also useful training tools and may be introduced in the lesson where appropriate.

PowerPoint slides should be limited to those which support lesson presentation. Avoid using word slides, slides with term definitions, and slides as lecture outlines. These types of slides are not effective at keeping participant attention. Effective slides contain questions, color graphics and short lists.

Exercises

Small-Group Activities and Exercises

Small-group activities and exercises (many with performance measures) are incorporated throughout this training course. Exercises are collected in a separate document, the Exercise Guide. In this Facilitator Guide, the instructions for the activity are shown. Scenarios for a number of response settings are presented in this Guide, so that Tabletops and hands-on work can be selected based on participant needs. As a facilitator, you will select the appropriate material and provide the exercise to the participants. The purpose of these activities and exercises is to experientially involve participants in clarifying information, identifying options and developing skills.

Most activities or exercises are done in small groups or with a buddy. These activities and exercises enhance the learning process; therefore, it is strongly recommended that you make activities and discussions comfortable so that everyone can participate. Assume that every class will have participants with a wide range of communication skills. Some participants will have no problems participating in group discussion, while others may have a hard time talking with group members, especially on day 1. Some participants will hesitate to be the recorder for the report backs. As with any team or group, facilitate productivity by the group, as they wish to organize themselves for a task.

Suggestions for handling group activities and discussions include the following:

- Allow participants to freely express their values, attitudes, and opinions.
- Do not judge participant responses.
- Facilitate discussion by paraphrasing and clarifying. It is seldom appropriate for the facilitator to give opinions.
- Avoid putting people on the spot. Instead of asking individuals for answers, have a volunteer from the group present answers to the class.
- Keep the groups focused on the task at hand. Because small-group exercises can draw heavily on the participants' personal experience, sometimes one person can dominate and run away with the discussion. If you see this happening, steer the discussion back on track by asking another group for reactions.
- Keep the participants alert and interested by encouraging participation. If the groups are not participating or giving only cursory answers, ask them probing questions about their answers to make them be more specific.

Activities are designed to provide the opportunity for participants to observe demonstrations and receive hands-on experience using equipment while reinforcing theoretical aspects learned in class. Some are set up as rotating stations with an assistant facilitator at each station. Performance checklists are completed by the participant during many of these activities; when used, the performance checklist is reviewed and signed by the facilitator when work at each station is completed. Performance checklists are part of the definition of Successful Completion, and must be collected, and retained by the training center as part of the participant permanent records.

Course Introduction

Time Requirement: 1 hour

Number of Facilitators: 1 or more, consistent with the ratio show in the Minimum Criteria

Materials

- Participant Guide
- Agenda
- Local example of release that resulted in a response
- Pretest

Objectives

During this introduction, participants will:

- Use a local example to identify or illustrate response hazards
- Complete the pretest

Teaching Methods

Discussion

Suggested Facilitator Preparation

- Review agenda and Participant Guide
- Develop an example of a local release or one from the Midwest that resulted in a response. Search in newspaper, newsletters and @MidwestHazMat. Chemical Safety Board investigations may also be a useful resource.
Include in the description:
 - Location and surrounding area features (homes, other hazards, transportation routes, water ways)
 - Time of day
 - Material(s) released — name and volume
- Test web links prior to the session and If any are inoperative please notify your Program Director
- Download the timeline and evaluation forms (ask Program Director for website)
- Download the pretest and answer guide (ask Program Director for website)

Minimum Content Requirements

- Welcome everyone and facilitate brief introductions
- Review the HAZWOPER acronym and the MWC
- Present a local example
- Review the agenda
- Each participant completes the pretest

Questions You May Be Asked

1. Why is there a test?

The pre-test allows us to determine what topics the class may already be strong at or may need more attention. We also will use it to measure how much knowledge has been gained during the course.

2. We do not have any equipment at the shop. I have no idea why I am here.

This course will help you identify what is needed in order to do a response. If the employer determines that you will not respond, but will call in outside assistance, this program will help you communicate better with that team.

3. Why does this take all week?

As a program funded by the National Institute of Environmental Health Sciences (NIEHS), we are devoted to hands-on training so that skills are developed and practiced. This takes time. We could read you the material in a much shorter

amount of time but back at work you would not be able to do the tasks of a responder.

Resources

Many releases are described on the MWC twitter feed: #MidwestHazMat

Presentation of the Session

This session can be presented as follows:

Introductions

Introduce yourself and have everyone introduce himself/herself.

Introduce HAZWOPER and the MWC

Turn to the Participant Guide and review HAZWOPER.

Using the Acknowledgements, introduce the Midwest Consortium, and the idea of 'model training', developed to be interactive and to facilitate development of skills that can be applied at work and in the community to reduce emissions and to respond when needed. Illustrate all the locations of training centers by pointing to the cover of the manual. Note that your organization is part of the MWC, a group funded by NIEHS to provide 'model' programs that emphasize interactive training for both knowledge gain and skill development that really 'sticks' and can be used at work.

Recent Releases (Local example)

Provide some context for training by using a local or regional example to generate discussion.

Questions you might ask include:

1. Is there anything that could have been done to prevent the release?
2. What actions might have limited the effects of the release?
3. Did everyone seem to know what to do?
4. What could be done to ensure a different outcome in the future?

Agenda for the week and what are some potential hazards?

Distribute the agenda for the week.

Refer participants to the list of potential hazards and link this to the agenda by referring to:

- Specific topics (e.g., Chemical Properties, Toxicology, Work Practices)
- Specific exercises
- Skills
- PPE, equipment, plans

Underscore the participatory nature of the program and how to get the most from the sessions.

Point out web access to a glossary and list of acronyms; if you have paper copy or SDS dictionary for use during the program, alert participants to location of the resources at the training facility.

Pretest

Distribute the pretest and provide approximately 15 minutes for each participant to complete it. Collect the pretest and the answer sheets.

Summary – Course Introduction

Review the list of 'How to get the most out of training'.

Answer any questions.

Introduction to HAZWOPER Emergency Response

Time Requirement: 1 hour

Number of Facilitators: 1 or more, consistent with ratio shown in Minimum Criteria

Materials

- Participant materials (Participant Guide and Exercise Manual)
- Copies of HAZWOPER or access to the electronic version
<https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.120>
- For definition of 'hazardous substance': section 103(14) of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (42 U.S.C. 9601); U.S. DOT 49 CFR 172.101 and appendices; 40 CFR 261.3; 49 CFR 171.8.
- Whiteboard or equivalent; marker

Objectives

During this session, participants will:

- Describe previous work experience
- Review the format of HAZWOPER
- Review the definitions of Hazardous Material and emergency
- Discuss advantages of response organization
- Contribute to a list of chemicals of interest

Teaching Methods

Discussion

Suggested Instructor Preparation

- Review agenda and Participant Guide
- Review HAZWOPER, especially the definitions and paragraph q
- Ensure web access, if to be used to access HAZWOPER
- Test web links prior to the session and if any are inoperative please notify your Program Director

Minimum Content Requirements

- Participants describe work experience
- Review HAZWOPER format
- Review definitions of hazardous material and emergency
- Review Incident Command System and training requirements
- Participants list chemicals or situations of interest

Questions You May Be Asked

1. I have never had any training and plug and patch all the time. Is that legal?
If you are doing actions to control the flow of material, and you are not a maintenance worker, then OSHA requires that you have Technician-level training. That is why you are here!
2. Maintenance does all of our responses. Are those emergencies?
This course deals with hazardous materials emergencies, which are spills or releases which require help outside of the maintenance department, according to OSHA. However, your Emergency Response Plan may include these as emergencies. Discuss this with your health and safety representative and refer to your ERP.
3. All I do is observe and report. Do I need Technician-level training?
No. Observe and report defines Awareness-level training.
4. You said we have to do this every year?
OSHA requires refresher training each year in order to maintain competencies.

Presentation of the Session

This session can be presented as follows:

Previous experience you bring to training

Many participants will have had a range of experiences that can be helpful during the training. For example, someone may have had experience with chemical manufacturing spills, and another person may have had an injury during a response working without training or at the operations-level.

Keep notes as experience is described, as it will be useful to you as a facilitator throughout the program. Share with other staff who may not be attending the introduction.

The format of HAZWOPER

Review 120 broadly and be prepared to discuss state-plan and federally enforced States. Maintain a focus on paragraph q.

Lead participants to 29 CFR 1910.120(q)(6) that shows the training for each level of responder activity. Show that in order to participate in Technician training, 24 hours of operations training should have been completed. Refer participants to the regulation to show that for the technician-level program, a prerequisite is 24 hours of training at the operations-level.

Review the actions that each level of emergency responder can do.

What is a Hazardous Material and an Emergency?

There are various definitions. The manual includes very generic definitions.

Have participants find the definition of 'hazardous substance' in the Definitions section of HAZWOPER.

Hazardous substance means any substance designated or listed under (A) through (D) of this definition, exposure to which results or may result in adverse effects on the health or safety of employees:

[A] Any substance defined under section 103(14) of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (42 U.S.C. 9601).

[B] Any biologic agent and other disease causing agent which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any person, either directly from the environment or indirectly by ingestion through

food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations in such persons or their offspring.

[C] Any substance listed by the U.S. Department of Transportation as hazardous materials under 49 CFR 172.101 and appendices; and

[D] Hazardous waste as herein defined.

Hazardous waste means –

[A] A waste or combination of wastes as defined in 40 CFR 261.3, or

[B] Those substances defined as hazardous wastes in 49 CFR 171.8.

Participants may want to know if employers can designate materials not part of the OSHA definition as ‘hazardous’. A good benchmark: when in doubt, it is hazardous!

Have participants find the definition in HAZWOPER.

Emergency response or responding to emergencies means a response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual aid groups, local fire departments, etc.) to an occurrence which results, or is likely to result, in an uncontrolled release of a hazardous substance. Responses to incidental releases of hazardous substances where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area, or by maintenance personnel are not considered to be emergency responses within the scope of this standard. Responses to releases of hazardous substances where there is no potential safety or health hazard (i.e., fire, explosion, or chemical exposure) are not considered to be emergency responses.

Facilitate a discussion and answer any questions that are asked.

How is a Response Organized?

Turn to the page with an illustration of the Incident Command System organization. Review the various groups.

Ask: “Where are the technician-level responders?”

Ask: “Where are the activities listed (phone calls through termination) in the organization?”

Briefly facilitate a review of responsibilities of each function.

Refer to the Participant Guide for a list of each element that must be in an Emergency Response Plan.

Facilitate a discussion linking the elements of the Plan and the agenda topics for the training program.

Exercise: Make a List

Facilitate a small group or full group discussion of exposures or topics of interest to participants. Post the results on the wall of the training area; check off items as they are covered.

Summary

Review the learning objectives:

- Describe previous work experience
- Review the format of the HAZWOPER
- Review the definitions of Hazardous Material and emergency
- Discussed advantages of having an organized response
- Contribute to a list of chemicals of interest

Review Summary content in Participant Guide.

Answer questions.

Chemical Properties

Time Requirement: 1 hour
Number of Facilitators: 1, consistent with number of participants shown in the Minimum Criteria

Materials

- Participant Materials (Participant Guide and Exercise Manual)
- Whiteboard or equivalent; markers
- NIOSH Pocket Guide

Objectives

When completed, participants will be better able to:

- Describe the importance of basic chemical terms
- Identify the factors needed for fire or explosion
- Demonstrate an ability to find properties of chemicals using resources

Teaching Methods

- Small-group activity
- Presentation
- Video

Suggested Facilitator Preparation

- Review the Participant Guide and Exercise Manual
- Prepare any stories and case studies which may be used when discussing specific hazards or in response to questions
- Test all web links prior to the session and if any are inoperative please notify the Midwest Consortium Program Director
- Prepare class notes
- Review background reading materials
- After assigning a chemical to each small group for the three NIOSH Pocket Guide Exercises, complete answer sheets to guide your participation in the report back sessions.

Minimum Content Requirements

- Selected physical and chemical properties of hazardous materials
- Discussion of at least five of the physical and chemical properties of chemicals
- Fire Tetrahedron/Pyramid and Lower and Upper Explosive Limits
- The characteristics of incompatible chemicals
- Use of the *NIOSH Pocket Guide to Chemical Hazards* to find chemical properties

Questions You May Be Asked

Why do I need to know about things like vapor pressure and gas density? Knowing the properties of chemicals can help predict their behavior, such as when they might explode. This could be important for your safety and the safety of your co-workers.

Presentation of the Session

This session can be presented as follows:

Important Terms

NOTE--This section is a review from prior training for most responders. If you have trained with this group for the operations-level, you may want to skip directly to the exercise as the review.

When you begin your presentation:

Ask "What are chemicals?" Name some chemicals used at your facility or that you have experience with. Refer back to the list generated during "Previous Experience You Bring to Training".

- List chemicals separately, forming three columns:
 - The first column should be chemicals that you know do not contain carbon. You will use this list to explain inorganic.
 - The second column should be chemicals that you know do contain carbon. You will use this list to explain organic.
 - The third column will be responses from the participants that are trade names, compounds, or chemicals with which you are not immediately familiar.
- Ask "In your work have you ever experienced or observed adverse or other chemical reactions?"
 - Possible answers include:
 - Acids degrading stainless steel or other metals (oxidation of metals, corrosion)
 - Blew a safety valve (pressure build-up due to temperature increase or chemical reaction)
 - Explosion (exceeded the Lower Explosive Limit and generated some source of spark)
- Ask "What chemical properties do you think are important to know when responding?"
- List answers. As you present, add any properties the participants missed.

Elements/Organic and Inorganic Chemicals

Ask for the names of some common elements. Explain how chemical compounds are made from elements. Provide some examples.

Refer back to the list generated in the Introduction to HAZWOPER, chemicals of interest that should be posted in the training area. Identify each chemical as organic or inorganic.

Boiling Point and Vapor Pressure

A video showing a vapor pressure experiment can be found on YouTube at: <http://www.youtube.com/watch?v=cMAYcwCjggo> (running time 3:14, but they repeat the experiment several times, so you can see the whole experiment in 1 minute). When the water in the aluminum can heats up, the vapor pressure of the water increases until it reaches the same air pressure as the room. At this temperature (the Boiling Point), the water boils and fills the can with warm water vapor. Plunging the can into ice water suddenly drops the vapor pressure inside the can, so that the air pressure of the room can crush the can.

This can actually happen when working with chemicals. If a container of a hot chemical is sealed up tight, and the temperature surrounding the container drops, the container can start to collapse.

Relative Gas Density

Sulfur hexafluoride is heavier than air ($R_{GasD} = 5.11$). In a short YouTube video <http://www.youtube.com/watch?v=1PJTq2xQiQ0> running time 0:30, an aluminum “boat” floats on a sea of sulfur hexafluoride, and is then sunk by filling it up with the gas, much as you might fill a boat with water and sink it. Emphasize that gases that are heavier than air can be very dangerous if they leak, as they will accumulate in low places.

pH, Acids, Bases

Ask participants to give examples of acids and bases. Have participants look at the pH Scale in the Participant Guide and talk about strong acids and strong bases (alkalis) as corrosive.

A small amount of water added to concentrated acid can generate a lot of heat, causing splashing. When diluting acid, it is always safer to add the acid to the water than to add the water to the acid. Hence the saying: Always Add Acid.

Incompatible Chemicals

Stress that the terms, “organic chemicals, hydrocarbons, or solvents,” may be used when describing incompatible chemicals. It is important to know whether a chemical is organic or not.

Reactive Materials

An example of water-reactive chemicals may be found at:

<http://www.youtube.com/watch?v=QSZ-3wScePM> (running time 1.09).

Discuss other reactive materials:

- Ethers stored for a long time can form shock-sensitive peroxides that can explode
- The inhibitors in monomers such as vinyl chloride may become ineffective, allowing runaway polymerization to occur, possibly rupturing containers
- Acids + sulfur-containing compounds produce hydrogen sulfide gas
- Acids + cyanide-containing compounds produce hydrogen cyanide gas
- Hydrogen sulfide and hydrogen cyanide exposure can be fatal

Spontaneous Combustion

Emphasize that oily rags must be stored in a tightly closed container to avoid the risk of spontaneous combustion.

Toxic Products of Combustion

Ask “Can you name something that gives off toxic gas or fumes when on fire?”

Unstable Compounds

Define and give an example.

Water-Reactive/ Air-Reactive Materials

Ask “Can you name something that reacts when it comes into contact with water/air?”

Exercise — Using the NIOSH Pocket Guide to Find Chemical Properties

Number of Facilitators: 1

Time Requirement: approximately 20 minutes (15 for exercise and 5 for report-back)

Materials:

- NIOSH Pocket Guide and worksheet in Exercise Manual
- List of chemicals, including those generated in Make a List Exercise in the Introduction to HAZWOPER Emergency Response

Procedure:

Ask: Are there any terms that look unfamiliar? (example CAS).

Review meaning and use of any identified.

Most participants should be familiar with the NIOSH Pocket Guide from previous training (to get to the technician-level).

Try to assign chemicals to each small group that represent different hazards, possibly using the list generated in the Make a List Exercise generated during the Introduction to the program. Facilitate a report back from each group. The worksheet in the Exercise Manual is for organizing their information and for future reference.

Some relevant points:

- A single chemical may be referred to by several different names and trade names, but its CAS number is unique. (example: hydrogen chloride)
- Comparing the BP to the ambient temperature will tell you whether a substance will be a liquid or gas. (example: petroleum distillates). If ambient temperature approaches the BP, VP increases.
- If your chemical has a low solubility, what will happen if it is spilled in water? (example: petroleum distillates)
- Flash point and Explosive limits: The lower the flash point and the wider the explosive limits, the more hazardous the chemical is for fire and explosion risk (example: dimethyl ether). More information on explosions follows this exercise.
- What chemicals are incompatible with the chemical that you looked up? What could happen if they are mixed?
- What does the line above “Incompatibilities & Reactivities” tell you? It tells about the flammability of the chemical.

Review any items that were confusing to participants.

Explosions

Explosions can occur under several different circumstances:

- Mixing incompatible chemicals
- Shaking, heating or compressing reactive materials, such as ether peroxides or monomers

Combustible dust explosions – videos and descriptions

Ask participants for examples from their experience or access the Chemical Safety Board, www.csb.gov, for regional examples, including

Wisconsin: <https://www.csb.gov/husky-energy-refinery-explosion-and-fire/>

Tennessee: <https://www.csb.gov/hoeganaes-corporation-fatal-flash-fires/>

Kentucky: <https://www.csb.gov/cta-acoustics-dust-explosion-and-fire/> (no video)

Indiana: <https://www.csb.gov/hayes-lemmerz-dust-explosions-and-fire/> (no video)

Allow 5-10 minutes for discussion.

Ask: Have any of you been involved in a dust explosion/fire response?

What are some cautions, based on experience?

Summary – Chemical Properties

Review the Objectives:

- Describe the importance of basic chemical terms
- Identify the factors needed for fire or explosion
- Demonstrate an ability to find properties of chemicals using resources

Review Summary content in Participant Guide

Ask the participants to give examples of practical chemistry as you go over the summary. The NIOSH Pocket Guide is a useful reference. Here are some examples:

- Producing a direct effect by contact
 - Corrosives
- Releasing Toxic Gases
 - Cyanide and acids -> hydrogen cyanide gas
 - Sulfides and acids -> hydrogen sulfide gas
- Large Amounts of Heat
 - Acids and alkalis
 - Water plus strong acids and alkalis
- Causing fires or explosions
 - Oxidizers and incompatible chemicals
 - Above the LEL and below the UEL of a chemical
 - Shaking, heating or compressing ether peroxides
 - Disturbing combustible dust
- Boiling point
 - If a chemical boils at or below ambient temperature, it will become a gas or vapor if released at ambient temperature. If ambient temperature is close to its boiling point, the vapor pressure will be high.
- Flash point/Explosive limits
 - Must evacuate if above a certain percentage of the LEL
 - Fire Tetrahedron: Oxygen will almost always be present
 - Important to know to avoid generating sparks around flammable, combustible or ignitable chemicals

Answer any questions

Toxicology and Health Effects

Time Requirement: 1 hour (day 1); 1 hour (day 2)

Number of Facilitators: 1 or more, consistent with ratio shown in Minimum Criteria

Materials

- Participant Guide, Exercise Manual
- Whiteboard or equivalent; markers
- Wall charts or slides of organ systems
- Medical dictionary, SDS Dictionary, MWC glossary
- List of chemicals of interest from Intro to HAZWOPER
- NIOSH Pocket Guides

Objectives

- Identify several principles of toxicology
- Identify human responses to some chemical exposures
- List reasons why medical surveillance is important to emergency responders
- Demonstrate an ability to find health effects of chemical exposure using resources

Teaching Methods

- Presentation/discussion
- Small-group activity

Suggested Facilitator Preparation

- Review the Participant Guide
- Test all web links prior to the session and if any are inoperative please notify the Midwest Consortium Program Director
- Prepare an outline to follow. Different groups will have different needs. It is better to respond to their concerns rather than to follow the manual rigidly. Refer back to the list generated during “Previous Experience You Bring to Training” and the chemicals you looked up in the previous exercise on Chemical Properties.

Minimum Content Requirements

- Basics of toxicology
- Possible routes of entry of selected exposures
- Each class is different, and you may need to go into some areas in depth, depending on the group interest. Emphasize terms in HCS2012 and adverse health effects of chemicals on the list the participants created in INTRO TO HAZWOPER.
- Exercise
- Medical Surveillance Program requirements
- Heat and Cold

Questions You May Be Asked

How can we learn about the chemicals we use at our facility or may be exposed to?
Show participants how to use resources such as the NIOSH Pocket Guide (NPG), SDSs, and Emergency Response Guidebook (ERG) which provide information about chemicals.

How can I know if I am being exposed to something with chronic health effects?
Show participants how to find information about chronic health effects of chemicals from resources such as the NIOSH Pocket Guide (NPG), SDSs, and Emergency Response Guidebook (ERG).

Presentation of the Session

The session can be presented as follows:

Introduction

Ask, "What is a response to exposure?" If no one answers, use the example of acid or inhaling propane.

Or ask, "Has anyone you ever worked with choked or had itchy skin because of an exposure at work?"

Some Basic Principles of Toxicology

Ask: "What is meant by saying exposures can be prevented by the warning properties of the chemical?" Some examples:

- Severe irritants of eyes, throat, airways, and skin
- Solvents-central nervous system effects
- Smells bad; the sense of smell can be unreliable-don't depend on your nose

Emphasize that warning properties are a very unreliable way of recognizing a hazardous exposure because the sense of smell varies and may be overcome, by a cold for example.

Ask the participants to name some chemicals that don't have good warning properties:

Examples: Carbon monoxide (CO), lead exposure and other heavy metals, asbestos

Acute Effects or Acute Toxicity

Ask "What is an acute exposure?"

- If no one answers, write the answer where all can see.
- Discuss acute exposures and health effects from examples provided by individuals in the class or your own experience. Facilitate a discussion of workplace exposures that result in an acute effect.

If they don't seem to get the point:

- Ask "What toxic effect does alcohol have on humans?" You will likely get the answer of a chronic effect (liver damage) rather than the acute effect (central nervous system).

Info re: OSHA HCS Labels and Pictograms can be found here:

<https://www.osha.gov/Publications/OSHA3636.pdf>. Each of the pictograms is associated with Hazards (shown in the pictogram box); chemicals are also associated with hazard statements. These have the format H3##. These Hazard Statements are shown on SDSs. For example, hexane has a Hazard Statement H336, may cause drowsiness and dizziness.

Introduce the two OSHA signal words: **Warning**, **Danger**.

The Signal Word indicates the relative level of hazard. '**Danger**' is used for more severe hazards, while '**Warning**' is used for less severe.

Show participants the Bursting Chest Pictogram. (If you have had time, link these to the list of chemicals that are of interest to the group)

Ask: What hazards does this portray? (shown in the Participant Guide with the pictogram)

Ask: What hazard statements may go with this pictogram? Examples include: May cause genetic defects. May cause cancer. See 29 CFR 1910.1200 Appendix C found here for more:

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10102

Do the same for each of the other pictograms in the section.

Link the pictogram to acute or chronic and local and systemic.

Chronic Effects or Chronic Toxicity

Ask "What is a chronic exposure?" Write some examples of chronic exposures where all participants can see. Emphasize that this involves exposure day after day resulting in many exposures without time to clear from body.

Ask "What do you worry about from chronic exposures?"

- Cancer. Participants may have a high level of interest in cancer. Ask "Do you know any workplace exposures that can cause cancer?" Be prepared to illustrate if any carcinogens are on the list of chemicals posted.
- Lung disease (from fibers, dusts, etc.)
- Damage to skin, eyes, liver, nervous system, kidneys, heart, and reproductive system

Present an example of an exposure that can cause either acute or chronic effects.

Solvents: acute=headache; chronic=dermatitis

Review a pictogram for a chronic exposure.

Routes of Entry

Ask: "What are routes of entry?"

- Discuss **inhalation, skin absorption, ingestion, and injection**
- Distinguish between skin contact and skin absorption
- Introduce multiple routes of entry and secondary sources of exposure

Factors That Influence the Body's Response to Exposure

Using the example of hydrogen sulfide (gas), ask the participants to imagine that everyone in a large group is exposed at one time. (What route of entry is this?)

Dose-response: The greater the exposure, the greater the effects.

Imagine the concentration increases until some have difficulty breathing. (Is this an acute or a chronic effect?) At this point, others have no apparent health effect.

Imagine the concentration continues to increase until some begin to feel dizzy. There still will be others with no apparent health effects. If this continues the H₂S example, might be a good place to ask where exposure may occur (sewers, confined spaces, oil tanks) and note that can only smell the 'rotten egg' odor initially, then sense of smell is overwhelmed. Sense of smell is not a reliable warning property.

Exposure or Dose? The concentration of a chemical in the air is Exposure. The concentration of the chemical or a metabolite in the body is Dose.

Ask: "Why do you think people may respond differently to exposures?" Some reasons may include:

- Heredity (includes sensitivity to allergens, metabolism, biochemical mechanisms, susceptibility, etc.)
- Gender
- Body weight
- Age
- Health condition
- Personal habits
- Synergistic effects with other exposures

Exposure Interactions

Ask: What is an additive interaction? Discuss additive, antagonistic, synergistic, and potentiation interactions.

Effects of Chemicals on the Body - Local and Systemic Effects and Target Organs

Ask: “Do the chemicals we have been talking about have **local** effects on contact (skin, eyes, airways) or get into the bloodstream (**systemic**)?” Refer back to exposures and effects that participants mentioned previously. Give an example of the difference between local and systemic effects. Emphasize that chemicals may act at a specific site or organ (liver, skin, lung, etc.). Cover the definitions found in the Participant Guide such as **carcinogen, mutagen, solvent** etc.

Refer to the first illustration, *Health Effects: Where does the health effect occur (Target Organ) and What are potential causes (the Hazard)?* in the Participant Guide, for possible responses to exposure and adverse health effects. Ask participants if there are exposures they do not recognize; facilitate finding definitions using available resources; add any that cannot be identified in the ‘parking lot’ for future discussion.

Refer to the second illustration, *Health Effects: How Does Your Body React (Acute/Chronic; Local/Systemic)?* for local and systemic effects and target organs. Ask participants if there are effects they do not recognize; facilitate finding definitions using available resources; add any that cannot be identified in the ‘parking lot’ for future discussion.

Make sure participants can use key terms: target organ, hazard, acute, chronic, local, systemic. Wall charts, slides, or a take-apart model may be used to illustrate this section. The OSHA Quickcard for HCS Pictograms can be found here: <https://www.osha.gov/Publications/OSHA3491QuickCardPictogram.pdf>

Exercise – Using the NIOSH Pocket Guide to Find Health Effect Information

In this exercise participants will use the NIOSH Pocket Guide to find health effect information for the chemical used in the previous exercise.

Number of Facilitators Required: 1

Time Requirement: approximately 15 minutes (10 for exercise and 5 for report-back)

Materials:

- NIOSH Pocket Guide and worksheet in Exercise Manual

Procedure: Participants will continue with the chemical used in the Chemical Properties exercise.

Answer questions during the exercise, as needed.

In a report back, identify any errors in information obtained. Review any items that were confusing to participants.

The worksheet in the Exercise Manual is for organizing their information and for future reference.

Ask: As a responder, what route of entry is of most concern to you? Why?

Heat and Cold

Ask “What are the symptoms of overexposure to heat?” Refer to table in Participant Guide.

Ask “What are the symptoms of overexposure to cold?” Refer responses in Participant Guide.

Medical Surveillance Program

Key points:

- HAZWOPER includes requirements for medical surveillance for responders that meet specific criteria.
- Employers are required to pay for required medical exams
- The employee should report all work-related injuries and illnesses immediately

Exposure Records

- OSHA gives employees the right to obtain relevant exposure and their medical records
- The employer must keep records of medical exams and exposure monitoring until 30 years after the worker's employment ends

Summary – Toxicology and Health Effects

Review the Objectives:

- Identify several principles of toxicology
- Identify human responses to some chemical exposures
- List reasons why medical surveillance is important to emergency responders
- Demonstrate an ability to find health effects of chemical exposure using resources

Review Summary content in Participant Guide.

Ask participants to give examples of a chemical, route of entry and hazard statement that might be related to each of the following:

- Acute exposure
- Chronic exposure
- Local effects
- Systemic effects
- Sensitizer
- Target organ
- Routes of entry

Contrast Dose-response and Exposure-response.

Medical surveillance requirements are shown in HAZWOPER.

Answer any questions.

Personal Protective Equipment (PPE) Introduction

Time Requirement: 15 minutes

Number of Facilitators: 1 or more, consistent with ratio shown in Participant Guide.

Materials

- Participant Materials (Participant Guide and Exercise Manual)
- Whiteboard or equivalent; markers

Objectives

When completed, participants will be better able to:

- Describe the role of PPE in limiting exposure

Teaching Methods

Presentation/Discussion

Suggested Facilitator Preparation

- Review the Participant Guide
- Prepare class notes

Minimum Content Requirements

- Overview of PPE; relate to agenda
- Hierarchy of controls

Questions You May Be Asked

PPE is easier, so I don't understand why it is last on the list.

Ask: "What has to happen after the PPE is purchased?"

Facilitate a discussion of the need to properly fit, train, maintain, replace PPE. This requires personnel, tracking, record keeping, and the ongoing costs do accumulate.

Presentation of the Session

The session can be presented as follows:

Introduction

Discuss PPE in terms of RPE, CPC and other; link to the agenda.

Refer to the Hierarchy of Control figure in the Participant Guide. Emphasize that PPE is the last line of defense against hazards.

Ask participants about PPE use in their previous responses, and if any of the responses involved chemicals on the list of those of interest created during Intro to HAZWOPER.

What part of the Hierarchy of Controls is illustrated by...?

- Keep adsorbents from losing the contaminant through evaporation (Contain)
- Confined Space work (Ventilate, Work Practice)
- Fire suppression (Contain, Work Practice)

Summary - PPE Introduction

Review the Objective:

- Describe the role of PPE in limiting exposure

There are specific OSHA requirements for RPE, CPC and other protective gear. This PPE is the last choice in the hierarchy of controls but is often needed in emergency response because of changing conditions and location(s) of actions needed to control the hazards.

Answer any questions.

PPE – Respiratory Protective Equipment

Time Requirement:	Intro to Respirators – 1.5 hours
	Demo and Workshop - 1.25 hours
Number of Facilitators:	1 or more, consistent with ratio shown in the Minimum Criteria (more may be needed for demo and workshop)

Materials

- Participant Materials (Participant Guide, Exercise Manual)
- Open-space room which will allow groups mobility with protective equipment
- Four tables set up as workshop stations
- SCBA units (one per participant)
- Plastic wash basins (1 per every 2 participants)
- Soap and disinfectant
- Sponges
- Paper towels
- Air-purifying respirators
- Cylinders of breathing air (1 breathing air cylinder per participant)

Section Objectives

When completed, participants will be better able to:

- Describe appropriate applications of respiratory protection
- Evaluate situations to determine if respiratory protection is required
- Identify the requirements of a respiratory protection program
- Demonstrate ability to don, use, and doff respirators
- Identify the elements of respirator training that should be provided by the employer

Teaching Methods

- Presentation
- Demonstration
- Small group activity
- Workshop

You should provide various examples of the types of respirators. If possible, as the different types of respirators are introduced, pass the facepieces around the room for the participants to look at. At the end of the presentation, ask some review questions to sum up the presentation. Long question-and-answer sessions with the participants should be avoided, because many of their questions will be answered during the workshop.

Suggested Facilitator Preparation

- Review the Participant Guide
- Review information from Lead / Program Director on expected response activities
- Prepare an outline for notes
- Review exercises and activities including answers
 - Respirator Protection Factor
 - Respiratory Protection Scenarios
 - Respiratory Protection demo and workshop
 - Donning and Doffing SCBA
 - Fit testing an APR
 - Inspecting and Cleaning Respirators
 - Wearing an airline with escape unit
- Test all web links prior to the session and if any are inoperative please notify the Midwest Consortium Program Director
- Review background reading materials listed at the end of the chapter
- Review manufacturer information and instructions for equipment used during module
- Assemble supplies and equipment for workshop stations
- Copy Performance Checklists from Exercise Manual
- Ensure medical fitness for training documentation has been received by staff
- Review 29 CFR 1910.134, Respiratory Protection

Minimum Content Requirements

- Selection - when respiratory protective equipment should be used and what type
- Use - respirator fit, medical fitness required
- Care and maintenance of respirators
- Exercises with Performance Checklists
- Donning and doffing SCBAs and APRs
- Workshops

Questions You May Be Asked

Participants might remark, "We don't inspect our PPE this way at our site. So what are we supposed to do?"

You should be prepared to facilitate a discussion about working through union or labor representatives to facilitate review and possible changes in the facility Emergency Response Plan (ERP). Emphasize that HAZWOPER requires the development and implementation of written procedures. Alternative procedures may be effective. Stress that inspection must be performed.

"What do I do when my employer tells me there is no budget to get new suits, but I have lost weight and need a smaller size?"

Be prepared to facilitate a discussion on strategies to improve the company program through discussions with employee or management representatives. Emphasize that the regulation requires that employers provide protective gear. Perhaps the employer is waiting to order a smaller size until the next fiscal year? Can you suggest that suit-compatible tape will save the cost of a new suit in the event of response?

"What about facial hair? My employer has a 'no beard' policy, and I don't like it."

Emphasize that facial hair prevents a good fit, resulting in exposure to toxic substances.

"What about medical clearance?"

Facilitate a discussion of the stresses of wearing PPE. Medical clearance is required for respirator use; employers may have additional requirements based on other PPE.

"We use SABA, not SCBA."

SABA is the global term that includes SCBA. SABA is not used by most responders because of the mobility concerns. SABA may be used in specialized responses but needs to have lots of line and an air source so often not safe or available at a response scene. Most frequent use of SABA at a response might be on the decon line - away from the response.

“What is the difference between a ‘level’ and a ‘limit’?”

Often the two terms are used interchangeably: PELimit, PELevel. The term ‘limit’ is often more associated with OSHA, as the PELs are enforceable. Values set by NIOSH, ACGIH and other groups are also referred to as ‘guidelines’.

Presentation of the Session

Respirator Selection

Ask "What considerations determine selection of respiratory protection?"

List responses (for example):

- Oxygen in the atmosphere
- Hazardous substances at the work site
- Exposure to confined space
- Exposure to extreme temperatures
- Communication needs

Types of Respirators

Introduce the two basic types of respirators (APR & ASR)

Note that ‘facepiece’ refers to the elastomeric part of the unit. A respirator is a device worn over the mouth and nose or entire face to prevent inhalation of toxins. Some may use ‘facepiece’ and ‘face mask’ interchangeably, but only ‘facepiece’ is used in this manual.

Air-Purifying Respirators

Ask: "What is an air-purifying respirator (APR)?"

Show an example of an APR to the class. Refer to the illustrations of full-face and half-face APRs in the Participant Guide. Be able to discuss when APRs are appropriate and their limitations.

Cartridges and filters for protection from Chemicals and Particles

Ask: "What do you know about filters used with APR?"

Discuss particulate filters and chemical cartridges, including:

- When not to use chemical cartridges
- The meaning of color labels
- When to change cartridge

Refer to the table in Participant Guide.

Other Reusable Air-Purifying Respirators

Discuss characteristics of gas masks and PAPRs. It may be useful to note that the definition of oxygen-enriched (>23.5%) is taken from 29 CFR 1910.147; OSHA cites greater than 22% for use in shipbuilding <https://www.osha.gov/SLTC/etools/shipyard/shiprepair/confinedspace/oxygendeficient.html>. Company guidance could show values lower than a maximum of 23.5%. Vendors do provide intrinsically safe PAPRs.

Atmosphere-Supplying Respirators (ASR)

Ask "How many of you have used a supplied-air respirator (SAR)?"

Ask "Was it a self-contained breathing apparatus (SCBA)?"

- Discuss key parts of a SCBA including air tank, facepiece, hose, demand regulator, main-line valve, and by-pass valve.
- Demonstrate donning and doffing a SCBA, using the following checklist:
 - Check gauges and valves for appropriate values
 - Turn on cylinder valve and listen for low-pressure alarm
 - Put on the tank and harness and adjust straps
 - Don the facepiece and check the facepiece seal (required user-check; fit testing will be reviewed later in this chapter)
 - Check operation of the main-line and by-pass valves
- Underscore that training must be provided by the employer for the specific type of unit used.

Have another facilitator demonstrate the procedures for donning and doffing the SCBA while the lead facilitator narrates the step-by-step procedures.

Occupational Exposure Limits and Guidelines

Measures of Concentration: Review the examples of measures of concentration given in the Participant Guide.

Key points:

- Emphasize that 1 ppm, 1 mg/m³ or 1 f/cc are very dilute concentrations, but some chemicals are hazardous even at these low concentrations
- Percent is used for more concentrated mixtures. 1% would be 10,000 ppm

Exposure guidelines and standards

Ask: “What exposure guidelines are used by your organization?”

Note: some employers adopt TLVs and some have developed companywide OELs

IDLH/PEL/TLV/REL/STEL/C

Points to be emphasized:

- There are several occupational exposure levels that are important, but only PELs are legally enforceable
- PELs are often not the most protective exposure limits

Time-Weighted Averages (TWAs)

- Many limits are expressed as an 8-hour time-weighted average
- Even though an exposure may be high for a short period of time, the 8-hour PEL may not be exceeded
- Short-term exposures should be compared to the STEL or C, if one exists. Facilitator should be prepared to indicate if any of the chemicals of interest (from Intro to HAZWOPER) have a STEL or C, or perhaps no PEL or TLV.

Biological Exposure Indices (BEIs) and Standards

- Few exposures are measured in biological fluids
- Measurements of chemicals in blood, breath or urine may be used to assess exposure such as lead, carbon monoxide, n-hexane, Parathion or trichloroethylene. (OSHA and ACGIH for lead; others ACGIH only)
- OSHA requires biological monitoring for workers exposed to lead and cadmium

Exercise – Using the NIOSH Pocket Guide to Find Occupational Exposure Levels and Protective Measures

Number of Facilitators: 1

Time Requirement: approximately 20 minutes (15 for exercise and 5 for report-back)

Materials:

NIOSH Pocket Guide and worksheet in Exercise Manual

Procedure:

Ask participants to look up the information listed on the worksheet in the Exercise Manual for the chemical the group has been working with in the previous two NIOSH Pocket Guide exercises. The worksheet in the Exercise Manual is for organizing their information and for future reference.

Some relevant points:

- The lower the exposure limit, generally the more toxic the chemical is
NOTE: some PELs may be misleading when using this guideline—many are old, having never been revised since OSHA was created.
- If a chemical is classified as a carcinogen, “Ca” is shown in the REL and IDLH areas in the NPG
- For carcinogens, there may be no safe level of exposure
- The TLV is not found in the NPG. It is found on SDSs, if a TLV has been set.

Exposure Records

It is important for participants to know that any exposure monitoring results are part of their medical records and can be obtained by the employee under the OSHA Standard on Access to Employee Exposure and Medical Records (1910.1020).

Important Points to Remember About Occupational Exposure Limits

- Most PELs, RELs, and TLVs are 8-hour average concentrations
- STELs are set for very few compounds
- IDLH, STELs, and C values are generally measured over short periods of time

Respirator Fit

Ask "What do you do to ensure that your respirator fits?" and "How do you know when you have a 'good' fit?"

Ask "What are two types of respirator fit testing?"

Review qualitative and quantitative fit testing, including:

- Purpose for testing
- Method of testing
- Cautions when testing

Ask: How many of you have had quantitative fit testing? Review positive- and negative-pressure user checks including:

- Purpose for the check
- Method of checking
- When checking is necessary

Ask: How many of you do a user check before each donning? Discuss difficulties that may occur while using respirators.

Assigned Protection Factors/Fit Factor Calculation/Maximum Use Concentration

(cover as time allows and need is documented)

Review use of APFs in respirator selection.

Discuss:

- Assigned protection factors
- Fit factor calculation. (Review sample calculation in the Participant Guide.)
- Maximum Use Concentration

Discussion

Some Respiratory Protection Programs may limit the use of APRs to compounds not known to be human carcinogens. Being more protective than what is required by OSHA is a public health and worker protection decision made by a company or negotiated in a labor-management discussion.

See for example the chemical methyl chloride, with an OSHA PEL of 100 ppm for an 8-hour TWA and a ceiling value of 200 ppm (<https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1000TABLEZ2>). Using these values and measurements, a Protection Factor could be calculated and compared with fit testing results. An APR might be selected.

However, NIOSH recognizes methyl chloride as a carcinogen and recommends use of SCBA only.

Exercise - Respiratory Protection Factor

Number of Facilitators: 1

Time Requirement: approximately 20 minutes (15 for exercise and 5 for report-back)

Materials:

- NIOSH Pocket Guide and worksheet in Exercises
- Participant Guide

Procedure:

This exercise is an illustration of how to calculate whether a respirator provides protection in a given atmosphere. Perform this exercise in small groups.

1. Calculate the MUC--chlorobenzene
 - The APF for the respirator (full-face SCBA in demand mode = 50) is found in the APF table in the Participant Guide
 - The PEL (75 ppm) and IDLH (1000 ppm) for the chemical may be found in the NPG
 - Use the MUC equation in the Participant Guide to calculate the MUC (calculated value is 3750 ppm)
 - However, MUC must be compared to the IDLH concentration. Only a *positive pressure* SCBA or SAR with escape bottle may be used in an IDLH atmosphere (notice the much-higher APFs in the APF table.). If the calculated MUC is higher than the IDLH (as it is in this case), the actual MUC will be the IDLH concentration.
2. Find the minimum safe respirator--ammonia
 - Use the NPG to find the PEL (50 ppm) and the IDLH (300 ppm)
 - Exposure is above the IDLH, so only a self-contained breathing apparatus equipped with a full facepiece and operated in a pressure-demand or other positive-pressure mode, or a pressure-demand SAR with a full facepiece in combination with an auxiliary pressure-demand SCBA may be worn.

In a report back, identify any errors in information obtained. Review the difference between Positive Pressure and Pressure Demand, to ensure that participants can distinguish.

Cleaning, Storage, Inspection, and Maintenance of Respirators

Ask: “Why is it important to maintain respiratory equipment?” Refer to guidance provided in the Participant Guide to review when inspecting, cleaning, and storing respirators. This administrative control is a required part of a respirator program.

Minimum Requirements for a Respirator Program

Ask "What criteria should be required for a respirator program?"

- List responses
- Refer to the list in the Participant Guide for points that must be included. Also refer to the Sample Respirator Program provided by OSHA found here: <https://www.osha.gov/Publications/3384small-entity-for-respiratory-protection-standard-rev.pdf#page=103>
- Review training requirements

Medical Fitness to Wear a Respirator

Ask "Why should a physician review the job and examine you if you are assigned to wear a respirator?"

List responses

Discuss:

- Some of the possible physical conditions which may *prevent* an individual from wearing a respirator
- Need for physical examinations prior to wearing a respirator. Include in the discussion who pays for the exam, how often exams are required, and who retains medical records for workers who wear respiratory protection.
- Some of the difficulties that may occur while wearing respirators

Exercise – Respiratory Protection Scenarios

Number of Facilitators: 1

Time Requirement: approximately 20 minutes (15 for exercise and 5 for report-back)

Materials:

- NIOSH Pocket Guide and worksheet in Exercise Manual

Procedure:

Working in groups, participants will evaluate the expected protection from wearing a respirator in given situations

Scenario 1

Make a fit factor calculation:

APR for a full-face APR is 50.

$$\frac{\text{measured chemical concentration (ppm)}}{APF} = \text{parts per million (ppm)}$$

$$\frac{750 \text{ ppm}}{50} = 15 \text{ ppm}$$

The PEL of 50 ppm is greater than 15 ppm, so the full-face APR gives enough protection. The IDLH is greater than the measured concentration of 750 ppm, so an APR may be used.

Scenario 2

If you do a fit factor calculation as above, you would get a value of:

$$\frac{200 \text{ ppm}}{50} = 4 \text{ ppm}$$

Even though this is below the PEL, the measured concentration of 200 ppm is above the IDLH, so the APR may not be used.

In a report back, identify any errors in information obtained.

Exercise – Respiratory Protection Demo and Workshop

Number of Facilitators Required: 1 or 2, consistent with the Minimum Criteria

Time Requirement: approximately 1.25 hours including report-back

Materials: See below for each station

Procedure: Set up 4 stations for rotations

Introduction

The purpose of providing the workshop is to give the participants an opportunity to become familiar with SCBAs, APRs and airline egress units, and cleaning and inspection procedures. Also during this time, participants practice proper fit testing procedures, learn the difference between various models and sizes of full-face APRs, and clean, assemble, and inspect a respirator for defective parts.

The four stations include:

1. Donning and Doffing SCBA
2. Fit Testing APR
3. Inspecting and Cleaning Respirators
4. Wearing air line with escape unit (optional)

At least six functioning SCBAs are needed if a full class of 24 participants is present.

Each of the four stations requires one facilitator who has experience with or is very familiar with the equipment to be donned so that questions can be answered as needed. Each station has a checklist to guide the participant and facilitator as to what occurs at the station. After the participant does the required tasks and completes the checklist, it should be brought to the station facilitator, who signs off, indicating that the participant has successfully completed the station.

If enough equipment exists for only three rotations, then the Inspection and Cleaning Station can be modified to require participants to wash the APR facepiece during the Fit Testing Station and demonstrate respirator procedures and assembly in large-group presentation. If three stations are used (numbers 1, 3, and 4), then document the Station 2 checklist form with the APR Station Leader signing it and writing across the sheet "Wash APR at Station 1 and Inspection Demonstrated."

The checklists are part of the Consortium documentation of Successful Completion and must be collected from the participants and maintained by the training institutions. Make copies of the checklist from your master facilitator guide. Some participants may wish to copy the completed checklist into the Exercise Manual.

Station 1: Donning and Doffing an SCBA

Equipment:

- One SCBA per participant
- Extra facepieces in various sizes
- Minimum of 1200 lbs of air pressure for each participant
- Manufacturer procedures for donning and doffing SCBA
- One table for every four participants
- Paper towels and mild cleaning solution, or moist wipes.
- Performance checklist (see Exercise Manual) with clipboard and pen for each participant

Organization:

- Depending on class size and equipment, determine how many groups to have
- Set up an equipment pick-up area
- Set up large tables (one for every 4 participants) for donning and doffing

Instructions:

- Issue facepiece and SCBA
- Review and demonstrate the manufacturer suggested procedures for donning and doffing SCBA. For example, if the manufacturer has a video, you may want to show it. Then demonstrate the procedures on one participant.
- With your guidance, have participants don SCBA, following the step-by-step instructions. The general steps follow:
 - Check air in SCBA to ensure that it is adequate for the duration of the workshop (approximately 1200 lbs)
 - Inspect SCBA to see whether all parts are functional
 - Follow manufacturer suggested "check-out" procedure, and don the SCBA
 - Turn on the emergency valve
 - Have participants wear the SCBA
- Give participants the opportunity to walk up and down steps

- Discuss hyperventilation; you should check to see that no one is hyperventilating and make eye contact to ensure that all are doing okay
- Check emergency valve; reinforce that 5 minutes of air remain when the bell goes off
- Have participants doff SCBA, following step-by-step instructions:
 - Bleed air out of high-pressure hose, then remove from cylinder
 - Remove and replace cylinder
 - Check condition of the "O-ring"
- Return to classroom with the facepiece, which will be used in other workshops
- Have participants complete the Workshop Performance Checklist, which you will review and sign

Station 2: Qualitative Fit Testing an APR

Materials:

- One APR per participant - assorted sizes and brands
- Cartridges to match APRs - various types and brands
- Qualitative fit testing supplies:
 - Aspirator bulbs
 - Isoamyl acetate or banana oil ampules
 - Saccharine kit (3M™ makes a kit with saccharine/bitter mister.)
 - Anti-fogging solution
 - Paper towels
 - Cleaning solutions (MSA™ has a cleaner/sanitizer in packets.)
 - 2 plastic wash basins
 - Clipboard and pen for each team
 - Performance checklist for each participant

Organization:

Depending on class size, determine whether to have one or two groups. Set up an area with respirators, fit testing chamber, and other supplies. Equipment should be displayed so participants can handle facepieces.

Instructions:

- Each participant should select a respirator
- Review and demonstrate maintenance and inspection procedures
- Check facepiece seal flexibility/integrity. Review degradation, and reinforce need for proper storage

- Remove cartridges, and check valves
- Check face shield
- Check head straps and clips
- Demonstrate and perform fit testing

NOTE: this does not fulfill the requirements of 29 CFR 1910.134

- Review and demonstrate various types of fit testing (routine or periodic)
 - Olfactory (smell)-isoamyl acetate or banana oil
 - Taste sensor-saccharine or bitter
- Show various types of cartridges
- Don respirators
- Check to see that proper procedures are followed
- Emphasize no facial hair; describe problems with contact lenses and dentures
- Review requirement for optical kit in full facepiece for workers requiring glasses
- Fit test each participant
- Demonstrate cleaning and disinfecting techniques (optional)
- Dips
- Anti-fogging solutions
- Doffing
- Demonstrate proper doffing technique
- Observe each participant doff respirator
- Review maintenance procedures briefly
- Label respirators for exclusive use of each participant during the remainder of the program, as appropriate
- Complete Workshop Performance Checklist, which is reviewed and signed by the facilitator

Station 3: Inspecting and Cleaning Respirators

Materials:

Each station should have:

- Plastic wash basin
- Soap and disinfectant
- Sponges
- Paper towels
- Clipboard and pen
- Workshop Performance Checklist

Organization:

Have station set up with equipment for cleaning respirators

Instructions:

- Participants should pair up and share wash basins, sponges, soap, and disinfectant (maximum 2 participants per basin)
- Review and demonstrate inspecting and cleaning of respirators
- Disassemble respirator and all its parts
- Inspect respirators for worn parts and defects
- Wash and dry respirator
- Reassemble respirator

Provide information for SCBAs to allow completion of questions 6-8 on checklist. From the OSHA Technical Manual:

- For all respirators, inspections must include a check of respirator function, tightness of connections, and the condition of the various parts including, but not limited to, the facepiece, head straps, valves, connecting tube, and cartridges, canisters, or filters. In addition, the elastomeric parts must be evaluated for pliability and signs of deterioration.
- For SCBAs, which require monthly inspections, the air and oxygen cylinders must be maintained in a fully charged state and recharged when the pressure falls to 90% of the manufacturer recommended pressure level. In addition, the regulator and warning devices must be inspected to ensure that they function properly.

Have participants complete Workshop Performance Checklist, which you will sign and keep.

Station 4: Wearing an Air Line with Escape Unit**Materials:**

- Four wash basins set up for cleaning respirators
- SAR (one per participant)
- Minimum 1200 lbs air pressure for each participant
- Egress units (one for each participant)
- Clipboard and pen for each participant

- Workshop Performance Checklist

Organization:

Have station set up with equipment for cleaning respirators.

Instructions:

- Review and demonstrate connecting to and disconnecting from egress unit using SAR
- Have participants practice connecting to and disconnecting from egress unit
- Review, sign, and collect the participants' completed Workshop Performance
- Checklists: The checklists are retained by the training center as part of each participant's permanent record.

Summary – PPE Respiratory Protective Equipment

Review the Objectives:

- Describe appropriate applications of respiratory protection
- Evaluate situations to determine if respiratory protection is required
- Identify the requirements of a respiratory protection program
- Demonstrate ability to don, use and doff respirators
- Identify the elements of respirator training that should be provided by the employer

Review Summary content in the Participant Guide.

Once again, refer back to the list created at the beginning of the course, and ask participants if they have any further questions on the subject of respirators.

Ask participants to name the advantages and disadvantages of different types of respirators.

Ask when a written respirator program is needed and for the important points in such a program. It is needed even if respirator use is voluntary.

Answer any questions.

PPE - Chemical Protective Clothing

Time Requirement:	Presentation – 1 hour
	Demonstration and Workshops
	Level C-1 hour
	Level B-1.5 hours
	Level A-1.5 hours
	PPE Checkout Demo and Workshop-1 hour
Number of Facilitators:	1 or more, consistent with ratio shown in Minimum Criteria (2 or more during workshops)

Materials

- Participant Materials (Participant Guide, Exercise Manual)
- Whiteboard or equivalent; markers
- Tables
- Chairs or stools for dressout
- Open-space room which will allow groups mobility with protective equipment
- Chemical protective clothing (CPC) of the appropriate level
- Other PPE—boots, hard hats

- Tape recommended by the manufacturer should be used in the field
- SCBA units (one per participant)
- Cylinder of breathing air (1 breathing air cylinder per participant)
- Air-purifying respirators
- Cleaning wipes
- Plastic wash basins (1 per every 2 participants)
- Soap and disinfectant
- Sponges
- Paper towels
- Mannequin (if needed)
- Assorted PPE for checkout; some should have imperfections/damage

Section Objectives

When completed, participants will be better able to:

- Identify appropriate use of several types of chemical protective suits
- Identify criteria used for selecting CPC
- Identify the EPA levels of protection
- Identify ways in which the effectiveness of CPC can be reduced
- Identify the advantages and disadvantages of commonly-used chemical-resistant materials
- Identify precautions to take while wearing PPE
- Describe how to properly inspect, maintain and store PPE
- Demonstrate ability to don and doff levels of protection

Teaching Methods

- Presentation
- Demonstration
- Small-group activity

Suggested Facilitator Preparation

- Review the Participant Guide
- Test web links prior to session and if any are inoperative please notify the Midwest Consortium Program Director
- Review background reading materials
- Prepare class notes
- Review exercises
 - Levels of Protection
 - Check out Level C
 - Don and Doff Level A
 - Don and Doff Level B
 - Don and Doff Level C
- Review manufacturer information and instructions for equipment used during module
- Assemble supplies and equipment for lab stations
- Review list of chemicals of interest that was made during Intro to HAZWOPER
- Prepare examples of different types of CPC, including several with damage
- Tailor the exercises to locally relevant scenarios
- Copy the four Performance Checklists for use and retention

NOTE: PPE checkout is shown in the Participant Guide for Level C only. You can use it for other levels, as time allows for preparation of some defective examples. The requirement to conduct an inspection is included in Levels A and B, as item 2; you may choose to include one defective item and identify whether or not participants notified the lead facilitator.

Minimum Content Requirements

- The different types of chemical protective clothing (CPC) that are available
- Recognize when CPC should be used and what type
- Different levels of protection of PPE
- Strengths and limitations of PPE
- Use, care, and maintenance of CPC
- Donning and doffing of the levels of PPE
- Check out PPE

Questions You May Be Asked

Participants might remark, "Where does other safety equipment come in—like fall protection?"

That too is PPE, but it is covered in specific training for those who will be doing response tasks at heights. Facilitate a discussion about whether the same principles apply - hazard analysis, provided and maintained, appropriately fit, training, maintained.

"What do I do when my employer gives me the wrong PPE and tells me that I've got to wear it or else?"

Be prepared to facilitate a discussion on strategies to improve the company respirator program through discussions with employee or management representatives. Emphasize that the law requires that employers provide adequate protection from respiratory hazards.

"Why doesn't everyone eliminate hazards?"

This is done when possible, but sometimes there are no engineering controls that are feasible. One example is during response to an emergency—it may not occur near the fume hood!

"How does this hazard assessment get done?"

Be prepared to help identify the responsible party and questions that might be asked and the information from responders that is used; note that responder input often changes the assessment as the response is conducted.

Presentation of the Session

This session can be presented as follows:

Chemical-Protective Clothing

Ask: "Why is protective clothing necessary?"

Ask: "What are the types of protective clothing you have used at a response?"

Ask: "What are situations in which protective clothing is required?"

List responses where the entire class can see them

Ask: "What considerations should be made when selecting protective clothing?"

List responses where the entire class can see them

Refer back to the list of chemicals from Intro to HAZWOPER, to relate them to the selection of CPC

Personal Protective Equipment Program

Ask: "What would you include in a PPE program for responders?"

Refer to list in Participant Guide.

Types of Chemical-Protective Suits

- Emphasize that different types of CPC are needed to protect against different hazards
- Stress that totally encapsulating chemical-protective suits are the only ones that can protect from vapor hazards
- Also note that CPC can have an expiration date, because it can and does degrade even in storage

Selection of CPC and other PPE

Ask: "What emergency response hazards are present in your current work or in previous work?"

List responses where all participants can see them. Point out that different hazards will require different PPE. Can also refer to the list of chemicals made during Intro to HAZWOPER.

Ask: "What examples of improper selection or use have you seen?"

Refer to the CPC Selection Guidelines page in the Participant Guide.

Levels of PPE

Direct participants to the pictures and descriptions found in the Participant Guide

Ask: "What equipment, according to OSHA, makes up Level A protective clothing?" and "What is required, and what is optional equipment?"

If available, have a second facilitator demonstrate Level A or have mannequin

Ask: "When is Level A equipment necessary?"

- Repeat these questions and demonstration for Levels B, C, and D protection
- Non-vapor tight TECPs may be used for Level B protection

Exercise - Levels of Protection

This optional exercise may be performed in small groups. It can be tailored to the needs of participants by replacing the situation shown below with locally relevant scenarios.

Number of Facilitators: 1

Time Requirement: approximately 20 minutes (15 for exercise and 5 for report-back)

Materials:

- NIOSH Pocket Guide
- Participant Guide

Procedure:

Write the exposure scenario where all can read it and distribute NIOSH Pocket Guides for use. Allow time for each small group to determine an answer. Ask for report-back.

1. At XYZ Inc. 15 drums identified to contain dioxane have been toppled, and some are leaking. What level of protection should be used to stop/contain the leak(s) and restage the drums for removal?

Supplied-air respirator with full facepiece and level B. Dioxane is a carcinogen, and the IDLH level is 500 ppm.

2. A tractor trailer has jack-knifed, and a cloud is escaping from the open door at the back end of the trailer; the cloud is drifting toward the tractor. What level of protection should be worn to help the driver who appears to be unconscious?

Level A

3. You are responding to a small leak (puddle is 1 x 1.5 feet; stream the size of a pencil) from a 55-gallon drum of ethanol on a loading pad. What do you wear as you approach the drum to plug the leak?

Level C

4. At a food processing plant, ammonia is detected at a perimeter monitoring station. What level of protection do you wear to check the perimeter station?

Level D. Carry APR and communication equipment.

5. At a food processing plant, ammonia is entering the warehouse. What level of protection is used to approach the pipe that has been damaged to stop the leak?

Level A

Characteristics and Properties of CPC/Penetration, Degradation, Permeation

Ask: “What is the difference between penetration, degradation, and permeation?”

Chemical-Resistant Materials

Refer to the Participant Guide for a list of CPC materials and their advantages and disadvantages.

Ask: “How many of you have used material or glove charts to match hazard to protection?”

Precautions When Wearing CPC

- Have participants make a list of five precautions to consider. This task should take about 3 minutes. Ask for volunteers to state what they considered.
 - List participant responses where everyone in the class can see them. Add additional responses to complete the list.
- Refer participants to the Participant Guide for a list of precautions in the use of CPC
- Discuss issues when wearing PPE such as:
 - Hearing impairment
 - Vision impairment
 - Heat stress
 - Slips, trips, and falls
 - Care taken when donning and doffing gloves to avoid rips and tears
 - Avoiding placing hands and knees on the ground to prevent permeation of chemicals and abrasion of suit material
 - Use of the buddy system

Inspection, Maintenance, and Storage of CPC

Ask: "Why is it important to inspect, maintain, and properly store CPC?"

Demonstrate how to inspect CPC including examining suits for cuts, holes, rips and tears, abrasions, weakness in zippers, signs of malfunctioning, and discolorations and visible chemical contaminants. Frequently, a checklist will be provided in the company's written program. Show participants some examples of CPC that should not be put into service or has degraded in storage such as holes, tears, sticky, cracked.

Donning and Doffing PPE

Stress the following:

- PPE should be inspected every time it is donned and doffed
- All tape should include tabs for ease of removal. Tape should be the brand/type recommended by the manufacturer. Positive and negative user checks of respirators should be performed every time a respirator is donned.
- Be sure there are annual pressure checks for Level A and B suits

Exercise - Level C Dressout AND Level C PPE Checkout

Exercise – Level B Dressout

Exercise – Level A Dressout

NOTE: These four exercises each include a required Performance Checklist

Number of Facilitators: See each exercise

Time Requirement: approximately 1 hour (including report-back) for Level C and checkout; 1.5 hours for Levels A and B

Materials: See below.

Procedure: Each is described below

The purpose of these exercises is to give participants the opportunity to wear and become familiar with proper donning and doffing of Levels A, B, and C protective

clothing and to teach participants inspection procedures of the various parts, such as boots, hard hat, gloves, CPC suit, facepiece, etc.

Four separate sessions are conducted: PPE Checkout and Level C dressout, Level B dressout, Level A dressout. If you want, you can use the PPE Checkout checklist for Levels B and A also; see NOTE in Preparation, above.

Each level of dressout requires one leader/facilitator who is experienced or very familiar with the clothing and respiratory equipment to be donned so that questions can be answered as needed. A checklist to guide the participant and facilitator as to objectives/skills demonstrations are provided. After the participant has donned and doffed the suit and completed the checklist, you review, sign, and collect the checklist.

In this program, participants will wear levels A, B and C.

These Performance Checklists are part of the Consortium documentation of training and must be collected from the participants and maintained by the training institution.

Before running each dressout, a facilitator should have demonstrated the PPE and taken time to review the checklist with the participants.

Level A Don/Doff

Materials:

- SCBAs (one for each pair of participants)
- Extra facepieces in various sizes
- Minimum of 1200 lbs air pressure
- Manufacturer procedures for donning and doffing SCBA
- One table for every four participants
- Paper towels
- Mild cleaning solution
- Moist wipes
- Cylinders of air
- Levels A suits
- Tape recommended by the manufacturer should be used in the field
- Clipboards and pens
- Performance checklists
- Selected gloves, boots, and hard hats

Organization:

- Depending on class size and equipment, determine how many groups to have
- Set up an equipment pick-up area
- Set up large tables (one for every 4 participants) for donning and doffing
 - Stools or chairs

Level B Don/Doff**Materials:**

- SCBAs (one per pair of participants)
- Extra facepieces in various sizes
- Minimum of 1200 lbs air pressure
- Manufacturer procedures for donning and doffing SCBA
- One table for every four participants
- Paper towels
- Mild cleaning solution
- Moist wipes
- Cylinders of air
- Level B suits
- Tape recommended by the manufacturer should be used in the field
- Clipboards and pens
- Performance checklists
- Selected gloves, boots, and hard hats

Organization:

- Depending on class size and equipment, determine how many groups to have
- Set up an equipment pick-up area
- Set up large tables (one for every 4 participants) for donning and doffing
 - Stools, chairs

Level C Don/Doff and Checkout**Materials:**

- APRs (one per pair of participants)
- Extra facepieces in various sizes

- Manufacturer procedures for donning and doffing APRs
- One table for every four participants
- Paper towels
- Mild cleaning solution
- Moist wipes
- Level C suits
- Tape recommended by the manufacturer should be used in the field
- Clipboards and pens
- Performance checklists
- Selected gloves, boots, face protection, and hard hats
- Assemble PPE for checkout—some of which should have defects.

Organization:

- Depending on class size and equipment, determine how many groups to have
- Set up an equipment pick-up area
- Set up large tables (one for every 4 participants) for donning and doffing
 - Stools, chairs

Other PPE

Allow participants to handle a display of available clothing, that may include:

- Face protection
 - Full-face shield
 - Eye protection
 - Face shield not tested for permeation
- Gloves
 - Performance charts
 - Sizes
 - Damage
 - Inspection
- Boots
 - Steel Toes
 - Stitching, molded seams
 - Shank
- Hard Hats
 - Approved versus not approved
 - Bump caps

Summary – Chemical Protective Clothing

Review the Objectives:

- Identify appropriate use of several types of chemical protective suits
- Identify criteria used for selecting CPC
- Identify the EPA levels of protection
- Identify ways in which the effectiveness of CPC can be reduced
- Identify the advantages and disadvantages of commonly used chemical resistant materials
- Identify precautions to take while wearing PPE
- Describe how to properly inspect, maintain, and store PPE
- Demonstrate ability to don and doff levels of protection

Review Summary content in Participant Guide.

Ask participants to explain the differences between the different levels of protection and when each should be used. Use this opportunity to make any clarifications or fill in gaps in knowledge.

Ask participants to list factors which could reduce the effectiveness of protection. Provide any answer that participants don't mention.

Answer any questions.

PPE – Other Protective Gear

Time Requirement:	30 minutes total
Number of Instructors:	1 or more, consistent with ratio shown in the Minimum Criteria

Materials

- Participant materials (Participant guide, Exercise Manual)
- Whiteboard or equivalent; markers
- Copies of OSHA standards (or sufficient number of electronic devices)
- Optional: Electronic media such as smart phone or laptop

Section Objectives

When completed, participants will be better able to:

- Identify OSHA requirements or other guidelines for hearing, eye/face, head and foot, hand/arm protection
- Describe special protective clothing

Teaching Methods

This session incorporates standards for Personal Protective Equipment (PPE) other than Respiratory Protective Equipment (RPE) and Chemical Protective Clothing (CPC) as a participant review and feedback.

- Presentation/discussion
- Small-group activity

Suggested Instructor Preparation

- Review the Participant Guide and Exercise Manual
- Review the PPE standards and guidelines listed in the participant guide
- Test all web links prior to the session and If any are inoperative please notify the Midwest Consortium Program Director
- Review the CPC sections of the program that these participants have completed.
- Prepare copies of the standards/guidelines (or ensure sufficient number of electronic devices are available)
- Prepare an outline for notes to be included in the program file
- Ensure that you have assembled all the materials needed for the Exercise

Minimum Content Requirements

- Review list of other PPE standards shown in the participant guide
- Exercise - use selected standards relevant to the group of participants

Questions You May be Asked

Participants might remark, "Where does other safety equipment come in—like fall protection?"

That too is PPE; if a participant needs to use it because of assigned duties or response activity, specialized training is required. Facilitate a discussion about whether the same principles apply—hazard analysis, provided and inspected, appropriately fit, training, maintained.

Presentation of the Session

The session can be presented as follows:

Review the objectives

Review the listed standards: noise, eye/face, head, foot, electrical, hand. Ensure that you know the answers to the items on the worksheet (some may be employer-specific).

Exposure-Specific Protective Clothing and Testing

Discuss the different types of exposure-specific clothing that may be used, with emphasis on those that participants may require.

Noise

Ask: “What are the loudest noises at your workplace?” Use responses and the dBA table in the Participant Guide to have a discussion about the impact of noise.

Exercise – Using the OSHA Standards and Other Guidelines

Number of Facilitators Required: 1

Time Requirement: approximately 20 minutes (15 for exercise and 5 for report-back)

Materials:

- Copies of OSHA standards (or sufficient number of electronic devices)
- Worksheet in Exercise Manual
- Participant Guide

Procedure:

Participants will work in groups to complete a worksheet. Assign each group a relevant standard or guideline from the list. Facilitate a report back using a writing surface viewable by all for summary of findings. In a report back, identify any errors in information obtained. Ensure that the worksheets are collected to document completion. These become part of the program file.

Summary – Other PPE Requirements

Review the objectives:

- Identify OSHA requirements and other guidelines for hearing, eye/face, head and foot, hand/arm protection
- Describe special protective clothing

Review Summary content in Participant Guide.

OSHA has specific standards for

- Hearing Protection
- General Requirements: Personal Protective Equipment
- Eye and Face Protection
- Head Protection
- Foot Protection
- Hand Protection

The general Personal Protective Equipment standard (1910.132) requires selection and use of all PPE is based on a documented hazard assessment and specifies the training required for all workers who must use PPE.

Ask: Based on this exercise, what are some of your takeaways as you go back to your employer? List them on a writing surface viewable by all.

Answer any remaining questions.

Material Identification

Time Requirement: 4 hours (1.5 hours for Material Identification,

1.5 hours for Physical and Safety Hazards,

1.0 hour for SDSs)

Number of Facilitators: 1 or more, consistent with ratio shown in Minimum Criteria

Materials

- Participant Materials (Participant Guide, Exercise Manual)
- Whiteboard or equivalent; markers
- Hazard Communication Standard, with appendices
- If possible, obtain laminated Hazard Communication Quick Cards from the local OSHA office. Twenty (20) can be ordered per requester from the OSHA online service.
- If extra training on the 2012 Hazard Communication Standard is needed, the HCS2012 Exercise may be used.
- Emergency Response Guidebooks or devices with ERG loaded
- SDS for one or more chemicals of interest, to tailor exercise to participants

Objectives

When completed, participants will be better able to:

- Identify possible contents of containers based on shapes and sizes
- Identify label information in the Hazard Communication standard or other systems including NFPA 704 and HMIS
- Identify hazards indicated by placards in the DOT system
- Identify other resources for hazmat information available with shipments or when containers are transferred
- Demonstrate an ability to identify health and safety hazards using resources

Teaching Methods

This chapter combines presentation/discussion and small group activities.

Suggested Facilitator Preparation

- Review the Participant Guide
- Test web links prior to the session and if any are inoperative please notify the Midwest Consortium Program Director
- Review the HCS2012 webpage: <https://www.osha.gov/dsg/hazcom/index.html>. Be familiar with key concepts such as pictograms, labels, placards, SDS content and how to use to find safety information.
 - See especially the questions as you scan down the page, and the sites shown on the sidebar at the right
 - Many of the tools on this website are used in the SDS exercises (Quick Cards, standard)
- If possible, tailor the labels and SDSs used to participant needs. Refer back to the list of chemicals from INTRO TO HAZWOPER. Alternatively, ask participants (or their employers) to bring labels and SDSs from the worksite. For responders who serve multiple worksites and situations, conduct reconnaissance to determine if they have become familiar with systems used in those locations.
- Review the Emergency Response Guidebook
- Review and prepare material for Exercises (and tailor to background/needs of participants). This includes making sure there are label/placards and that the expected response entries for the worksheet for each label or placard have been developed. Copy SDS for use.
- Prepare an outline for your presentation.

Minimum Content Requirements

- Container shapes and sizes
- Systems and symbols
 - Hazard Communication standard
 - NFPA 704 system
 - HMIS system
 - DOT system of placards and labels – Emergency Response Guidebook
 - Pesticide labels
 - Infectious materials and radiation symbols
- Documentation
 - Shipping papers
 - Bill of lading
 - Hazardous waste manifests
 - Waste profile sheets
- SDSs
- Exercises appropriate for the group

Questions You May Be Asked

“Why are there so many different labeling systems?”

They were made by different groups. DOT labels are for transportation of chemicals, while the NFPA and HMIS systems are for workplace hazards. HCS2012 (OSHA) doesn't require replacement of these workplace warnings, but any other system must be consistent with HCS. Suppliers must provide an SDS according to HCS requirements.

“Which of these labels and pictograms are we required to use?”

In transportation it is necessary to comply with DOT regulations. For workplace hazards, any system must be consistent with HCS2012.

“Can we keep using the MSDS sheets we have?”

No, the format and information in HCS2012 differs; you need an updated SDS.

“What changes took place with the new 2012 standard?”

There are 3 major changes: 1) Hazard classification updates, 2) Labels now require harmonized signal word, pictogram, and hazard statements, and 3) SDSs now have a standardized 16-section format.

Presentation of the Session

The session may be presented as follows:

Prepare a chart to help participants differentiate between various systems

Container Shapes and Sizes

Review the usual contents of various types, shapes and sizes, referring to the illustrations found in the Participant Guide.

Ask: “Which are at your worksite or sites where you may respond?”

Systems and Symbols

In this section, labels, placards and documents that can be used to identify hazardous materials will be covered. In order to gain information about whether participants have received effective Hazcom training,

Ask:

- Are you familiar with pictograms?
- What other labels and placard systems are you familiar with? NOTE: folks may not know the name of a system; be prepared to hold up examples.
- Have you ever used documents such as shipping papers or SDSs?
- How are labels, placards and documents useful to a responder?

Globally Harmonized System - Hazard Communication Standard

Key Points:

- Hazard Communication standard labels are found on chemical containers coming from the manufacturer. If another system is used, it must be consistent with HCS2012, so the content must be there. While multiple systems were initially used, likely the transition to one system is in place in most workplaces. Responders who serve multiple workplaces should be aware of the systems in use that may be encountered.
- Container labels have certain required elements, including a pictogram. The use of pictograms is a quick way of communicating the hazard(s) of a substance.
- Signal words can only be “Danger” (more hazardous) or “Warning”
- Hazard classes are found in Appendix C.4. of HCS2012

Exercise - Pictograms

Number of Facilitators Required: 1

Time Requirement: approximately 20 minutes (15 for exercise and 5 for report-back).

Materials:

- OSHA Quick Card and worksheet in Exercise Manual.

Procedure: Have each group complete Worksheet.

Facilitate a report back.

Other types of labels may still be used. Alternative labeling systems such as the National Fire Protection Association (NFPA) 704 and the Hazardous Material Information System (HMIS) are permitted for workplace containers. However, the information supplied on these labels must be consistent with HCS2012, e.g., no conflicting hazard warnings or pictograms. See:

<https://www.osha.gov/dsg/hazcom/hazcom-faq.html#11>

Labels

Labels may be found on small containers or large stationary tanks of chemicals. Colors, symbols and numbering systems are used to identify hazards.

National Fire Protection Association (NFPA)–704 System

- Display an NFPA label. Discuss the meaning of colors, numbers and special symbols
- The higher the number, the higher the hazard. This is the opposite of the HCS2012 system. However, HCS category numbers do not appear on labels. They will be found in Section 2 of the Safety Data Sheet (SDS).

The HMIS (Hazardous Material Information System)

Display an HMIS label. Discuss the meaning of colors, numbers and letters. Like the NFPA system, the higher the number, the higher the hazard.

Letter codes (A-K, X) indicate PPE required.

An asterisk in the first box next to “Health” indicates a chronic health effect. The target organ is designated by an icon. Physical hazards are also indicated by icons.

Emergency Response Guidebook–System of Placards and Labels (Enforced by the US Department of Transportation [DOT])

- Review how to use the DOT Emergency Response Guidebook (ERG). Provide a copy of the book to each participant for use during the program.
- Display DOT placards and labels. Discuss the meaning of colors, words, symbols and numbers on the placards.
- Select a DOT placard and lead the class through finding information on one chemical. Have the page numbers ready to give to participants. Using a chemical that has been involved in a recent local response could make the discussion more interesting (use the chemical in the local example presented in the introduction of the program; ask participants to read the Numbered Guide information and discuss the importance to a responder.

Pesticide Labels

Display a pesticide label. EPA regulates pesticides under FIFRA. Pesticides make up 7 of the top 30 chemicals on the Substance Priority List of hazardous substances found at NPL (Superfund) sites.

Infectious Materials and Radioactive Materials Symbols

Show radiation and infectious materials symbols. Emphasize the need to treat materials with respect if they see these symbols.

Exercise – Labels and Placards

Number of Facilitators: 1

Time Requirement: approximately 20 minutes (15 for exercise and 5 for report-back)

Materials:

- HCS labels
- DOT Placards or Labels
- NFPA Labels
- HMIS Labels
- DOT Emergency Response Guidebook
- NIOSH Pocket Guide

Procedure:

Divide the class into small groups. Pass out examples of different labels and placards for the same chemical to each group. Compare the different labeling systems. Have the groups complete fill in as much information as possible.

Ask all the groups the same question from the worksheet at the same time. Answers to the questions will vary, depending on the label or placard.

Not all labeling systems provide the same information. In order to familiarize the participants with the various labels, this exercise will facilitate decision making regarding information sources. The following questions may be useful:

- If you need to look up information, where do you look?
- When should you familiarize yourself with the chemical?
- Which placard or label gives the most information?
- Which placard or label gives the information quickest?
- What information is missing from your placard or label?

Participants will notice that there is a lot more information on the Hazard Communication labels than on an NFPA-704 label or a DOT placard, and the information is available without referring to a guidebook or SDS.

- DOT, NFPA, and HMIS placards and labels offer quick, general warnings to the hazards of a substance. The HMIS label also offers information on personal protective equipment needed.
- The number from a DOT number placard can be used to look up further information in the Emergency Response Guidebook (ERG).
- If the name or CAS number of a substance is given along with the NFPA or HMIS label, more information can be found in an SDS, the NIOSH Pocket Guide, or other resources.

Documentation

Discuss other sources of information.

Review in the Participant Guide:

- Shipping papers for hazardous material-required by DOT.
- Manifest forms-required by the EPA and DOT.
- Waste Profile Sheets-analysis of hazardous waste.
- SDSs – required by the Hazard Communication standard to be available in the workplace.
- Documents are important resources for recognizing health and safety hazards.
- Discuss the limitations of documentation.

Exercise – Finding Safety and Health Information, SDS

Number of Facilitators: 1

Time Requirement: approximately 30 minutes (25 for exercise and 5 for report-back)

Materials:

- OSHA Quick Card, Hazard Communication Safety Data Sheets
- SDS on the following pages, or an SDS of interest to the participants

Procedure:

Ask participants in small groups to use an SDS to find the health and safety information necessary to complete the Worksheet – Information in an SDS, found in Exercises. It is recommended to use an SDS for a chemical identified by participants at the beginning of the course, or the SDS given on the following pages may be used. Facilitate a report back to resolve questions or problems in finding information.

OR

Exercise - Electronic Resources

Overview: Electronic resources are increasingly useful tools for emergency responders. In this Incident Command System exercise, you will use several online databases as resources to gather information needed to plan a response to an emergency scenario. See <https://mwc.umn.edu>.

Safety Data Sheet

Printing date 06/21/2013 Reviewed on 06/21/2013

1. PRODUCT AND COMPANY IDENTIFICATION

· *Product identifier*

· *Trade name: REMOVER/THINNER 911*

· *Article number: 911-1*

· *CAS Number: 107-98-2*

· *EC number: 203-539-1*

· *Index number: 603-064-00-3*

· *Relevant identified uses of the substance or mixture and uses advised against: No further relevant information available.*

· *Application of the substance/the preparation: Laboratory chemicals*

· *Details of the supplier of the safety data sheet*

· *Manufacturer/Supplier:* Chemco
909 Chemway Ct.
Montgomery, AL
USA

Telephone: +1 800-999-9999

Fax: +1 800-888-8888

Emergency Phone # (For
both supplier and
manufacturer) : (123) 456-7890

Preparation Information : Chemco Product Safety – North America
1-800-777-7777

2. HAZARDS IDENTIFICATION

· *Classification of the substance or mixture*

· *Classification according to Regulation (EC) No 1272/2008*



GHS02 Flame

Flam. Liq. 3 H226 Flammable liquid and vapour.



GHS08 Health hazard

Repr. 1B H360 May damage fertility or the unborn child.



GHS07

Acute Tox. 4 H312 Harmful in contact with skin.

Acute Tox. 4 H332 Harmful if inhaled.

Skin Irrit. 2 H315 Causes skin irritation.

STOT SE 3 H336 May cause drowsiness or dizziness.

GHS Label elements, including precautionary statements

· Hazard pictograms



· Signal word Warning

· Hazard statements

H312 Harmful in contact with skin.

H332 Harmful if inhaled.

H315 Causes skin irritation.

H336 May cause drowsiness or dizziness.

· Precautionary statements

P261 Avoid breathing dust/fume/gas/mist/vapours/spray.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P321 Specific treatment (see on this label).

P322 Specific measures (see on this label).

P405 Store locked up.

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

· Classification system:

· NFPA ratings (scale 0 - 4)

Health = 2

Fire = 1

Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**

Health = 2

Fire = 1

Reactivity = 0

3. COMPOSITION/INFORMATION ON INGREDIENTS

· **Chemical characterization: Substances**

· **CAS No. Description**

107-98-2 1-methoxy-2-propanol

· **Identification number(s)**

· **EC number:** 203-539-1

· **Index number:** 603-064-00-3

· **Dangerous components:**

1589-47-5 2-methoxypropanol ≤ 2.5%

4. FIRST AID MEASURES

· **Description of first aid measures**

· **General information:**

Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.

· **After inhalation:**

Supply fresh air. If required, provide artificial respiration. Keep patient warm. Consult doctor if symptoms persist.

In case of unconsciousness place patient stably inside position for transportation.

· **After skin contact:** *Immediately wash with water and soap and rinse thoroughly.*

· **After eye contact:** *Rinse opened eye for several minutes under running water.*

· **After swallowing:** *If symptoms persist consult doctor.*

· **Information for doctor:**

- **Most important symptoms and effects, both acute and delayed** *No further relevant information available.*
- **Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5. FIREFIGHTING MEASURES

- **Extinguishing media**
- **Suitable extinguishing agents:** *Use firefighting measures that suit the environment.*
- **Special hazards arising from the substance or mixture** *No further relevant information available.*
- **Advice for firefighters**
- **Protective equipment:** *Mouth respiratory protective device.*

6. ACCIDENTAL RELEASE MEASURES

- **Personal precautions, protective equipment and emergency procedures** *Not required.*
- **Environmental precautions:** *Do not allow to enter sewers/ surface or ground water.*
- **Methods and material for containment and cleaning up:**
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Dispose contaminated material as waste according to item 13.
Ensure adequate ventilation.
- **Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7. HANDLING AND STORAGE

- **Handling:**
- **Precautions for safe handling**
Ensure good ventilation/exhaust at the workplace.
Prevent formation of aerosols.
- **Information about protection against explosions and fires:**
Protect from heat.

Protect against electrostatic charges.

· **Conditions for safe storage, including any incompatibilities**

· **Storage:**

· **Requirements to be met by storerooms and receptacles:** *No special requirements.*

· **Information about storage in one common storage facility:** *Not required.*

· **Further information about storage conditions:**

Keep receptacle tightly sealed.

Protect from heat and direct sunlight.

· **Specific end use(s)** *No further relevant information available.*

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

· **Additional information about design of technical systems:** *No further data; see item 7.*

· **Control parameters**

· **Components with limit values that require monitoring at the workplace:**

107-98-2 1-methoxy-2-propanol

REL ST: 540 mg/m³, 150 ppm

TWA: 360 mg/m³, 100 ppm

TLV STEL: 360 mg/m³, 100 ppm

TWA: 180 mg/m³, 50 ppm

· **Additional information:** *The lists that were valid during the creation were used as basis.*

· **Exposure controls**

· **Personal protective equipment:**

· **General protective and hygienic measures:**

Keep away from foodstuffs, beverages and feed.

Immediately remove all soiled and contaminated clothing.

Wash hands before breaks and at the end of work.

Avoid contact with the skin.

Avoid contact with the eyes and skin.

· **Breathing equipment:**

In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use respiratory protective device that is independent of circulating air.

· **Protection of hands:**

Protective gloves:

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation. Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.

Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation.

· **Material of gloves**

The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.

· **Penetration time of glove material**

The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.

· **Eye protection:** *Goggles recommended during refilling.*

9. PHYSICAL AND CHEMICAL PROPERTIES

· **Information on basic physical and chemical properties**

· **General Information**

· **Appearance:**

Form: *Fluid*

Color: *Colorless*

· **Odor:** *Alcohol-like*

· **Odour threshold:** *Not determined.*

· **pH-value at 20 °C (68 °F):** *4-7*

· **Change in condition**

Melting point/Melting range: *-96.7 °C (-142 °F)*

Boiling point/Boiling range: *80 °C (176 °F)*

· **Flash point:** *110 °C (230 °F)*

· **Flammability (solid, gaseous):** *Not flammable.*

· **Ignition temperature:** *270 °C (518 °F)*

· **Decomposition temperature:** *Not determined.*

· **Auto igniting:** *Not determined.*

· **Danger of explosion:** *Product does not present an explosion hazard.*

· **Explosion limits:**

Lower: 2.3 Vol %

Upper: ~ 20 Vol %

- **Vapor pressure at 20 °C (68 °F):** 12 hPa (9 mm Hg)
- **Density at 20 °C (68 °F):** 0.962 g/cm³ (8.028 lbs/gal)
- **Relative density** Not determined.
- **Vapour density** Not determined.
- **Evaporation rate** Not determined.
- **Solubility in / Miscibility with Water:** Not miscible or difficult to mix.
- **Partition coefficient (n-octanol/water):** Not determined.
- **Viscosity:**

Dynamic: Not determined.

Kinematic: Not determined.

Organic solvents: 34.0 %

VOC content: 34.0 %

Density: 997.9 g/l / 8.33 lb/gl

Solids content: 66.0 %

- **Other information** No further relevant information available.

10. STABILITY AND REACTIVITY

- **Reactivity**
- **Chemical stability**
- **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
- **Possibility of hazardous reactions** No dangerous reactions known.
- **Conditions to avoid** No further relevant information available.
- **Incompatible materials:** No further relevant information available.
- **Hazardous decomposition products:** No dangerous decomposition products known.

11. TOXICOLOGICAL INFORMATION

- **Information on toxicological effects**
- **Acute toxicity:**

· **LD/LC50 values that are relevant for classification:**

107-98-2 1-methoxy-2-propanol

Oral LD50 5660 mg/kg (rat)

Dermal LD50 13000 mg/kg (rabbit)

Inhalative LC50/4 h 6 mg/l (rat)

· **Primary irritant effect:**

· **on the skin:** *Irritant to skin and mucous membranes.*

· **on the eye:** *No irritating effect.*

· **Sensitization:** *No sensitizing effects known.*

· **Additional toxicological information:**

· **Carcinogenic categories**

· **IARC (International Agency for Research on Cancer)**

Substance is not listed.

· **NTP (National Toxicology Program)**

Substance is not listed.

12. ECOLOGICAL INFORMATION

· **Toxicity**

· **Aquatic toxicity:** *No further relevant information available.*

· **Persistence and degradability** *No further relevant information available.*

· **Behavior in environmental systems:**

· **Bioaccumulative potential** *No further relevant information available.*

· **Mobility in soil** *No further relevant information available.*

· **Additional ecological information:**

· **General notes:**

Water hazard class 1 (Assessment by list): slightly hazardous for water

Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.

· **Other adverse effects** *No further relevant information available.*

13. DISPOSAL CONSIDERATIONS

· *Waste treatment methods*

· *Recommendation:*

Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

· *Uncleaned packagings:*

· *Recommendation:* Disposal must be made according to official regulations.

14. TRANSPORT INFORMATION

· *UN-Number*

· *DOT, ADR, IMDG, IATA UN3092*

· *UN proper shipping name*

· *DOT, IMDG, IATA 1-METHOXY-2-PROPANOL*

· *ADR 3092 1-METHOXY-2-PROPANOL*

· *Transport hazard class(es)*

· *DOT*

· *Class 3 Flammable liquids.*

· *ADR, IMDG, IATA*

· *Class 3 Flammable liquids*

· *Packing group*

· *DOT, ADR, IMDG, IATA III*

· *Environmental hazards:*

· *Marine pollutant: No*

· *Special precautions for user Warning: Flammable liquids*

· *Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.*

· *UN "Model Regulation": UN3092, -METHOXY-2-PROPANOL, 3, III*

15. REGULATORY INFORMATION

· *Safety, health and environmental regulations/legislation specific for the substance or mixture*

· *SARA*

· *Section 355 (extremely hazardous substances):*

Substance is not listed.

· **Section 313 (Specific toxic chemical listings):**

Substance is not listed.

· **TSCA (Toxic Substances Control Act):**

Substance is listed.

· **Proposition 65**

· **Chemicals known to cause cancer:**

Substance is not listed.

· **Chemicals known to cause reproductive toxicity for females:**

Substance is not listed.

· **Chemicals known to cause reproductive toxicity for males:**

Substance is not listed.

· **Chemicals known to cause developmental toxicity:**

Substance is not listed.

· **Carcinogenic categories**

· **EPA (Environmental Protection Agency)**

Substance is not listed.

· **TLV (Threshold Limit Value established by ACGIH)**

Substance is not listed.

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**

Substance is not listed.

· **OSHA-Ca (Occupational Safety & Health Administration)**

Substance is not listed.

· **Product related hazard information:**

The product has been classified and marked in accordance with directives on hazardous materials.

· **Chemical safety assessment:** *A Chemical Safety Assessment has not been carried out.*

16. OTHER INFORMATION

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Department issuing SDS:** *Safety Data Sheet Department*

· **Contact:** *Safety Department*

· **Abbreviations and acronyms:**

ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road); IMDG: International Maritime Code for Dangerous Goods

DOT: US Department of Transportation; IATA: International Air Transport Association

ACGIH: American Conference of Governmental Industrial Hygienists

EINECS: European Inventory of Existing Commercial Chemical Substances

CAS: Chemical Abstracts Service (division of the American Chemical Society)

NFPA: National Fire Protection Association (USA)

HMIS: Hazardous Materials Identification System (USA)

VOC: Volatile Organic Compounds (USA, EU); LC50: Lethal concentration, 50 percent; LD50: Lethal dose, 50 percent

Revision: 06.21.2013

Summary – Material Identification

Review objectives:

- Identify possible contents of containers based on shapes and sizes
- Identify label information in the Hazard Communication standard or other systems including NFPA 704 and HMIS
- Identify hazards indicated by placards in the DOT system
- Identify other resources for hazmat information available with shipments or when containers are transferred
- Demonstrate an ability to identify health and safety hazards using resources

Review Summary content in Participant Guide.

Review a Hazard Communication Standard label and ask for the meanings of selected terms.

Review the methods of labeling chemicals in the workplace and in transit. Refer to PG.

Refer back to the list of chemicals of concern created during INTRO TO HAZWOPER and ask participants if they have any further questions on the subject of material recognition.

Answer any questions that the participants may have.

Monitoring

Time Requirement:	1.75 hours
Number of Facilitators:	1 or more, consistent with ratio shown in the Minimum Criteria (up to 2 assistants needed for the exercise)

Materials

- Participant Materials (Participant Guide and Exercise Manual)
- Whiteboard or equivalent; markers
- Representative monitoring instruments relevant to responses of participants

Objectives

When completed, participants will be better able to:

- Identify hazards that can be detected or measured
- Describe resources to monitor air, water, soil and surfaces, as appropriate
- Identify the procedures required when conducting monitoring
- Demonstrate the ability to use of one or more monitoring devices

NOTE: The Participant Guide includes a wide array of instruments and tools for exposure assessment. Each facilitator must identify the relevant instruments and tools and focus on those in the session and workshop. The learning objective is to

demonstrate the use of one or more monitoring device(s), selected based on expected response activities.

Teaching Methods

- Presentation
- Demonstration
- Small-group activity

Suggested Facilitator Preparation

- Review the Participant Guide
- Test web links prior to session and if any are inoperative please notify your Program Director
- Review this section
- Determine the instruments that will be available to participants
- Review OSHA standard 1910.1000, Air Contaminants, where PELs are listed
- Review Exercises
 - Select exercise to be done
 - Assemble instruments/supplies needed
 - Copy the Performance Checklist
- Review employer SOPs for monitoring (contract programs only)
- Determine need for other monitoring exercises---water, soil, surface (based on expected work activities)
- Review manufacturer information and instructions for use, maintenance, and storage of equipment to be used during. Test to ensure operable.
- Have as many instruments as possible available for observation/demonstration. Be sure to have the ones that will be used and are appropriate for the participants
- Develop outline/notes to cover those instruments following the Participant Guide
- Prepare class notes

Minimum Content Requirements

- Uses for Monitoring Data (detect, measure)
- Monitoring at an emergency
- What can be monitored in air?
- Overall Guidance
- Sampling Plan or Protocol
- Selected (relevant) sampling instruments and tools
- Demonstrate ability to use one or more pieces of monitoring equipment

Questions You May Be Asked

1. Our 4-gas meter seems to always give the same result when we respond. Can this be correct? Note that the program covers the essentials of keeping a calibration log and maintenance log. Are these done and up to date? Has the person who is in charge of the logs been trained in use and troubleshooting?

2. The last time we responded to a release, there was no monitoring that I saw. We were just told to go in and take care of the mess where the tote failed, and we had to shovel the stuff up for hours.

If the material was identified and of low toxicity, and it was a solid (?), there may have been no need to monitor. Adequate respiratory (FF APR, fit tested) and skin protection may have been sufficient as detailed in the ERP.

Presentation of the Session

This session can be presented as follows:

Introduce the wide array of instruments and tools to assess exposure in air, water, soil and on surfaces. You will not use many of these, but the resource is provided should you need them in the future. For this program, the following have been selected:

(insert, based on reconnaissance with employer or input from participants)

The Importance of Monitoring/ Uses for Monitoring Data

Introduce this section by asking: "Why would you want to monitor?" List responses where the whole class can see them. Be prepared to fill in any gaps not mentioned. Refer back to the list generated at the beginning of the class and to examples in the Participant Guide.

Ask: "When would you want to monitor?"

Ask: "How are the results of these (refer to the list) reported?"

Monitoring at an Emergency

Ask: "What monitoring can be done before an emergency? During? After?"

Review the lists found in the Participant Guide.

Ask: What are reasons for monitoring?

If participants do not list the following, fill the gaps.

- Pre-planning is essential for emergency response
- The Emergency Response Plan (ERP) includes monitoring plans, as determination of level of PPE is based on data
- Conditions can change constantly during an emergency

What Can Be Monitored in the Air?

Review the following:

Oxygen Deficiency/Enriched

The question in the Participant Guide under this heading gives three different oxygen levels. Issues that may arise for each are:

- a) $O_2 < 19.5\%$ - Oxygen is deficient below this level. A positive-pressure SCBA or positive-pressure airline respirator equipped with an escape air supply must be used when the oxygen level may be below 19.5%.
- b) $O_2 = 20.5\%$ - Oxygen is within the acceptable range (19.5%-23.5%) to use an APR, but you should investigate the reason why the oxygen level is below the normal 20.9%. Are toxic gases or asphyxiants replacing the oxygen?
- c) $O_2 > 23.5\%$ - Oxygen is enriched. Special procedures to minimize the risk of explosion will be needed.

Fire and Explosion Hazards /Explosive Limits

Combination (LEL/explosivity, combustibility) meters are approved for use in flammable environments where oxygen does not exceed 20.9% unless specifically tested in oxygen-enriched atmospheres. Condensation can also be a problem with tubing; be alert for signs of condensation and use any result with caution.

Distinguish between percent on these meters and ppm for human health. 1% is 10,000 ppm. Normal oxygen in air is present at 209,000 ppm.

Review LEL and UEL concepts which were covered in CHEMICAL PROPERTIES

Toxic Chemicals/Corrosivity/Radioactivity/Biological Hazards

Review approaches to monitoring each of these types of hazards.

What Can Be Monitored in Soil, Water or on Surfaces?

Review that the following may be monitored as part of a response:

- Soil
- Water
- Surfaces

Note: Methods are included in the Participant Guide but are used in the training only if there is indication that participants will find them applicable.

Conducting Monitoring Activities**Overall Guidance**

This section provides overall guidance for monitoring and general considerations when preparing for sampling.

Depending on the needs of participants, highlight appropriate consideration shown in the Manual.

Underscore the need for following a written procedure such as an Exposure Assessment SOP and follow quality assurance procedures. Follow manufacturer guidance or discuss with the manufacturer any modifications needed for a particular situation.

Sampling Plan or Protocol

Ask: “What should a sampling plan include?”

List responses and add any from the Participant Guide that have been omitted.

Before you sample...

Review the important points to remember in the Participant Guide for direct-reading instruments and personal monitoring, as appropriate for the participants

After you sample...

Ask: “What should you do after you sample?”

List responses and add any from the Participant Guide that have been omitted.

Sampling Instruments and Tools

The notes shown below each type of sampling instrument or tool in the participant guide include operational characteristics, cautions for use and practical guidance. These notes do not replace the Operator Manual supplied at the time of purchase.

Ask participants the name of some sampling instruments and tools available to them for use.

Review the overall format of the description of each instrument.

Discuss the features of relevant instruments to be used by participants during responses and demonstrate them and/or pass them around the class. Some examples might include:

- pH paper
- Oxygen/Combustible-gas indicator (CGI)/Combination instruments
- Colorimetric detector tubes
- Personal alarms
- Hydrocarbon detectors
 - Photoionization Detectors (PID)
 - Flame Ionization Detectors (FID)
- More specialized instruments
- Radiation exposure monitoring
- Noise monitor

Exercise - Monitoring

Number of Facilitators: 1; an assistant may enhance the conduct of the exercise

Time Requirement: approximately 30 minutes (25 for exercise and 5 for report-back)

Materials: See below for each exercise

Procedure: See below for each exercise

Based on the expected duties, select one of the three exercises and have each participant complete the summary Performance Measure at the end of the session for your signature and retention with the program documentation

- Measuring Concentration #1 (See Exercise Manual)
- Measuring Concentration #2 (See Exercise Manual)
- Air Monitoring Instrument Exercise

Measuring Concentration #1

Materials:

- Air monitoring instrument with calibration accessories
- Multigas with flammables, oxygen, carbon monoxide sensors
- Photoionization Detector (PID)
- Detector/colorimetric tubes and pumps
- Tubing to connect instruments to bag
- Gas bags (one for station 1)
- Hypodermic syringe
- SCBA cylinder or other air source
- Relevant solvent(s)—exercise shows hexane (station 2) and two unspecified chemicals (station 4, vertical source)
- Span gas at concentrations useful for expected duties of responders
- Instrument manuals or quick-reference guides with relative response data
- Vertical tube with three ports (4-foot tube, 4-6 inches in diameter. Sealed at top with sampling ports at 4 inches, 24 inches, 46 inches)
- Pan such as baking sheet (10x20 inch) with at least ½ inch lip
- Hood to contain contamination
- Source of air movement, if used
- Exercise manual or copy of exercise for recording data
- Paper towels or absorbing material
- Disposal container for glass

- Disposable container for flammables (if there is a spill of a solvent)
- Goggles/safety glasses
- Fire extinguisher

Procedure:

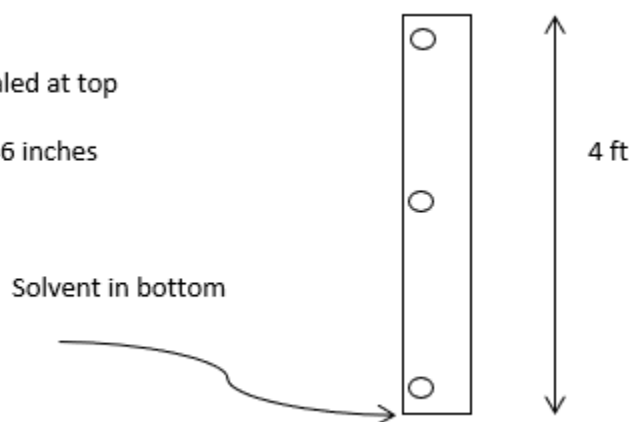
Preparation:

1. Construct concentration gradient prop--a vertical tube with three ports for sampling

4-foot tube, 4-6 inches in diameter. Sealed at top

Sampling ports at 4 inches, 24 inches, 46 inches

Tight fitting pan at bottom or sealed.



Assemble materials for 'flat surface' concentration measurements

2. Select a solvent relevant to the participants
3. Set out detector tubes and pumps
4. Inject a drop or two of a relevant chemical with the syringe through the septum into a gas bag and fill the bag with air from available source.
5. Calculate expected concentrations given the volume of the bag.
6. Charge vertical tube with selected solvent
7. Make sure the vertical tube base is secure or is sealed to a pan
8. Charge flat pan with selected solvent

Exercise:

1. Set up stations for each part of the exercise (bag, vertical tube, pan).
2. Collect data as shown in the figures and record on the worksheet
3. Review the results when each group is finished

4. Confirm that relative response calculations were calculated correctly (station 3)
5. Facilitate a discussion of the results

Since the colorimetric tube is +/- 25% at PEL, is the PID actually more accurate?

May want to review that colorimetric, detector and length-of-stain are names for the same supply. Some may also refer to the method by vendor name, such as Draeger pump and tube.

Measuring Concentration #2

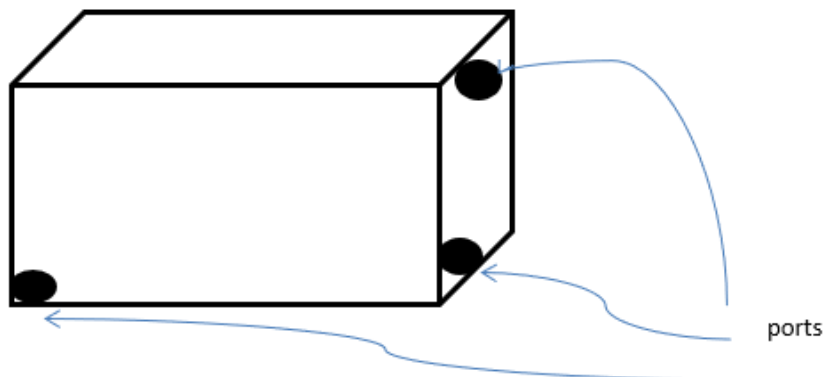
Materials:

- Air monitoring instrument with calibration accessories
- 4-gas meter with relevant sensors
- Photoionization Detector (PID)
- Detector/colorimetric tubes for hexane and pumps
- Tubing to connect instruments to bag
- Gas bags (one for station 2; large bag (20-gallon tote with three sampling ports for station 4)
- Hypodermic syringe
- SCBA cylinder or other air source
- Relevant solvent(s)—exercise shows hexane (station 2) and toluene (station 4)
- Instrument manuals or quick-reference guides with relative response data
- Exercise manual or copy of exercise for recording data
- Paper towels or absorbing material
- Disposal container for glass
- Disposal container for flammables (if there is a spill of a solvent)
- Goggles/safety glasses

Procedure:

Preparation:

1. Construct "room" using the large bag with three ports for sampling



Use 20-gallon tote with three gas-tight ports. Place about 2 ml of a solvent in an open container in the tote.

2. Select a solvent relevant for participants
3. Set out detector tubes and pumps
4. Inject a drop of two of a relevant chemical with the syringe through the septum into a gas bag and fill the bag with air from available source.
5. Calculate expected concentrations given the volume of the bag.

Exercise:

1. Set up stations for each part of the exercise
 - Bag (station 2)
 - Large bag (station 4)
2. Collect data as shown on the worksheet
3. Review the results when each group is finished
4. Confirm that relative response calculations were calculated correctly (station 3)
5. Facilitate a discussion of the results

Since the colorimetric tube is +/- 25% at PEL, is the PID actually more accurate?

May want to review that colorimetric, detector and length-of-stain are names for the same supply. Some may also refer to the method by vendor name, such as Draeger pump and tube.

Air Monitoring Instrument Exercise

Materials:

- Air monitoring instrument with calibration accessories
- Multigas with flammables, oxygen, carbon monoxide sensors
- Photoionization Detector (PID)
- Detector tubes and pumps
 - MSA - hexane and carbon monoxide
 - Drager - alcohols and ammonia
- Tubing to connect instruments to bag
- Gas bags (one per group, plus 2)
- Hypodermic syringe
- SCBA cylinder
- Prepared gas cylinders (calibration gases)
 - MSA - 58%LEL Pentane, 15% Oxygen, 60 ppm Carbon Monoxide
 - Hexane - 100 ppm and/or 10% LEL (1200 ppm)
- Exercise Worksheets
- Instrument manuals or quick-reference guides with relative response data

Procedure:

Preparation:

1. Inject a drop of two of isopropyl alcohol and/or ammonia solution with the syringe through the septum into a gas bag and fill the bag with air from an SCBA cylinder.
2. Inflate bags from the prepared cylinders
3. Set out detector tubes and pumps

Exercise:

1. Distribute one bag per group. Do not reveal what chemical is in each bag. The group will attempt to identify the chemical and estimate concentration.
2. Use each instrument and each kind of detector tube
3. Review the results when each group is finished
4. Confirm that relative response calculations are done correctly

Notes for Air Monitoring Instrument Exercise:

MSA Instrument Calibration Gas: Instruments calibrated to another gas (e.g., propane, methane) will typically read lower than the labeled 58% LEL, but will still be more than 10% LEL, the evacuation level of most agencies. If the flammable reading was 0, the oxygen level could be addressed by the use of SCBA.

PID will give no reading if the gas used is methane. Explain that MSA uses methane formulated to a concentration that could simulate 58% LEL of pentane, the standard for many instruments. Methane is not detectable by PIDs because its ionization potential is 12.6 eV.

Carbon Monoxide detector tube and the CO sensor usually show good agreement.

Hexane: If 100 ppm is used, typical multigas instrument without PID will not alert to presence of chemical

10% LEL formulation will give a lower reading by the flammables sensor (4-6% LEL, depending on the calibration gas of the instrument)

Hexane detector tube tends to read fairly accurately

CO detector tubes will give a response because of cross-sensitivity or interference (see instruction sheet for tubes). The fact that the sensor in the multigas meter did not respond should be a clue. Emphasize that using more than one means to measure a hazard is helpful.

PID response is lower than the actual concentration. If you have a relative response factor for the instrument to hexane, use that to convert the reading to an estimate of the actual concentration and compare this to the detector tube reading.

Alcohol and Ammonia: Typically a very slight reading of the flammable sensor (1-2% LEL) is the only response of the multigas instrument

Detector tubes for alcohols and ammonia will give estimates for the respective concentrations

PID readings are typically much lower than the combined concentrations of alcohol and ammonia as estimated by the detector tube reading. However,

unlike the hexane bag, a relative response factor cannot be applied to the reading because more than one chemical is present.

Summary: Even though the same bag (and hence the same concentration) is being used, response differences are taken into account.

Ignoring (or being unaware of) the concept of relative response can result in serious underestimating of the concentration of a chemical in the air. You must know the chemical identify to be able to estimate a concentration.

Common direct reading instruments are not useful to identify unknowns or selectively measure components of a mixture of chemicals. Other hazard assessment tools such as container shape, labels, placards, SDSs are needed.

Overall Summary – For the Monitoring Exercise session: Air monitoring is used to detect and measure chemicals in air. The capabilities and limitations of the available instruments must be known in by responders.

In discussion at end of the selected exercise, identify any errors in information obtained.

Document the exercise as conducted for the program file

Ensure that the Performance Checklist is collected to document skill completion. These become part of the program file.

Specific Hazard Monitoring - include details as needed

Demonstrate equipment for noise monitoring-- a sound level meter for area measurements or a noise dosimeter for personal sampling of an individual responder's noise exposure. Personal monitoring will be conducted after careful consideration of the need for the data and possible difficulties including heat, PPE and microphone placement.

For personal monitoring for organic vapors and particles - Review methods that require a pump and those that do not. Illustrate a sampling train that would be placed on a person in order to determine exposure. Personal monitoring will be conducted after careful consideration of the need for the data and possible difficulties including heat, PPE and microphone placement.

For area monitoring for particles/fibers/dust - Area monitoring is generally done with high-volume sampling pumps, as shown.

Water Sampling - include details as needed

The following resources provide background:

http://www.epa.gov/sites/production/files/2015-06/documents/gw_sampling_guide.pdf
<http://oilandgas.ohiodnr.gov/portals/oilgas/pdf/EPA-fact-sheets/RecommendationsforDrinkingWaterWellSamplingBeforeOilandGasDrilling.pdf>

Utilize You Tube videos to demonstrate water sampling, such as:

<https://www.youtube.com/watch?v=x9fri5rmbbI>
https://www.youtube.com/watch?v=7_5RcnaFn_w&list=PLa86V_dhHTNUd4_x2OqyX-Tx711_MfLky
<http://www.youtube.com/watch?v=yfnoQhHBOHg>

Soil Sampling - include details as needed

The following resource provides background:

<http://www.epa.gov/sites/production/files/2015-06/documents/Soil-Sampling.pdf>

Describe the application of the various types of sampling:

- Surface
- Below surface, guide
- Below surface, mechanized

Surface Contamination Sampling - include details as needed

There are several reasons to conduct surface sampling at a response including evaluating the effectiveness of decon or to identify any areas of contamination away from the emission. Contact laboratory personnel for guidance prior to conducting any surface sampling.

Summary - Monitoring

Review the Objectives:

- Identify hazards that can be detected or measured
- Identify resources to monitor air, water, soil, and surfaces, as appropriate
- Describe procedures required when conducting monitoring
- Demonstrate the ability to use one or more monitoring devices

Review Summary content in the Participant Guide.

Refer back to the list from the beginning of the course and discuss the techniques that could be used to sample for each of the exposures that have been listed of interest to participants.

Answer any questions.

Work Practices

Time Requirement:	Presentation/discussion	0.75 hours
	Demonstration and Workshop	1.25 hours
Number of Facilitators:	1 or more, consistent with ratio shown in Participant Guide; an assistant may be needed for the workshop	

Materials

- Participant Materials (Participant Guide and Exercise Manual)
- Whiteboard or equivalent; markers
- For-Training-Only ERP

Objectives

When completed, participants will be better able to:

- Define the terms standard operating procedure (SOP) and standard operating guide (SOG)
- Describe work practices to reduce risk of injury and further release/contamination during response operations
- Demonstrate use of a written work practice SOG or SOP to control hazards

Teaching Methods

- Presentation/discussion
- Demonstration
- Small-group activity

Suggested Facilitator Preparation

- Review the Participant Guide and Exercise Manual
- Review this section
- Test web links prior to session and if any are inoperative please notify your Program Director
- Review OSHA standard 29 CFR 1910.146 - Permit-Required Confined Spaces
- Review OSHA standard 29 CFR 1910.147 - Control of Hazardous Energy (Lockout/Tagout)
- For contract programs, relevant SOPs in the site-specific ERP should be reviewed
- Using the material in the Participant Guide, prepare SOGs for the selected activity(ies) in the workshop; for CSE, prepare relevant permit examples
- Prepare class notes
- Copy Performance Checklists

Minimum Content Requirements

- Definitions of SOG and SOP
- Elements of an SOG
- Relevant Work Practices shown in the Participant Guide
- Work Practice Exercise

Questions You May Be Asked

Participants may state that particular SOPs are lacking at their work site. Be ready to facilitate discussion of how to determine if an SOP exists, how to obtain a copy within the company structure, where to find 'models' for comparison and how to approach problem resolution.

The following guidance from OSHA may be useful in answering questions about confined spaces:

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=21788

Presentation of the Session

This session can be presented as follows:

Types of Hazards

Ask: "What are some examples of physical and safety hazards that should be anticipated at a response?" "How would you organize work so that the risks of injury or illness are reduced?"

List responses where the whole class can see.

Participants may list more than are shown in the Participant Guide. Be prepared to discuss additional work practices. If the participants don't list all of those shown, as you discuss each hazard, add those they omitted, if relevant (not everyone will work around ponds/lagoons, for example).

Review - measures to control hazards, from most preferred to least preferred are: elimination/substitution, engineering controls, administrative controls, and PPE. Work practices are administrative (written) procedures but may include other approaches as part of the overall plan. For example, ventilation would be included in the written confined space entry work practice.

Ask: How many of you routinely make use of the "buddy system" during responses?

- Review benefits
- Note that hand signals are covered later in the program

Standard Operating Procedures (SOPs/SOGs)

Ask: "What is an SOP?"

"What are some SOPs that you have used in responses?"

Describe the need for an SOG in training. A training-only SOG is only for guidance and not site-specific.

Emphasize that an SOP may be short or long. Placement of boundary DO NOT ENTER signs at specified height on the fence line and under security lights for night visibility is an example of a very simple SOP.

Underscore the need for written procedures for the various hazards. The site-specific ERP should contain all of the details.

For each Work situation/task below, ask participants to list the hazards and approaches to limit the hazards:

Ponds and Lagoons

Ask participants for their experiences working around ponds and lagoons.

Slips, Trips, and Falls

Ask: "What actions help prevent s/t/f?"

Steam

Anything that looks like a cloud of steam should be avoided. (The cloud could be a chemical.) If steam, severe burns can occur.

Vehicle Operation

Emphasize that:

- Special rules of vehicle operation may be in effect during an emergency.
- Only trained and qualified personnel authorized by the company should operate equipment during an emergency.
- Operators should familiarize themselves with the restriction PPE imposes before operating vehicles in critical situations.

Spills/Releases

Ask: "What methods have you used to control a spill?" List answers provided by participants and discuss various control activities. Use the list to distinguish between defensive and offensive actions. Be sure to cover the various methods found within **Basic Control, Confinement, and Containment** (i.e. diking, plugging, etc.)

Confined Spaces

SOPs for confined space entry should be reviewed to determine compliance with 29 CFR 1910.146. Review guidelines for a permit-required confined space.

Emphasize that one should never rush into a confined space to perform an attempted rescue. Specialized training is necessary for confined space entry and rescue. Over half of deaths in confined spaces are to would-be rescuers.

Electricity

Ask: “When do you have to use Lock-out/Tag-out?”

Facilitate a discussion of appropriate Lock-out/Tag-out procedures

Radiation

Key points for ionizing radiation: Time, Distance, Shielding

UV is an important radiation hazard to the skin

Ergonomics

Ask: “What work practices related to ergonomics can you adopt to reduce injuries to responders?”

Exercise – Work Practices

Number of Facilitators: 1 or more, depending on size of class and number of exercises conducted

Time Requirement: approximately 45 minutes (30 for exercise and 15 for report-back)

Materials: See below for each exercise

Procedure: See below for each exercise

Depending on the type of emergency participants may encounter, select one or more of the following exercises: Spill Control, Patching and Plugging, Confined Space Permit, Overpacking. Each has a Performance Checklist to complete (see Exercise Manual).

Each of the Exercises is designed to stimulate the review of detailed information in an SOG by the members of each small group.

Mention that minimal PPE is recommended only to prevent the participants from becoming excessively wet. Full PPE with respirators/SCBA may be used, although more time will be required.

The facilitator should describe the problem, provide additional materials, and answer questions.

- Minimize hazards - do not use hazardous substances during the simulation.
- Implement the ERP during the simulation (i.e., know emergency medical numbers, have an instructor who is an EMT, etc.)
- Emphasize the use of non-sparking tools.

During discussion identify deficiencies in performance and provide suggestions for improvement. After the exercise, hold a short debriefing and review the common elements below. Write where all can see.

- Someone in Charge
- Proper PPE/Tools
- Inspect
- Minimize Contact
- Buddy System

Exercise - Spill Control**Pre-Exercise:**

- Assemble materials:
 - Stopwatch
 - Sorbent socks, pillows, and/or sheets
 - Sandbags
 - Sorbent booms
 - Dry granular sorbent (cat litter, vermiculite, dirt)
 - Shovel
 - Salvage drum
 - Manufacturer spec information for absorbent
- Assemble equipment and PPE
- Prepare the area and chemical leak

Procedures:

- Have the team assemble the necessary equipment from the available supply and develop a strategy
- Have the team review their strategy with you
- You and team members should then don PPE
- Have the team approach the spill and perform the task in a manner that minimizes contact with the material
- Have the team initiate clean-up, and discuss disposal/cleaning of PPE/equipment
- Reinforce concepts of decontamination and the need to identify the material before sorbent is applied
- Have team members complete performance checklists, which you should then review and sign
- Debriefing-Emphasize the following points:
 - Evaluate the work practice. Make suggestions and recommendations. For example, if inappropriate actions were observed, have the class discuss worst-case results.
 - Ask questions (i.e., "What if the substance has high viscosity? What if the spill is near water?")
 - Emphasize the need for using compatible materials.
 - Finally, ask the participants if they have additional questions concerning absorption techniques.

Post-Exercise:

- Incorporate any valuable or incisive participant comments into this lesson plan.
- Review the inventory of equipment/supplies. Re-stock equipment/supplies and clean up the area.

Exercise - Patching and Plugging

Briefing

Emphasize the following points:

- Before patching, always know what substances are involved (i.e., Methyl Chloride). Always use non-sparking tools (made of plastic or Beryllium) with volatile or unknown materials.
- Think about compatibility when selecting types of patches and plugs. Carefully evaluate the container to be patched or plugged in order to select the best device(s) for the job. Note details such as the shape of the surface of the container; the size, shape, and texture of the puncture and/or dent; and the presence of corrosion or pressure within the container.
- When putting together a patch kit, keep in mind that most of the items can be purchased in a hardware store. Many items can be found around the house and garage. Such items include inner tubes, modeling clay, golf tees, various bolts and screws, etc.

Procedures:

- Groups of two to three can practice the various techniques, wearing chemical-resistant gloves to simulate actual working conditions. Although the vertical drum is open at the top, participants should be cautioned not to reach down into the drum to patch or plug.
- A variety of devices from the simple (a golf tee) to the more complex (a ladder patch) should be available. Plugs should first be hand tightened, then secured using a screwdriver or mallet, depending upon the plug material.

Debriefing

Emphasize the following points:

- Evaluate. Make suggestions and recommendations.
- Ask "What if . . .?" type questions (i.e., "What if a bolt used to plug a drum is protruding enough to prevent overpacking? Should we use a hacksaw on it? What if partial corrosion is present?")
- Emphasize the need for using compatible materials and non-sparking tools
- Finally, ask the participants if they have additional questions concerning basic patching techniques

Post-Exercise:

- Incorporate any valuable or incisive participant comments into this lesson plan.
- Review the equipment and clean up the area.

Exercise - Confined Space Permits**Pre-Exercise:**

- Assemble materials:
 - NIOSH Pocket Guide
 - Examples of confined space entry permits
 - Worksheets
- Copy the model permits included in this section

Procedures:

- Mention that the exercise is designed to illustrate complete/adequate and incomplete/hazardous uses of the permit system.
- Participants should use the Pocket Guide and the training manual to evaluate whether anyone should enter the space.
- Have participants consider the following issues:
 - What other questions must be answered?
 - What remedies are there?
 - Who on the team has been trained to monitor a space?
- Who on the team has been trained to enter a space?

Post-Exercise:

- Incorporate any valuable or incisive participant comments into this lesson plan
- Review the equipment and clean up the area

CONFINED SPACE ENTRY PERMIT

This permit must be filled out before any entry can occur and returned to the Safety Officer for filing when work is completed.

1. Name/Location of Area	<u>Bully Glutch Trench</u>
2. Time/Date of Entry	<u>3:00 p.m. Monday</u>
3. Personnel who will enter	<u>John Pauline</u>
4. Have all valves/electrical equipment been locked?	Yes <u>N/A</u> No _____
5. Have all lines been broken, blanked off, or isolated?	Yes <u>X</u> No _____
6. Combustible-Gas Meter Test Results	<u>37% LEL</u>
7. Oxygen Meter Test Results	<u>20.5%</u>
8. Hydrogen Sulfide Test Results	<u>2%</u>
9. Other Air Monitoring Test Results	<u>none done</u>
10. Warning Signs Posted?	Yes <u>X</u> No _____
Respirators worn? (List/Type)	_____
12. Lifeline and safety winch?	Yes <u>X</u> No _____
13. Other safety equipment used?	<u>hats boots</u>
14. Intrinsically safe equipment and non-sparking tools?	Yes <u>X</u> No _____
Sign after checking personally:	
1. _____	2. _____
3. _____	4. _____

CONFINED SPACE ENTRY PERMIT

1. Name/Location of Area	<u>#75 Railcar. top entry</u>
2. Time and Date of Entry	<u>4:00 p.m.. Tuesday</u>
3. Personnel who will enter	<u>Sarah</u>
4. Have all valves/electrical equipment	Yes <input type="checkbox"/> X <input checked="" type="checkbox"/> No
5. Have all lines been broken, blanked	Yes <input type="checkbox"/> X <input checked="" type="checkbox"/> No
6. Combustible-Gas Meter Test Results	<u>0.1%, 0.0%, 0.05%, 0.0%, 0.1%</u>
7. Oxygen Meter Test Results	<u>20.9%, 21%, 21%, 20.9%, 21%</u>
8. Hydrogen Sulfide Test Result	<u>None detected</u>
9. Other Air Monitoring Test Results	<u>Co-indicator tube negative</u>
10. Warning Signs Posted?	Yes <input type="checkbox"/> X <input checked="" type="checkbox"/> No
Respirators worn? (List/Type)	<u>SCBA</u>
12. Lifeline and safety winch?	Yes <input type="checkbox"/> X <input checked="" type="checkbox"/> No
13. Other safety equipment used?	<u>Forced air ventilation</u>
14. Intrinsically safe equipment and non-sparking tools?	Yes <input type="checkbox"/> X <input checked="" type="checkbox"/> No
Sign after checking personally:	
1. <u>Safety Buff</u>	2. _____
3. _____	4. _____

CONFINED SPACE ENTRY PERMIT

This permit must be filled out before any entry can occur and returned to the Safety Officer for filing when work is completed.

1.	Name/Location of Area	<u>Incinerator #3</u>
2.	Time and Date of Entry	<u>11:00 a.m. Monday</u>
3.	Personnel who will Enter	<u>Joe</u>

4. Have all valves/electrical equipment been locked? Yes ☒ No ☐

5. Have all lines been broken, blanked off, or isolated? Yes ☒ No ☐

6. Combustible-Gas Meter Test Results 10 readings, all < .1%

7. Oxygen Meter Test Results 10 readings, all 21%

8. Hydrogen Sulfide Test Results max 1 PPM (range 0-PPM)

9. Other Air Monitoring Test Results none

10. Warning Signs Posted? Yes ☒ No ☐

11. Respirators worn? (List/Type) particulate

12. Lifeline and safety winch? Yes ☒ No ☐

13. Other safety equipment used? Forced ventilation

14. Intrinsically safe equipment and non-sparking tools? Yes ☒ No ☐

Sign after checking personally:

1. G. O. <u>Tuit</u>	2.
3.	4.

Exercise - Overpacking

Pre-Exercise:

- Assemble Needed Materials:
 - Leaking Drum (non-toxic liquid)
 - Overpack
 - Drum cart
 - Splash suits
 - Gloves
 - Boots
 - Face shield
 - Performance checklist with clipboard and pen for each participant
 - Resource Manuals (NIOSH Pocket Guide, Chemical Dictionary)
- Assemble equipment and PPE
- Prepare area and leaking drum Briefing:
- Before containment and overpacking, always know what substances are involved. Always use non-sparking tools (made of plastic or beryllium) with volatile or unknown materials.
- Think about compatibility when selecting types of overpack materials. Carefully evaluate the container in order to select the best device(s) for the job. Note details such as the shape of the container and the presence of corrosion or pressure within the container.
- Emphasize training level needed to do this activity. Be sure the participants understand the distinction between operation and technician levels.

Procedure:

- Groups of two or three can practice with the various materials and techniques, wearing chemical-resistant gloves to simulate actual working conditions.
- A variety of devices from the simple to the more complex should be available.
- Review safety precautions, including lifting guidelines.
- The team should assemble the necessary equipment from the available supply and develop a strategy.
- Team reviews strategy with facilitator.
- Facilitator and team members don PPE.
- Team approaches spill and performs the task in a manner that minimizes contact with the material.
- Facilitator critiques overpack.

- Team initiates clean-up and discusses disposal of PPE/equipment.
- Facilitator critiques clean-up and reinforces concepts of decontamination and the need for identification of material before clean-up is undertaken.
- Team members complete performance checklists, which are reviewed and initialed by the facilitator.

Debriefing:

Emphasize the following points:

- Evaluate. Make suggestions and recommendations.
- Ask "What if...?" type questions
- Emphasize the need for using compatible materials and non-sparking tools
- Ask the participants if they have additional questions concerning basic overpacking techniques
- Reinforce differences between operation-level and technician-level actions

Post-Exercise:

- Incorporate any valuable or incisive participant comments into this lesson plan
- Review the equipment and clean up the area

Review, sign and collect the Performance Checklists for inclusion in the Program File documentation of 'successful completion'.

Summary – Work Practices

Review the Objectives:

- Define the terms standard operating procedure (SOP) and standard operating guide (SOG)
- Describe work practices to reduce risk of injury and further release/contamination during response operations
- Demonstrate use of a written work practice SOG or SOP to control hazards

Review Summary content in Participant Guide.

Implementing detailed written work practice plans or Standard Operating Procedures will assist responders in maintaining health and safety. These detailed plans are included in the employer ERP; review, update and routine practice increase the effectiveness of the plan.

Decontamination

Time Requirement:	1.5 hours
Number of Facilitators:	1 or more, consistent with ratio shown in Minimum Criteria (an assistant is recommended for the demo; up to two assistants are recommended for the exercise)

Materials

- Participant Guide and Exercise Manual
- Whiteboard or equivalent; markers
- Decon line equipment, supplies, etc.

Objectives

When completed, participants will be better able to:

- Identify steps in pre-planning decontamination
- Identify methods to limit contamination of personnel, PPE and equipment
- Identify the purpose of each work zone
- Identify basic decontamination methods
- Identify safe procedures for decontamination line operators
- Demonstrate setting up a decontamination line

Teaching Methods

Presentation/discussion/demonstration followed by an exercise

Suggested Facilitator Preparation

- Review the Participant Guide and Exercise Manual
- Review this section
- Test web links prior to session and if any are inoperative please notify your Program Director
- Review 29 CFR 1910.120(k)
- Review relevant sections of the ERP and employer SOPs for decontamination (contract programs only)
- Develop a scenario for which the decon line will be needed. Include: release, time of day, wind, surroundings/topography, weather
- Copy Performance Checklist for participants

Minimum Content Requirements

- Pre-planning for decontamination
- Limiting contamination
- Work zones
- Decontamination procedures
- Exercise

Questions You May Be Asked

Participants might remark, "We don't do decon this way at our responses. So what are we supposed to do?" You should be prepared to facilitate a discussion about working through union or management representatives to facilitate review and possible changes in the facility ERP. Emphasize that HAZWOPER requires the development and implementation of written procedures. Alternative procedures may be effective. Stress that inspection should (must?) be performed.

Also, participants may ask, "Am I dragging contaminants around the plant and into my car and home if I don't follow decon properly?" The answer is yes. Use this opportunity to reinforce the need for proper decon to protect yourself, your family members and the community.

Presentation of the Session

This session can be presented as follows:

Introduction

Ask: "What has been your experience with decon?"

"What should be considered when performing decon?"

Make a list of the participant responses where everybody can see them. You can fill in items omitted and refer participants to the introductory material in the chapter.

- Another useful introduction might include several pictures of an actual decon line. Some good pictures are available here:
- <https://video.search.yahoo.com/yhs/search?fr=yhs-sz-001&hsimp=yhs-001&hspart=sz&p=decontamination+videos+for+hazmat#id=96&vid=15deb1c936f20e5971062cef0d8d19dd&action=view>. Images are also found in the Participant Guide. A short (Running time: 1:18) video of a decon line in action can be found at: <http://www.youtube.com/watch?v=-s1Aukngw8>. If time allows, this video (that has no audio) could be watched and evaluated critically for actions done correctly and actions that might be done more correctly.
- Many training groups provide a video of participants setting up or using decon lines for review and analysis.

Pre-Planning for Decontamination

Ask: "What should be included in your decontamination plan?" See list in Participant Guide.

Emphasize that the ERP needs to be reviewed and updated when hazards you may respond to change.

Ask: "When is decon used?"

Limiting Contamination

PPE is not foolproof. For best protection of your health, always avoid direct contact with contaminants as much as possible.

Ask: “When donning PPE, what things can you do that will help minimize potential contact with contamination?” Review list in Participant Guide.

Ask: “During response, what can be done to minimize exposure to contamination?” Review list in Participant Guide.

Work Zones

Ask: “What work zones have you used?”

Introduce and explain the three Work Zones. Review graphics in the Participant Guide. Emphasize that establishing work zones helps to control contamination and protect the health of workers, their families and the community.

Primary Activities in Each Work Zone

Ask “What activities occur in each Work Zone?” Refer to diagrams found in Participant Guide. Use discussion to make sure participants understand the difference between zones. Consider making a list of what takes place in each zone

Decontamination Line

Continue to refer to the graphics in Participant Guide. Proper removal of PPE along the decontamination line will allow the responder to leave the site without bringing contamination along. Follow procedures in ERP. A few points to emphasize:

- Each procedure is performed at a separate station. The stations are arranged in order of decreasing contamination, preferably in a straight line.
- Tools and equipment are dropped at specified locations
- First, outer more heavily contaminated items such as boots, gloves, and suits are decontaminated and then removed
- Next, inner, less-contaminated clothing (inner boots and gloves) is decontamination and removed
- Facepieces are removed near the end of the line
- Materials that cannot be decontaminated are discarded

Decontamination Procedures and Follow up Steps

Ask “What are the primary methods of decontamination, like rinsing off contaminants for example?”

Review each procedure found in Participant Guide.

Evaluating the Effectiveness of Decontamination

Ask: “How can you tell how effective the decontamination is?” Discuss methods found in the Participant Guide.

Decontamination of Equipment and Breathing Apparatus

Emphasize that equipment, tools and PPE must be properly decontaminated. Any liquids and disposables used for decontamination must also be decontaminated or disposed of properly.

Other Considerations

Ask: “What safety precautions can be taken to protect those on the decon line as well as those being decontaminated?” Review list in PG.

Ask: “How do you handle complications such as injuries or if the area is a crime scene?” Which comes first, treatment or decon?

Demonstration-Victim Decon

Optional – demonstrate victim decon using a training mannequin. Facilitate discussion.

Exercise – Setting up a Decon Line

During this exercise, participants will have the opportunity to inspect and then don and doff PPE ensembles for a decon line work.

Number of Facilitators: 1, with 1 or more assistants to help with supplies

Time Requirement: approximately 45 minutes (35 for exercise and 10 for report-back/critique)

Materials:

Checklists are found in the Exercise Guide

Minimum Decon Line Equipment:

- (3) pools or tubs
- Plastic sheeting, 15' x 45' minimum, 4 mil thick or greater
- Assorted brushes, minimum of 3 long-handled

- (3) Garden hoses with water hook-up and backflow preventer or 3 garden sprayers
- (4) Stools or three-step ladders (If using Level A, provide enough for suiting up, doffing, and decon.)
- (3) Trash bins with liners
- Clipboard and pen (one per participant)
- Lab Performance Checklists (one set per participant)
- Clothing racks

Procedure:

- Provide the necessary equipment and develop a response scenario for the group to address. Participants set up decon line.
- Critique the line and correct problems as necessary.
- Sign and collect the Performance Checklists to be included in the Program file.

Summary - Decontamination

Review the Objectives:

- Identify steps in pre-planning decontamination
- Identify methods to limit contamination of personnel, PPE, and equipment
- Identify the purpose of each work zone
- Identify basic decontamination methods
- Identify safe procedures for decontamination line operators
- Demonstrate ability to set up a decontamination line

Review Summary content in Participant Guide.

There are three zones:

- Hot Zone or Exclusion Zone
- Warm Zone or Contamination Reduction Zone (CRZ)
- Cold Zone or Support Zone

The decontamination line is:

- An organized series of procedures performed in a specific sequence.
- Used to reduce levels of contamination on personnel, PPE, and equipment.
- In operation until no contaminant is present

Methods to decontaminate personnel, PPE, and other equipment will vary depending on the substances at the site:

- Physical removal
- Chemically removing contaminants
- Rinsing off contaminants
- Disinfecting and sterilizing (infectious materials)
- Combining the above methods

Stations are arranged in order of decreasing contamination, preferably in a straight line. Decontamination activities are located in the Contamination Reduction Zone (CRZ).

All personnel working the decon line must be decontaminated before leaving the CRZ. All decon supplies, solutions, and equipment must be properly decontaminated or disposed of properly.

When decontamination of materials is incomplete or not possible, the materials must be disposed of appropriately.

Answer any questions.

Rights and Responsibilities

Time Requirement: 1 hour

Number of Instructors: 1 or more, consistent with ratio shown in Participant Guide

Materials

- Whiteboard or equivalent; markers
- Participant Manuals (Participant and Exercise Manual)

Objectives

When completed, participants will be better able to:

- Identify relevant government agencies and some emergency response safety and health regulations each enforces
- Identify worker rights and responsibilities under the OSHA
- Identify employer rights and responsibilities under the OSHA

Teaching Methods

- Presentation/discussion
- Small Group Activity

Suggested Instructor Preparation

- Review the Rights and Responsibilities chapter in the Participant Manual.
- Review this section.
- Review <https://www.osha.gov/workers/index.html>
- Review <https://www.osha.gov/dcsp/smallbusiness/index.html>.
- Review Whistleblower provisions
https://www.whistleblowers.gov/complaint_page.html
- Review <http://www.csb.gov/investigations/detail.aspx?SID=43>, for the case study.
- Develop background if contract program: has there been an OSHA inspection?
- Review OSHA reporting requirements, effective 1/1/2015 in states where enforcement is federal
<https://www.osha.gov/recordkeeping2014/OSHA3744.pdf>; if in a state-plan jurisdiction, determine implementation date by contacting OSHA

Minimum Content Requirements

The following are minimum content requirements for the section:

- Exercise
- Worker Rights and Responsibilities
- Employer Rights and Responsibilities
- Roles of OSHA, EPA, USCG, DOT

Questions You May Be Asked

“Can they really make me shave?”

Review the hierarchy of controls and hazards from inhalation. The short answer is ‘yes’ if RPE is required.

“Does OSHA have to cite?”

No. OSHA only cites when an apparent violation is found.

“Are there alternatives to OSHA?”

Yes, there is a federal or state-based consultation group that can be called to visit a facility and conduct the same quality of inspection that OSHA would perform. These groups do not issue citations and assist in remediating health and safety deficiencies.

Presentation of the Session

This session can be presented as follows:

Exercise – Worker and Employer Rights and Responsibilities

Number of Facilitators: 1

Time Requirement: approximately 20 minutes (10 for first use; 5 for second review after the OSHA Rights and Responsibilities review and 5 for discussion)

Materials: Participant Guide

Procedure: Introduce this exercise as a ‘see what you know’ start for the session. (See Exercises)

Answers: 1, 2 F
 3, 4 T
 5 F
 6, 7 T
 8 F
 9, 10 T

Review the exercise at the end of the OSHA discussion to ensure everyone has the correct answers.

Format for a citation and the annual posting of Work-related Injuries and Illnesses are shown in the Manual.

OSHAct

Although SARA required HAZWOPER, development of the standard and enforcement for most workers is the responsibility of OSHA. The OSHAct requires that every employer provide ‘employment and a place of employment free from recognized hazards’. This is referred to as General Duty Clause.

Worker and Employer Rights and Responsibilities are summarized in the Participant Guide. This can be quite ‘dry’ when presented as Powerpoint; consider asking each

group to review several of the entries and report back with a very short summary and assessment of the use/impact by responders. Alternatively, increase interaction by

Review each of the Rights and Responsibility for workers.

Ask: "How does this impact responders?"

Review each of the Rights and Responsibility for employers.

Ask: "How does this impact responders?"

OSHA's Form 300A - Summary of Work-Related Injuries and Illnesses

Review content and requirements for posting.

Ask: "Have you seen this posted? What did you learn from it?"

SARA

Ask: "Who knows what SARA stands for?"

Briefly review the benefits to workers of SARA.

HAZWOPER - Review that this training is a direct result of SARA.

Ask: "Are there questions about HAZWOPER?"

HAZCOM - Briefly review that the updated (2012) standard has moved from the Right to Know forward to the Right to the Understand. Although everyone should have had Hazcom training, the pictograms and new wording can still be confusing. Urge everyone to ask questions if they see label information that is confusing.

Other Agencies and Legislation

Briefly note that EPA, DOT, USCG, NRC have jurisdiction over hazardous materials through a number of legislative actions (some of which are described).

Ask: "Who has heard of Superfund?" Describe the connection to emergency response.

Exercise – Rights and Responsibilities Revisited

Return to the worksheet completed earlier. Ask: Does anyone have questions?

Exercise – Using Rights and Responsibilities

Number of Facilitators: 1

Time Requirement: approximately 15 minutes (10 for exercise and 5 for report-back)

Materials: Participant Guide

Procedure: Conduct as a small group activity.

Ask participants to read the situation and discuss response to each.

Facilitate a report back.

1. What agency and regulations might govern respirators for emergency response?

OSHA, Respirator standard 29 CFR 1910.134

2. Your facility is located near a Great Lake port. Who would you notify if an accidental release occurred?

Coast Guard

3. You drive into the facility during off hours and see that a pallet of 55-gallon drums has fallen and contents are leaking into the sewer. What is your first action? Why?

Call 911, as all employees have been trained

4. List two OSHA regulations that include training of emergency responders.

Respirators, Hazard Communication, HAZWOPER, substance-specific standards such as Noise

5. Where will Safety Data Sheets be kept to allow responder access?

On site in paper files or electronic format

6. Which emergency responders must receive medical examinations, and who pays for them?

29 CFR 1910.120(f)(2) Employees covered. The medical surveillance program shall be instituted by the employer for the following employees:

29 CFR 1910.120(f)(2)(i) All employees who are or may be exposed to hazardous substances or health hazards at or above the established permissible exposure limit, above the published exposure levels for these substances, without regard to the use of respirators, for 30 days or more a year;

29 CFR 1910.120(f)(2)(ii) All employees who wear a respirator for 30 days or more a year or as required by 29 CFR 1910.134;

29 CFR 1910.120(f)(2)(iii) All employees who are injured, become ill or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation; and

29 CFR 1910.120(f)(2)(iv) Members of HAZMAT teams.

Employer pays

7. To what safety and health records does an employee have access upon request?

Personal exposure and medical records

Any studies of workplace exposures

8. List the agency you would contact to help control the following possible releases/emergency:

Trucks entering without proper documentation—DOT

Particles from a very black plume exiting from a nearby facility are falling on raw materials stored at your facility and you are concerned about potential fouling — EPA

Requirements for working on the pond in a boat—USCG

Uncovered waste with radiation symbols--NRC

Summary – Rights and Responsibilities

Review the Objectives:

- Identify relevant government agencies and some emergency response safety and health regulations each enforces
- Identify worker rights and responsibilities under OSHA
- Identify employer rights and responsibilities under OSHA

Review Summary content in Participant Guide.

OSHA is the federal government agency that has major responsibility for writing and enforcing safety and health rules in the workplace. The regulations are either enforced by the federal government or state employees; these state programs are known as 'state plans' and must be "at least as effective" as the federal program. HAZWOPER references many other OSHA regulations, resulting in a broad standard.

Employees and employers have rights and responsibilities established by the OSHA Act. A major employer responsibility is to furnish a workplace free from recognized safety and health hazards likely to cause serious physical harm. A major employee responsibility is to follow reasonable employer safety rules and to wear personal protective equipment when required. Employers and employees have specific rights regarding OSHA enforcement, development of standards, and inspections.

The following governmental agencies may be involved in hazardous materials operations:

- **EPA** (Environmental Protection Agency) – concerned with the protection of the environment's air, land, and water.
- **DOT** (Department of Transportation) – concerned with the transport of hazardous materials through interstate commerce.
- **USCG** (United States Coast Guard) – concerned with the transportation of hazardous material across navigable waterways and the preservation of our bodies of water.
- **NRC** (Nuclear Regulatory Commission) – responsible for community and worker protection from radiation hazards.

The following legislation has impact on hazardous materials emergency response:

- **TSCA** (Toxic Substance Control Act) of 1976
- **RCRA** (Resource Conservation and Recovery Act) of 1976
- **CERCLA** (Comprehensive Environmental Response, Compensation, and Liability Act) of 1980
- **SARA** (Superfund Amendment and Re-authorization Act) of 1986

Employers and employees have specific rights regarding OSHA enforcement, development of standards, and inspections.

Answer any questions.

Emergency Response

Time Requirement: 3 hours

Presentation/discussion 1 hour

Tabletop Exercise 2 hours

Number of Instructors: 1 or more, consistent with ratio shown in Minimum Criteria

Materials

- Participant materials (Participant Guide)
- ERP for training or use employer/local ERP—see resources below
 - Company Plan available - Use the plan or a shorted version
 - An ERP for training is shown here: <https://mwc.umn.edu/catalog/>
- Selected scenario (participant version) and provided answers (facilitator version) in the Appendix of the Facilitator Guide
 - A. County Hazmat Team Exercise #1
 - B. County Hazmat Team Exercise #2
 - C. Emergency Response Tabletop

- D. Spill Response Tabletop #1
- E. Spill Response Tabletop #2
- F. Spill Response Tabletop #3

Objectives

When completed, participants will be better able to:

- Identify the functions of key positions in the Incident Command System
- Contrast the actions of technician-level and operations-level responders
- Implement an Emergency Response Plan through termination (tabletop)

Teaching Methods

- Discussion
- Hands-on tabletop

Suggested Instructor Preparation

- Review Participant Guide
- Obtain/develop/update ERP to be used
- Review any listed on-line resources
- Test web links prior to the session and If any are inoperative please notify your Program Director
- Review level of knowledge regarding ICS (intro to HAZWOPER ER, day 1) as you plan this agenda; include more discussion, as needed.
- Select a scenario for the tabletop exercise; copy materials for participants.
Review provided answers (see Appendix to this Facilitator Guide for participant materials and answers.)

Minimum Content Requirements

- Review Hazardous Material definition
- Review “emergency” definition
- Review Emergency Response (ERP content, planning, NIMS, functions/ICS), training levels, communication, treatment/first aid, security/control, termination, plans
- Implement a response through termination (tabletop)

Questions You May Be Asked

I have been responding to spills, but this is my first training. How do I get more training?

Your level of training needed depends on your responsibilities. An employer can certify your competence by documenting proficiency (see listing in CFR 1910.120 for each level).

(This training may have occurred. Now your employer wants you to have off site training at the Technician level. Refresher training will be required in the future.)

We never do sessions at the end of a response, because we have to get back to work. Is this training really needed?

Termination is an important part of a response and Technician-level responders must be able to implement this aspect of a response. Much can be learned by reviewing what went well and what did not go so well during a response. This leads to changes in the ERP, equipment/supplies and perhaps ore training or drills.

Presentation of the Session

This session can be presented as follows:

- Review the objectives
- Review: What is a Hazardous Material?
- Review the definition

NOTE: definitions differ by context/agency/employer. We provide a broad definition for the safety of responders and those they serve: damage to people, property or the environment.

Ask: “Can you think of something that would not be included?”

Ask: “Why (why not) is each of the materials on the list made on day 1 a hazardous substance by the OSHA definition?”

- Review: What is an Emergency?

Ask: “Is there a distinction between an ‘organized response’ and a ‘do it yourself cleanup’?”

Ask: “What has triggered a response by you or your team?”

- Review the OSHA definition.

Emergency Response Plan (ERP)

Ask participants to turn to the list of required elements of an ERP shown in the Participant Guide.

Review the list

Ask: “How often do you and your team contribute to updating the ERP you use?”

Ask: “Why is it so important to identify potential emergencies in advance?”

Ask: “Assume you are called to a response. What do you need to know in order to plan a response? (initial size up)”

Personnel roles, lines of authority, training and communication

Ask participants to turn to the list of important activities in the Participant Manual

Review terms that are not as familiar to participants (depending on level of knowledge demonstrated on day 1 and conversations throughout the program)

Note that in NIMS, ‘role’ has been replaced with ‘function’

Ask: “How can preplanning and practice improve the conduct of (examples: monitoring, decon, PPE selection...)?”

Ask participants to turn to the chart of the Incident Command System (ICS).

Ask: “Who is the Incident Commander in your responses?”

Ask: “Where is the response team shown on the ICS chart?”

Review the functions of the various positions.

Training

Review the names of the five training levels.

Ask: “Who has been trained at the Awareness level in your organization?”

(note that everyone trained at Op level has been trained in the skills of Awareness)

Ask: “What training is needed to block a drain that the hazardous material may flow toward?”

Ask: “What conditions make blocking a drain an operations-level activity?”

Ask: “What training is needed to stop the emission at a rupture in a pipe?”

Ask: “What conditions make blocking a drain a technician-level activity?”

Review the specific duties/skills at each level of training.

Provide several examples and ask participants can distinguish between defensive and offensive actions.

Communication

Ask: “What are some reasons that communication systems will be needed?”

Ask: “What are barriers to communication?”

Ask: “What back-up systems are used?”

Practice hand signals.

Ask participants to list reasons for the ‘buddy system’.

Site Security and Control

List reasons that site security and control are important at a response?

Emergency Medical Treatment and First Aid

Ask: “Who in your organization can provide treatment in a response?”

Ask: “Why does OSHA require someone trained in patient transportation be available at a response?”

Termination

Ask participants to review the listing of termination activities.

Ask: “Why would forms be useful?”

Show on the agenda that termination will be practiced in an exercise (see agenda). The above content is repeated in ‘Clean up and Critique’.

Tabletop Exercise

Number of Facilitators: 1 per 24 participants

Time Requirement: approximately 2 hours including report-back

Materials: Participant and Facilitator materials are provided. See each exercise

Procedure: During this exercise, participants will complete a tabletop response.

The Facilitator Guide Appendix includes the following scenarios:

- A. County Hazmat Team Exercise #1
- B. County Hazmat Team Exercise #2
- C. Emergency Response Tabletop
- D. Spill Response Tabletop #1
- E. Spill Response Tabletop #2
- F. Spill Response Tabletop #3

Include name of scenario used in the Program File notes.

Summary – Emergency Response

Review the Objectives:

- Identify the functions of key positions in the Incident Command System
- Contrast the actions of technician-level and operations-level responders
- Implement an Emergency Response Plan through termination (tabletop)

Review Summary content in Participant Guide.

Ask: “What is the most important thing you learned during this tabletop?”

Answer questions.

Level A or B Simulation with Full Decon Line

Time Requirement:	0.5 hours simulation prep 3.0 for simulation
Number of Instructors:	1 or 2 for prep, consistent with ratio shown in Minimum Criteria: Levels A or B, 1 facilitator or assistant per 5 participants

Materials

- Participant materials (Participant Guide, Exercise Manual; ERP for training or use employer/local ERP; scenario). An ERP for training is shown here: <https://mwc.umn.edu>
- ERP for the training area. See Program Director for guidance from **MWC Procedure and Policy Manual**, Tab 20, Simulation and Exercise Trainer Qualifications and Emergency Plan, Template 3
- Ensure Fitness for Training requirements have been met (**MWC Policy and Procedure Manual**, Tab 6)
- Supplies for simulation

Objectives

When completed, participants will be better able to:

- Demonstrate ability to don/doff a level of protection
- Demonstrate ability to set up a decon line, consistent with the level of protection of the simulation
- Conduct a technician level task(s)
- Properly dispose of contaminated materials

Teaching Methods

- Discussion
- Group activity
- Hands-on

Suggested Instructor Preparation

- Review Participant Guide and specifications in this guide (and ERP for training area)
- Review diagram for Level A or Level B decon
- Review ERP for the scenario, SOP or SOG for Decon
- Select/review/revise scenario and Technician-level tasks to be conducted. (Modifying the conditions or materials in one of the tabletops might be considered.)
- Obtain copies of the needed checklists (see Exercise Manual)
- Assemble all needed supplies in the training area for the session
- Review any listed on-line resources
- Test web links prior to the session and If any are inoperative please notify your Program Director
- File scenario, decon plan and supporting documents in Program File

Minimum Content Requirements

- Participate in scenario response including decon
- Conduct technician-level task(s)

Questions You May Be Asked

We do not have an ERP.

Be prepared to facilitate a discussion to identify who to ask about this at the company. (It is likely there is one, but training has not been adequate.) Use 1910.120 to identify what must be in a plan, so that the participant is prepared to discuss this with appropriate personnel in the employer organization.

Our air monitoring person is at corporate, 400 miles away. How do you deal with this?

This must be covered in the ERP. Facilitate a discussion of alternatives: for releases of some materials, monitoring may not be needed (a food processing plant where the coolant is ammonia and one of the process lines containing ammonia is broken by a forklift). For unknowns, monitoring will be needed: are there emergency crews in the area that can be called? what is in the ERP?

Presentation of the Session

This session can be presented as follows:

On the agenda, there are 30 minutes scheduled before the Response Simulation for Planning. This is an opportunity to cover the Emergency Response Plan for the training site, introduce the scenario and answer questions about the Response Simulation.

Exercise – Level A or B Simulation with full Decon

Definition: The Emergency Response Simulation is a coordinated response requiring Technician-level actions. For a simulated response, each participant will conduct one or more assigned activities.

During the simulation, a response scene will be set up with the various work zones, in order to respond using good work practices. Pairs or groups of participants will participate in specific tasks such as sampling the air, identify the hazard, control an emission with appropriate PPE, go through decon, decon others and/or equipment or other task(s) relevant to expected response activities.

The sections below include specifics for the Trainer Qualifications, the training center ERP, Simulation site, and considerations in designing/conducting the Simulation.

Trainer Qualifications for Response Simulation (MWC Policy)

- Staffing consistent with the Minimum Criteria requirements
- Medically cleared to use respiratory protection for training
- Experienced in use of all the PPE and procedures
- Skills in anticipation and recognition of possible hazards when using PPE
- Skills in anticipation and recognition of possible hazards during decon
- Documented training in recognizing heat and cold stress effects
- Working knowledge of the Emergency Response Plan

Emergency Response Plan for the Conduct of the 40T Simulation (MWC Policy)

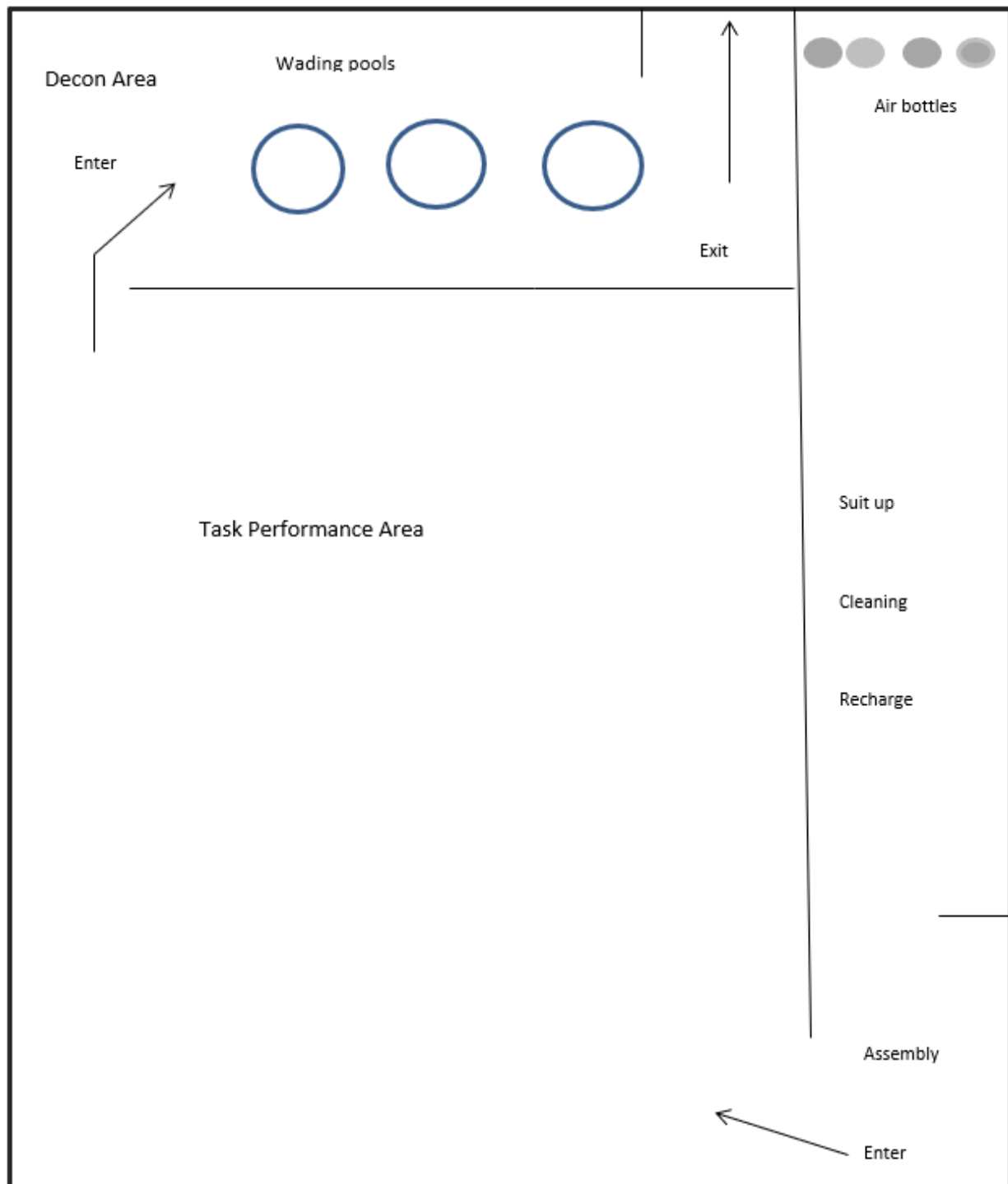
The following elements must be included as shown in Template 3.

- Safety briefing
- Emergency communication, including emergency stop
- At least one person certified in First Aid and CPR must be on site (does not have to be a trainer), unless EMS is onsite
- Emergency Medical Care alert system
- Site description/access
- Site description
- Physical Hazard analysis, including heat and cold or weather events
- Responsibilities of Facilitators and Participants/Accountability

The sections below may be useful as you design the simulation activity.

Considerations for a response simulation site

- Running water available from an outside spigot or an air driven pump to supply water for the exercise (decontamination) and potable water to prevent dehydration among participants.
- Telephone or radio to summon emergency assistance
- Access to adequate restrooms within 100 yards of site
- Physical site at least 150' x 150'
- Shelter (shield from sun/rain and for breaks and briefings) to seat 30
- Identify alternative site as a contingency plan
- Site should be situated so as to minimize public reaction or preparations should be made to deal with concern among passersby. Radio communication requires advance notice to agencies monitoring stations that this is a drill, the name of the group conducting the simulation (other locally required information) and notification to the agencies that the drill is terminated.
- If conducted in an area that may be observed by the public or others at the facility, a sign should be used to indicate that training is occurring; local authorities (police and fire, etc.) and the local media should be notified if the exercise is visible to the public.
- If night exercises are contemplated, lighting requirements set by OSHA must be met.
- Close proximity to the classroom facility is preferable.



Example of Response Simulation Layout in Field or Parking Lot

Minimum Required Equipment/Supplies for 24 participants:

8-24 SCBA units with cases and airline capability; 8-14 spare tanks with recharge capability onsite

If Level A to be used: 8 complete Level A training ensembles. Suit fitted with glove rings so the participant can retract hands into suit to operate SCBA, wipe fog from face shield, etc.

- 1 level A suit for demonstration purposes
- Airline system to run 2 airline units with egress and SCBA units
- Up to 24 full facepieces; 16 APRs with cartridges if level C is used
- If response uses Level A: 16 complete Level B ensembles
- If response uses Level B: 16 complete Level C ensembles
- Paper towels and spray disinfectant
- De-fogging solution per manufacturer recommendation
- Tape consistent with manufacturer recommendations for suits
- Visqueen
- 24 Hardhats
- Adequate supply of safety shoes/boots

Simulation set up: (modify supplies and monitoring equipment based on scenario selected)

- A release that is relevant to the participants (pipe, drum or another container)
- Spark-proof tools for any work to be done
- Radio system for use with Level A (optional but strongly recommended)

Decontamination supplies:

- 3 baby pools/decon pool/methods to construct pools with boards and tarps etc.
- 3 50' lengths of garden hose
- 3 sprayers attachable to hoses
- Sprayer
- 2 long-handled brushes
- Garbage can
- 2 rinse buckets

Air Monitoring:

- Colorimetric pump and appropriate tubes
- pH paper
- Direct reading detector

Other supplies

- First Aid Kit
- Drinking fluids and disposable cups
- 4 stools or short step ladders for suiting up
- Barrier tape, stakes, safety cones
- Tape compatible with the suits
- Clipboards
- Binoculars (for Recon if part of the scenario)

Participant attire:

- Steel-toed shoes
- Eyeglasses, if corrective lenses are used (NO contacts); may need eyeglass kits.
- Work clothes

Participant Tasks at Simulation Site

Properly don/doff/decontaminate Levels A or B, or Levels B and C

Demonstrate ability to do at least one of the following activities

- Hazard Assessment: Sample/identify hazard based on labels and/or sampling information
- Plan response
- Respond to stop the release
- Decontaminate responders and tools

Rotation/multiple tasks

Depending on the number of participants and the scenario, there may be time for some to complete more than one task (example: hazard assessment, decon). If a rotation or multiple tasks is used, a schedule should be developed to show which groups will rotate and the duration each group will have to accomplish the task.

Design the scenario and supporting documents

-Describe the scene

- What has happened?
- The setting—other buildings, inhabited areas, drains, waterways, roads, rail, etc.
- The time of day and weather

Participants will find a drawing of the scene useful. This can be displayed on paper or whiteboard.

(See the various tabletop scenarios for examples of detail and drawings.)

-ERP

SOGs or SOPs and risk assessment information should be presented in a 'for training only' ERP or by using sections of the employer ERP.

-Plan Functions/Assignments

One of the facilitators will act as IC, when decisions are needed. An important IC function in the Simulation is to stimulate questions, to guide the development of the response.

Groups of participants will assume the following functions:

- Risk Assessment using the ERP
- Set up decon
- Conduct decon
- Response
- Other activities shown in the ICS, depending on numbers of participants such as:
 - Security
 - Public Information
 - Finance

All participants will contribute to:

Plan the response

-Exercise Stimuli (Optional)

If included in the scenario, document in the Program File.

-Collect signed Performance Checklists for program documentation and as part of the program 'successful completion'.

Summary

Review the Objectives:

- Demonstrate ability to don/doff a level of protection
- Demonstrate ability to set up a decon line, consistent with the level of protection of the simulation
- Conduct a technician level task(s)
- Properly dispose of contaminated materials

Ask: "What are important things you learned during this simulation - from set up to decontamination?"

Emergency Response Simulation

Time Requirement:	0.5 hours simulation prep 3.0 for simulation
Number of Instructors:	1 or 2 for prep, consistent with ratio shown in Minimum Criteria: Levels A or B, 1 facilitator or assistant per 5 participants

Materials

- Participant materials (Participant Guide and Exercise Manual; ERP for training or use employer/local ERP; scenario). An ERP for training is shown here: <https://mwc.umn.edu/catalog/>
- ERP for the training area. See Program Director for guidance **from MWC Procedure and Policy Manual**, Tab 20, Simulation and Exercise Trainer Qualifications and Emergency Plan, Template 3
- Ensure Fitness for Training requirements have been met (**MWC Policy and Procedure Manual**, Tab 6)
- Scenario
- Supplies for simulation

Objectives

When completed, participants will be better able to:

- Demonstrate ability to size up and plan a response
- Demonstrate ability to conduct the activities for an assigned role

Teaching Methods

- Discussion
- Group activity
- Hands-on

Suggested Instructor Preparation

- Review participant guide and specifications in this guide (and ERP for training area)
- Review diagram for Level A or Level B decon
- Review ERP SOP or SOG for Decon
- Select/review/revise scenario and Technician-level tasks to be conducted. (Modifying the conditions or materials in one of the tabletops shown in the Level A or B Simulation with Full Decon might be considered; if Level B is used in the Level A or B Simulation with full Decon, change conditions that would require Level A for similar scenario layout; ensure that different tasks are assigned to each participant in this simulation; opportunity to reinforce practices that were not conducted properly in Level A/B exercise.) If you select a task not shown (see 'other' on checklist) prepare additional ERP materials as needed.
- Copy the needed checklist (see Exercise Manual)
- Assemble all needed supplies in the training area for the session
- Review any listed on-line resources
- Test web links prior to the session and If any are inoperative please notify the Midwest Consortium Program Director
- File scenario (or reference a scenario in this manual), decon plan and supporting documents including the signed Performance Checklists in the program file

Minimum Content Requirements

- Size up and plan a response for a given scenario
- Conduct technician-level response

Questions You May Be Asked

Why do we have to do this again?

Facilitate a discussion regarding response actions:

- Are all responses the same?
- Do conditions change?
- Benefits of practice, especially for teams

We often find that supplies are missing. How can this be changed?

Facilitate a discussion of how to identify the person in charge of supplies and equipment and time schedule for review of supplies and check on condition. Refer to required elements of an ERP, and ask: where should this concern be addressed?

Presentation of the Session

On the agenda, there are 30 minutes scheduled before the Simulation Preparation. This is an opportunity to review the Emergency Response Plan for the training site, introduce the scenario and answer questions about the Site Emergency Simulation.

Exercise – Emergency Response Simulation

Definition: The Emergency Response Simulation is a coordinated response requiring Technician-level actions. For a simulated response, each participant will conduct one or more assignments.

During the simulation, a response scene will be set up with the various work zones, in order to respond using good work practices. Pairs or groups of participants will participate in specific tasks such as sampling the air, identify the hazard, control an emission with appropriate PPE, go through decon, decon others and/or equipment or other task(s) relevant to expected response activities.

The sections below include useful guidance on designing and conducting the simulation.

Trainer Qualifications for Response Simulation (MWC Policy)

- Staffing consistent with the Minimum Criteria requirements
- Medically cleared to use respiratory protection for training
- Experienced in use of all the PPE and procedures
- Skills in anticipation and recognition of possible hazards when using PPE
- Skills in anticipation and recognition of possible hazards during decon
- Documented training in recognizing heat and cold stress effects
- Working knowledge of the Emergency Response Plan

Emergency Response Plan for the Conduct of the 40T Simulation (MWC Policy)

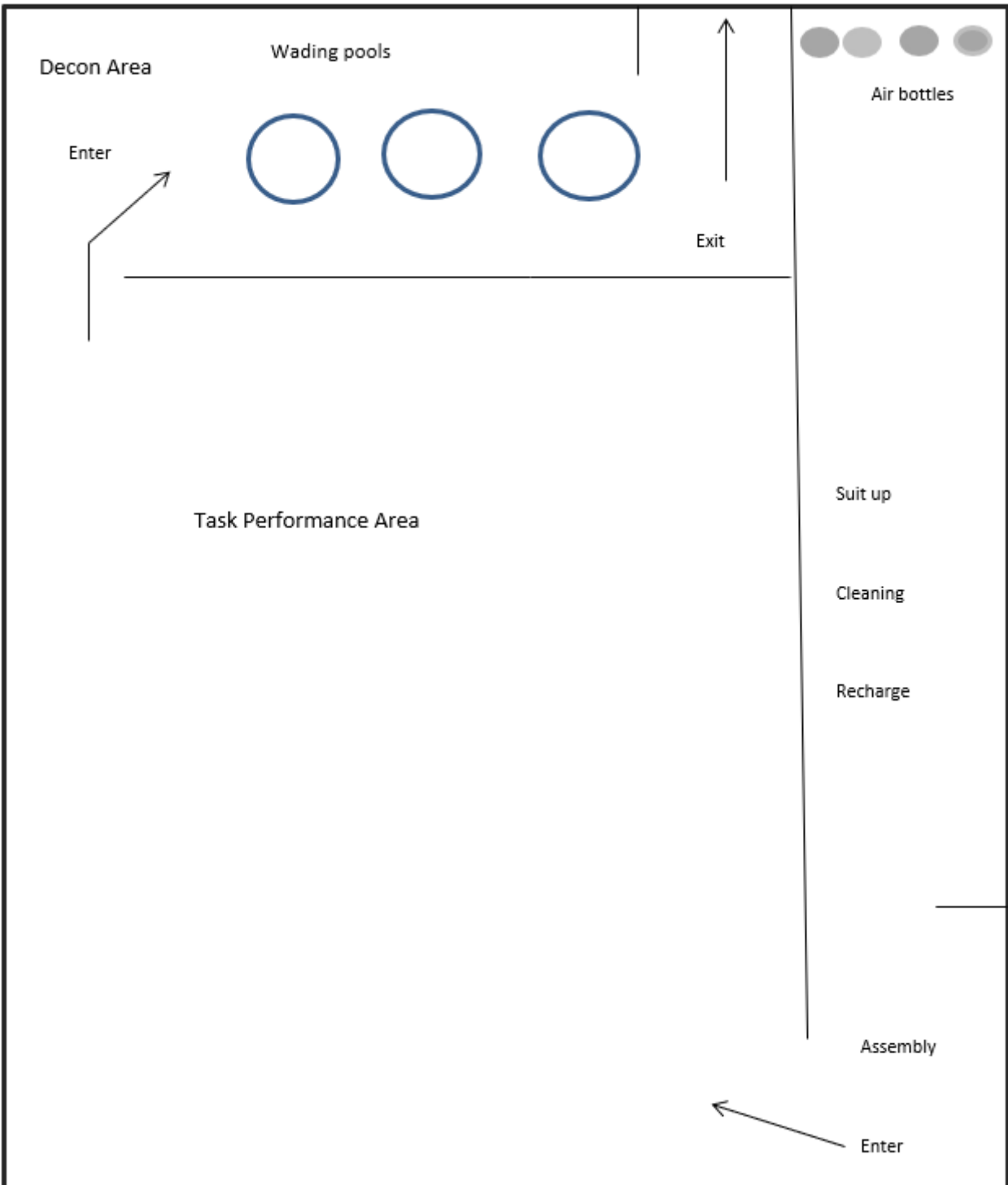
The following elements must be included as shown in Template 3.

- Safety briefing
- Emergency communication, including emergency stop
- At least one person certified in First Aid and CPR must be on site (does not have to be a trainer), unless EMS is onsite
- Emergency Medical Care alert system
- Site description/access
- Site description
- Physical Hazard analysis, including heat and cold or weather events
- Responsibilities of Facilitators and Participants/Accountability

The sections below may be useful as you design the simulation activity.

Considerations for a response simulation site

- Running water available from an outside spigot or an air driven pump to supply water for the exercise (decontamination) and potable water to prevent dehydration among participants.
- Telephone or radio to summon emergency assistance
- Access to adequate restrooms within 100 yards of site
- Physical site at least 150' x 150'
- Shelter (shield from sun/rain and for breaks and briefings) to seat 30
- Identify alternative site as a contingency plan
- Site should be situated so as to minimize public reaction or preparations should be made to deal with concern among passersby. Radio communication requires advance notice to agencies monitoring stations that this is a drill, the name of the group conducting the simulation (other locally required information) and notification to the agencies that the drill is terminated.
- If conducted in an area that may be observed by the public or others at the facility, a sign should be used to indicate that training is occurring; local authorities (police and fire, etc.) and the local media should be notified if the exercise is visible to the public.
- If night exercises are contemplated, lighting requirements set by OSHA must be met.
- Close proximity to the classroom facility is preferable.



Example of Response Simulation Layout in Field or Parking Lot

Considerations in designing/conducting the simulation

Minimum Required Equipment/Supplies for 24 participants:

8-24 SCBA units with cases and airline capability; 8-14 spare tanks with recharge capability onsite

If Level A to be used: 8 complete Level A training ensembles. Suit fitted with glove rings so the participant can retract hands into suit to operate SCBA, wipe fog from face shield, etc.

- 1 level A suit for demonstration purposes
- Airline system to run 2 airline units with egress and SCBA units
- Up to 24 full facepieces; 16 APRs with cartridges if level C is used
- If response uses Level A: 16 complete Level B ensembles
- If response uses Level B: 16 complete Level C ensembles
- Paper towels and spray disinfectant
- De-fogging solution per manufacturer recommendation
- Tape consistent with manufacturer recommendations for suits
- Visqueen
- 24 Hardhats
- Adequate supply of safety shoes/boots

Simulation set up: (modify supplies and monitoring equipment based on scenario selected)

- A release that is relevant to the participants (pipe, drum or another container)
- Spark-proof tools for any work to be done
- Radio system for use with Level A (optional but strongly recommended)

Decontamination supplies

- 3 baby pools/decon pool/methods to construct pools with boards and tarps etc.
- 3 50' lengths of garden hose
- 3 sprayers attachable to hoses
- Sprayer
- 2 long-handled brushes
- Garbage can
- 2 rinse buckets

Air Monitoring

- Colorimetric pump and appropriate tubes
- pH paper
- Direct reading detector

Other supplies

- First Aid Kit
- Drinking fluids and disposable cups
- 4 stools or short step ladders for suiting up
- Barrier tape, stakes, safety cones
- Tape compatible with the suits
- Clipboards
- Binoculars (for Recon if part of the scenario)

Participant attire

- Steel-toed shoes
- Eyeglasses, if corrective lenses are used (NO contacts); may need eyeglass kits.
- Work clothes

Participant Tasks at Simulation Site

Properly don/doff/decontaminate Levels A or B, or Levels B and C

Demonstrate ability to do at least one of the following activities

- Hazard Assessment: Sample/identify hazard based on labels and/or sampling information
- Plan response
- Respond to stop the release
- Decontaminate responders and tools

Design the Scenario

Describe the scene

- What has happened?
- The setting—other buildings, inhabited areas, drains, waterways, roads, rail, etc.
- The time of day and weather

Participants will find a drawing of the scene useful. This can be displayed on paper or whiteboard.

(See the various tabletop scenarios for examples of detail and drawings.)

Plan Roles/Assignments

One of the facilitators will act as IC, when decisions are needed. An important IC function in the Simulation is to stimulate leading questions, to guide the development of the response.

Groups of participants will assume the following activities:

- Risk Assessment using the ERP
- Set up decon
- Conduct decon
- Response

Other activities shown in the ICS, depending on numbers of participants such as:

- Security
- Public Information
- Finance

All participants will contribute to:

Plan the response

Exercise Stimuli

If stimuli are used, document in the Program File.

Collect the signed Performance Checklists for program documentation and as part of the program 'successful completion'.

Summary

Review the learning objectives.

- Demonstrate ability to size up and plan a response
- Demonstrate ability to conduct the activities for an assigned role

Ask: "What are important things you learned during this simulation—from set up to decontamination?"

Cleanup and Critique (Termination)

Time Requirement: 1 hour

Number of Facilitators: 1 or more, consistent with ratio shown in the Minimum Criteria

Materials

- Participant materials (Participant Guide and Exercise Manual)
- Performance Skill Checklist - Termination

Objectives

When completed, participants will be better able to:

- Inspect equipment used in the simulation and tag as appropriate
- Properly dispose of contaminated materials
- Critique a response

Teaching Methods

- Hands-on activity
- Discussion

Suggested Instructor Preparation

Review participant guide and exercise

Minimum Content Requirements

- Clean up the area
- Inspect supplies and tag as needed
- Properly dispose of contaminated materials
- Critique Simulation

Questions You May Be Asked

We do not have money for any new PPE. We just have to keep using it.

Facilitate a discussion of reasons that the PPE may not be protective. When this occurs, the employer is no longer meeting the responsibility of supplying PPE that is protective.

Our response supplies tend to disappear. Is there a way to keep supplies ready for use?

Facilitate a discussion on what others in the group do to ensure that supplies are there if a response action is needed. Some groups are also putting a diagram on storage units, showing location of various supplies for easy access. This is especially useful if outside groups may assist in a response.

Presentation of the Session

This session can be presented as follows:

Review the objectives

Termination Activities

Review the listing of termination activities in the Participant Guide. Note that others may be specified in the employer-specific SOP.

Clean up the area, inspect and tag

Ask participants to list the actions needed to clean this area

- Inspect
- Sort: Discard, Verify decontaminated, Re-stow
- Tag each pile
- Dispose of Properly

Ask: “What considerations are important in disposal of ...?”

- Contaminated PPE, tools, supplies
- Liquids that may include hazardous materials

Critique

Ask: “What went well and what could have been done better?”

Make a list of ‘went well’ and ‘could be improved’

Fill in gaps that you noted, by asking leading questions. For example, ‘Did anyone notice that some of the decon water splashed out of the containment?’. This could then be added to the ‘improved’ list.

For the ‘could be improved’

Facilitate a discussion of how to improve each item/action.

Ask: “How would you improve?”

Complete the Termination Checklists. Collect them as part of program documentation.

Exercise – Clean up and Critique

Number of Facilitators: 1

Time Requirement: approximately 20 minutes (15 for exercise and 5 for report-back)

Materials: Participant Guide and checklist from Exercise Manual

Procedure: See Exercise Manual

Summary – Cleanup and Critique (Termination)

Review the Objectives:

- Inspect equipment used in the simulation and tag as appropriate
- Properly dispose of contaminated materials
- Critique a response

Review and Games

Time Requirement: 1 hour

Number of Facilitators: 1 or more, consistent with ratio shown in Minimum Criteria

Materials

- Review Guide
- Whiteboard or equivalent; markers
- Games

Objectives

- Review content interactively
- Ask for questions
- Use the Review Guide
- Use Performance Checklists as review
- Link chemicals of interest to figures in the Participant Guide
- Quiz participants using labels, placards, pictograms
- Use games from the following list (see Program Director):
 - Decon Card Sort
 - Toxic Jeopardy
 - Toxic Pyramid

Avoid using this session to ‘teach to the test’. Facilitate a broad-based review of important points from each section.

Teaching Methods

Discussion

Suggested Instructor Preparation

- Review first day list of chemicals that participants identified of particular interest.
- Review aspects of the program where participants appeared unsure or did not perform as well as expected

Minimum Content Requirements

The following are minimum content requirements for the section:

Review

Questions You May Be Asked

“What happens if I fail the test?”

Assure participants that most score well on the test. The training center has a plan to assist anyone that does not do well. (BUT this will not ensure ‘success’ if participation has indicated a person did not achieve the needed skills.)

Presentation of the Session

Provide an interactive session, so that participants have opportunity to review.

Closing and Program Evaluation

This concludes the program and may be done after the post-test depending on training center agenda.

Time Requirement: 1.5 hours

Number of Facilitators: 1 or more, consistent with ratio shown in Minimum Criteria

Materials

- Whiteboard or equivalent; markers
- Posttest
- Evaluation forms

Objectives

- Conduct and grade the posttest
- Review initial list from first day and anything remaining in the 'parking lot' to ensure complete
- Answer questions
- Review need for annual refresher
- Identify key rights and responsibilities workers have under the OSHA Act
- Thank participants.

Teaching Methods

Discussion

Suggested Instructor Preparation

Review first day list of chemicals that participants listed of particular interest.

Minimum Content Requirements

The following are minimum content requirements for the section:

- Conduct posttest
- Review initial questions/list
- Answer last questions
- Thank participants

Questions You May Be Asked

“What happens if I do not take a refresher?”

If needed for a job, you will not be up-to-date and may be required to take this program again. Some employers ‘stretch’ the requirement to 18 months, if the refresher is taken ASAP, but it is a gamble.

Presentation of the Session

After the review, provide the exam. Allow plenty of time for completion (some programs give the exam prior to the Termination topic to decrease the ‘I just want to leave’ attitude on a Friday afternoon).

This is an opportunity for final questions and to ensure that the list of questions generated on day has been addressed during the program.

Thank participants for attending the program.

Evaluation is important to continued program improvement. This should not be rushed. Provide 15 minutes to complete the program evaluation forms and collect them.

Facilitator Follow up

Make this program better:

Forward suggestions to your Program Director

Are there other 'Questions you may be asked' that should be included in specific sections of this manual?

Appendix

The Appendix includes Participant Guides, Facilitator Guides and Worksheet (if applicable) for:

- Exercise A. County Hazmat Team Exercise #1
- Exercise B. County Hazmat Team Exercise #2
- Exercise C. Emergency Response Tabletop
- Exercise D. Spill Response Tabletop #1
- Exercise E. Spill Response Tabletop #2
- Exercise F. Spill Response Tabletop #3

Exercise A Participant Guide

County HazMat Team Exercise #1

The Situation

The County HazMat Team is summoned to a plant where a stack of super sacks has fallen or collapsed in cold storage, causing a domino effect on adjacent pallets of bagged material. On an intact super sack, the guard was able to read the words SODIUM CARBONATE and there was a black and white diamond for Corrosion visible.

The guard secured the area—easier because it was third shift.

In a recon action, the HazMat first entry team of Clem and Oliver enter the cold storage area with binoculars to do an initial hazard and risk analysis. They determine that at least 4 or 5 different powdered materials have been released, but none can be identified without going closer.

The IC informs the plant CEO upon his arrival that this appears to be a ‘clean up’ situation and she should call Onyx Clean-Up. She says to save time, she will pay \$2,000 plus expenses if the County team will clean-up the spill. After discussing it, as a low risk scenario with minimum personnel needs, the team agrees to finish the job.

The environmental manager, calling in from home does NOT want the powders combined if possible during the clean-up. It is decided that Clem and Oliver will dress in Level C with a hooded Tyvek suit, neoprene gloves and boot covers and a full-face respirator with HEPA filter.

Question #1: Do you agree with this PPE?

They will shovel/sweep each separate material into a plastic, lined open-top 55-gallon drum.

One hour later, they are finishing up. They have 8 drums, 2 are filled with the material from the super sack, as is half of another; the other 5 are filled with the material from the broken bags. The bags have been picked up and placed in a dumpster and the area has been vacuumed.

Question #2: Oliver is asked how he has tagged the drums to show what material is in each. Was a label from the bag put with each drum?

Oliver says he was never told to do this. How was he to know?

The problem continues...

The IC now has to sample each of the containers and identify the contents, using the SDS list for the chemicals in the storage area as a starting point.

The plant CEO brings you the list and Clem brings samples for you to identify.

Using the test kit given to you and the SDSs, identify the materials that Clem has collected.

SDS list for the Cold Storage Area

- Sodium Carbonate
- Urea
- Citric Acid
- Lithium Hydride
- Sodium Hydroxide
- Alconox Glass Cleaner
- Sodium Hypochlorite

Test kit supplies

- Squirt bottle of water
- Single strike matches
- Bottle of HCl with dropper
- pH paper
- Test tube holder
- Test tubes

PPE

- Face shields
- Aprons
- Gloves

Work in small groups to identify the materials.

Clean up your space, ensuring safe disposal of all used materials.

Exercise A Facilitator Guide

County HazMat Team Exercise #1

The Situation

The County HazMat Team is summoned to a plant where a stack of super sacks has fallen or collapsed in cold storage, causing a domino effect on adjacent pallets of bagged material. On an intact super sack, the guard was able to read the words SODIUM CARBONATE and there was a black and white diamond for Corrosion visible.

The guard secured the area—easier because it was third shift.

In a recon action, the HazMat first entry team of Clem and Oliver enter the cold storage area with binoculars to do an initial hazard and risk analysis. They determine that at least 4 or 5 different powdered materials have been released, but none can be identified without going closer.

The IC informs the plant CEO upon his arrival that this appears to be a ‘clean up’ situation and she should call Onyx Clean-up. She says to save time, she will pay \$2,000 plus expenses if the County team will clean up the spill. After discussing it, as a low risk scenario with minimum personnel needs, the team agrees to finish the job.

The environmental manager, calling in from home, does NOT want the powders combined if possible during the clean-up. It is decided that Clem and Oliver will dress in Level C with a hooded Tyvek suit, neoprene gloves and boot covers and a full-face respirator with HEPA filter.

Question #1: Do you agree with this PPE?

Answer: [Yes, after reviewing SDSs](#)

They will shovel/sweep each separate material into a plastic, lined open-top 55-gallon drum.

One hour later, they are finishing up. They have 8 drums, 2 are filled with the material from the super sack, as is half of another; the other 5 are filled with the material from the broken bags. The bags have been picked up and placed in a dumpster and the area has been vacuumed.

Question #2: Oliver is asked how he has tagged the drums to show what material is in each. Was a label from the bag put with each drum?

Answer: [No, it was not.](#)

Oliver says he was never told to do this. How was he to know?

Have discussion here on Notification. Oliver should be directed to take Hazcom/RTK training.

The problem continues...

The IC now has to sample each of the containers and identify the contents, using the SDS list for the chemicals in the storage area as a starting point.

The plant CEO brings you the list and Clem brings samples for you to identify.

Using the test kit given to you and the SDSs, identify the materials that Clem has collected.

Provide resources shown in Facilitator Guide to identify

SDS list for the Cold Storage Area

- Sodium Carbonate-no concentration listed
- Urea-no concentration
- Citric Acid--disregard
- Lithium Hydride
- Sodium Hydroxide
- Alconox Glass Cleaner
- Sodium Hypochlorite

We would need to have concentrations for each chemical

Test kit supplies-purpose to test flammability of chemicals

- Squirt bottle of water
- Single strike matches-
- Bottle of HCl with dropper
- pH paper
- Test tube holder
- Test tubes

PPE

- Face shields
- Aprons
- Gloves

Work in small groups to identify the materials.

Clean up your space, assuring safe disposal of all used materials.

In a report back, compare findings of each group. Use resources (print and/or electronic) to resolve questions.

Facilitator Preparation Notes

Assemble SDSs for the following:

- Sodium Carbonate
- Urea
- Citric Acid
- Lithium Hydride
- Sodium Hydroxide
- Alconox Glass Cleaner
- Sodium Hypochlorite

Assemble samples of the materials to be identified

Assemble supplies for testing the materials

- Squirt bottle of water
- Single strike matches
- Bottle of HCl with dropper
- pH paper
- Test tube holder
- Test tubes

Assemble PPE for each participant

- Face shield
- Apron
- Gloves

Ensure fire extinguisher is available, and appropriate containers for waste disposal

For materials listed above, provide answer sheet.

Exercise B Participant Guide

County HazMat Team Exercise #2

The Situation

The area monitor alarmed in the acid mixing room, indicating a potential emergency situation; it is wired to the County HazMat office alerting the team immediately. An exhaust fan automatically starts ventilation in the area when the alarm activates.

An associate from the mix room meets the County HazMat team and reports the product being blended was Deoxalume 1000. She believes that a transfer pump from the blend vessel that sends the product to packaging ‘blew’ because Deoxalume was being emitted from the pump as she exited the room.

She cut power to the pump by hitting the emergency shut off when she was outside the room. The room is now dark except for emergency lighting.

The Problem

Entry team 1 will

- a. determine the extent/quantity of spill and confine it with polypropylene fiber, if feasible.
- b. determine if the electronic shut off worked and shut the manual valve between the vessel and the pump as a precaution.
- c. identify the need for clean-up.

Work in small groups to complete the worksheets provided.

Exercise B Worksheet 1. Air Monitor Selection

Working as a group, complete the worksheet, noting the reasons to use (pro) or not use (con) the instrument listed.

- Multi-gas meter

Pro:

Con:

- Colorimetric Tubes

Pro:

Con:

- PID (10.6 eV lamp)

Pro:

Con:

- pH paper

Pro:

Con:

- Other _____

Pro:

Con:

Exercise B Worksheet 2. PPE Selection

Working as a group, use resources to complete the worksheet below.

Exercise B Worksheet 2. PPE Selection

Entry and Back up Teams					Decon Team				
Level of Protection	A	B	C	D	Level of Protection	A	B	C	D
Boot					Boot				
Boot Cover					Boot Cover				
Boot Liner					Boot Liner				
Inner Glove					Inner Glove				
Outer Glove					Outer Glove				
Abrasive Glove					Abrasive Glove				
Suit					Suit				
Other					Other				

Exercise B Facilitator Guide

County HazMat Team Exercise #2

The Situation

The area monitor alarmed in the acid mixing room, indicating a potential emergency situation; it is wired to the County HazMat office alerting the team immediately. An exhaust fan automatically starts ventilation in the area when the alarm activates.

An associate from the mix room meets the County HazMat team and reports the product being blended was Deoxalume 1000. She believes that a transfer pump from the blend vessel that sends the product to packaging ‘blew’ because Deoxalume was being emitted from the pump as she exited the room.

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The Problem

Entry team 1 will

- a. determine the extent/quantity of spill and confine it with polypropylene fiber, if feasible.
- b. determine if the electronic shut off worked and shut the manual valve between the vessel and the pump as a precaution.
- c. identify the need for clean-up.

Work in small groups to complete the worksheets provided.

Identify needed SDS on the internet or from the employer from the list of chemicals of interest.

Exercise C Participant Guide

Emergency Response Tabletop Exercise

Working in small groups, read the information below and answer the questions. Select a record keeper in your group who will take notes and report the work of the group back to the other participants for a critique.

Following the tabletop, a full exercise will be conducted with PPE and decon.

The Incident

The temperature is 80° F on a July day. There is a slight breeze out of the west.

At approximately 9 a.m. Joe is working in the distribution center and hears a crash. When he turns to see what is going on, he sees that the forklift mast has hit a refrigeration unit. The driver, Ralph, is slumped over the controls. There is a small stream of liquid running down the unit onto the floor and the odor of ammonia is already strong. Joe is forced to retreat before he can rescue Ralph.

The temperature in the distribution center is 10° F.

There are four trucks at the dock and the white cloud is growing as Joe leaves the center. The Management offices and production facility are in a separate building, west of the Distribution Center.

Your Assignment

Answer the questions on each page before proceeding to the next page.

1. Who does Joe call? List the information that he reports.

Call:

Information:

2. What should Joe do after making the call?

3. Another worker grabs Joe and says they have to rescue Ralph right now. What should Joe do?

4. Who is the IC, and where should the ERT members assemble?

5. After a brief size-up, the team decides there is a potential for an emergency if the leak escalates, and they implement the ER plan. List the immediate risks and objectives to reduce/ mitigate each.

Risk	Objective to reduce/mitigate
a.	
b.	
c.	
d.	

6. What internal/external phone calls must be made?

What outside resources must be alerted?

7. Does anyone need to be evacuated at this time?

Who, if any?

8. Estimate the size of your ER team now: ____ Diagram your IC system.

9. Identify your exclusion zone on Figures A and B.

10. Entry Team One is to rescue Ralph. List steps and considerations to do this.

11. Do you have enough people to have another entry team to begin shutting down the system or implement isolation?

12. How many employees will it take to secure the area (refer to 9, above).

13. The plant manager is now on the scene. What is her responsibility in the response? Is she qualified to be the IC?

14. Human Resources reports that one employee is unaccounted for. What are the options the IC must consider?

What does the IC do?

15. A reporter arrives at the same time that the outside ER responders and vehicles arrive.

Who will deal with the reporter?

Who will deal with the external responders?

16. The first team is unable to find Ralph and returns. What are the options that must be considered?

Would driving the semis away from the docks help?

17. Maintenance reports that the system has been isolated. How long will ammonia continue to escape and cloud the area?

What about Ralph?

18. Someone suggests that the fire department fog ahead of the rescue team to clear the cloud. What are the pros and cons of this action?

Pros

Cons

Who is the IC if the fire department is on the scene now?

Can the fire department do this safely?

19. The switchboard operator reports that the cement company called and is noticing a strong odor of ammonia. The plant is ½ mile to the Northeast, across the highway. Who handles this information?

What is done?

20. Who are the players at the incident now? Show as changes on the IC diagram (8, above).

21. What has been learned about the missing employee?

Have off-shift ER personnel been called in to assist?

22. The Fire Chief calls for the regional hazmat team. What is your responsibility now?

.

23. If the incident continues, will Ralph be alive when he is found?

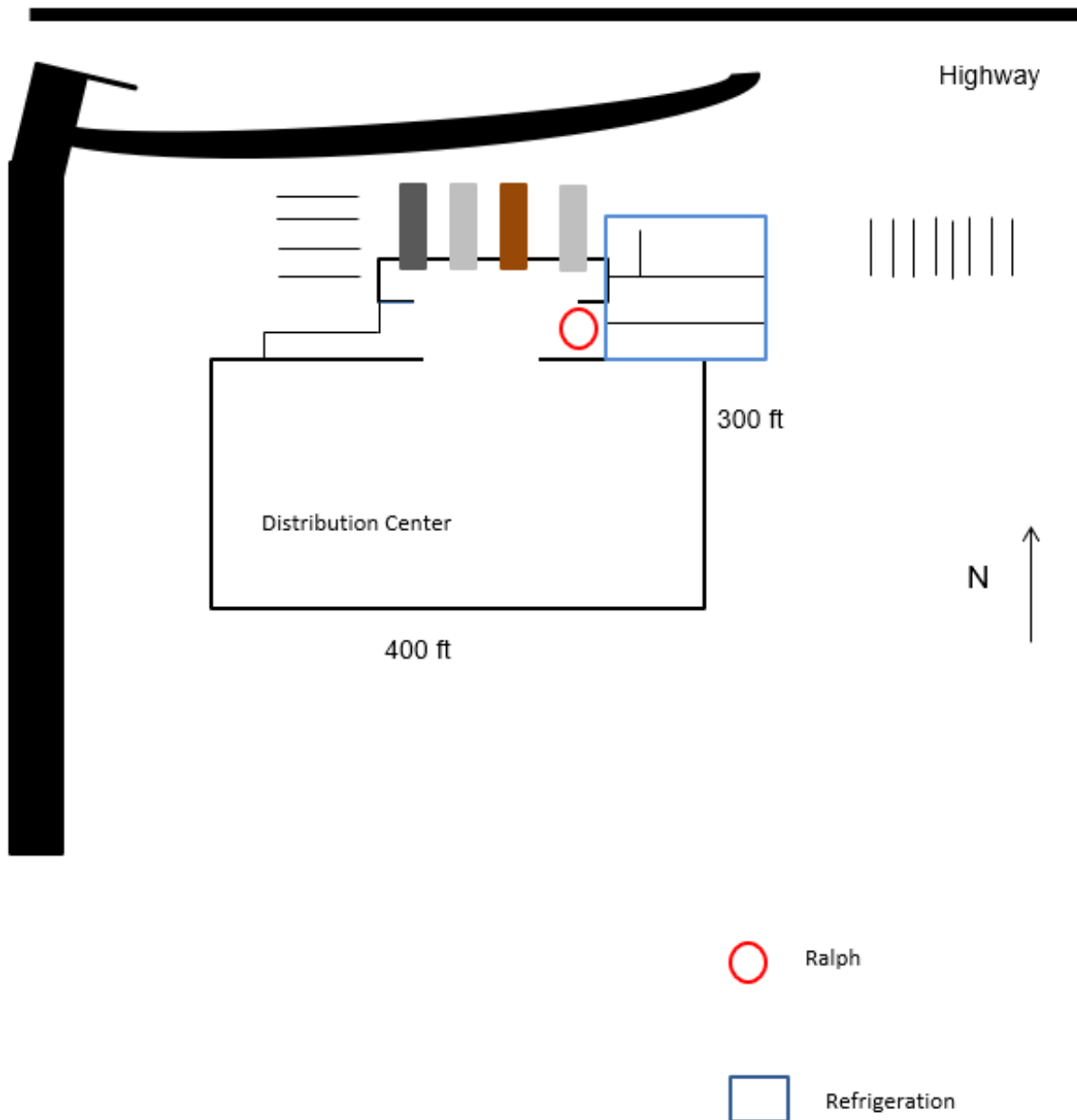


Figure A



Figure B

Exercise C Facilitator Guide

Emergency Response Tabletop Exercise

Working in small groups, participants will read the information below and answer the questions. Each group should select a record keeper who will take notes and report the work of the group back to the other participants for a critique. After the tabletop, this scenario can be run as a full-scale exercise.

NOTE: print map in color or indicate to all the location of the refrigeration unit.

The Incident

The temperature is 80° F on a July day. There is a slight breeze out of the west.

At approximately 9 a.m. Joe is working in the distribution center and hears a crash. When he turns to see what is going on, he sees that a forklift mast has hit a refrigeration unit. The driver, Ralph, is slumped over the controls. There is a small stream of liquid running down the unit onto the floor and the odor of ammonia is already strong. Joe is forced to retreat before he can rescue Ralph.

The temperature in the distribution center is 10° F.

There are four trucks at the dock and the white cloud is growing as Joe leaves the center. The Management offices and production facility are in a separate building, west of the Distribution Center.

Assignment

Alert participants to follow the directions to answer all questions on each page, before proceeding to the next page. The following items in the Participant Guide should be on one page each: 1-4, 5-9, 10-13, 14-17, 18-20, 21-23. Suggested answers are shown below, keyed to the page of the Participant scenario.

Page 2 of Participant scenario

1. Who does Joe call? List the information that he reports.

Call: 911, Supervisor, ERT, FD depending on ERP and previous training

Information:

calling to report a forklift incident
chemical release

2. What should Joe do after making the call? Secure the area

3. Another worker grabs Joe and says they have to rescue Ralph right now. What should Joe do?

Prevent entry. Refrain from rescue until more information is received.

4. Who is the IC, and where should the ERT members assemble?

Have participants review the diagram
Command post is in the NW corner
Team members at the corner
Ralph is initial IC

Page 3 of Participant scenario

5. After a brief size-up, the team decides there is a potential for an emergency if the leak escalates, and they implement the ER plan. List the immediate risks and objectives to reduce/ mitigate each.

Risk	Objective to reduce/mitigate
a. death/ exposure	remove Ralph from hazard
b. loss of product	supply line, contain
c.	
d.	

6. What internal/external phone calls must be made?

ERP may require corporate notification, other

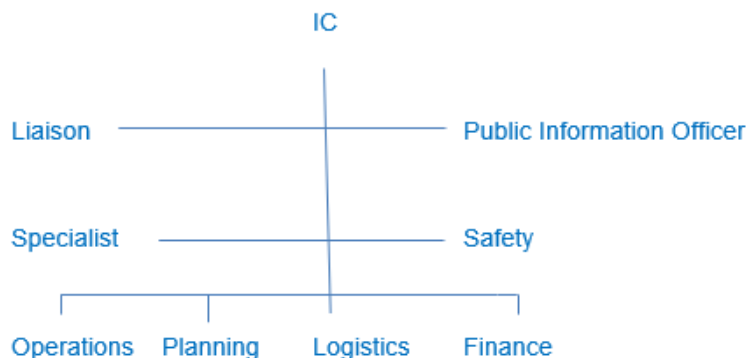
What outside resources must be alerted?

Fire Department, County Emergency Management

7. Does anyone need to be evacuated at this time? Yes

Who, if any? Employees in Distribution Center

8. Estimate the size of your ER team now. 12 Diagram your IC system.



9. Identify your exclusion zone on Figures A and B.

At the plant, include the interior of the distribution center, as it is not known if there is door that can be closed, or closes automatically when there is a release. Also include the dock and area north and west toward the highway (due to wind information). Based on volume (small), this exterior should initially be 100 ft, and then be extended to 0.1 mi (ERG, green section). If large spill, might use nurse tank as the surrogate for a source (ERG, green section Table 3), and then the downwind distance would be 0.3 miles.

For the larger layout, based on a large spill, the area at the cement plant would be included. Even if a small spill, the cement plant might be included depending on observation by the IC.

Page 4 of Participant scenario

10. Entry Team One is to rescue Ralph. List steps and considerations to do this.

Identify product and hazards

Identify PPE

Isolate power on forklift

Perform removal

11. Do you have enough people to have another entry team to begin shutting down the system or implement isolation?

Ask ICS; depends on company training level

12. How many employees will it take to secure the area (refer to 9, above).

At least 4, one for each door plus potentially more depending how the response goes.

13. The plant manager is now on the scene. What is her responsibility in the response? Is she qualified to be the IC?

Responsibility depends on level of knowledge of plant operations

IC assignment depends on training

Page 5 of Participant scenario

14. Human Resources reports that one employee is unaccounted for. What are the options the IC must consider?

Call the person if cell phones are allowed at the facility

Where was the person last seen? What are the usual duties of the person?

What does the IC do?

Call for outside assistance (personal accountability reporter)

15. A reporter arrives at the same time that the outside ER responders and vehicles arrive. Who will deal with the reporter?

Public Information Officer (see IC chart)

Who will deal with the responders?

The IC

16. The first team is unable to find Ralph and returns. What are the options that must be considered?

He left the area on his own?

Were they sure of his last location?

Where did he go?

17. Maintenance reports that the system has been isolated. How long will ammonia continue to escape and cloud the area?

Depends on system.

What about Ralph?

Once safe, systematic search is initiated for Ralph

Page 6 of Participant scenario

18. Someone suggests that the fire department fog ahead of the rescue team to clear the cloud. What are the pros and cons of this action?

Pros

Reduce concentration

Cons

takes time

Who is the IC if the fire department is on the scene now?

We are, until we transfer

Can the fire department do this safely?

Depends on training, wind direction and local environmental considerations.

19. The switchboard operator reports that the cement company called and is noticing a strong odor of ammonia. The plant is ½ mile to the Northeast, across the highway. Who handles this information?

IC

What is done?

Air sampling; notify DNR or appropriate agency

20. Who are the players at the incident now? Show as changes on the IC diagram (8, above).

Show on diagram; could differ as the group makes decisions.

Page 7 of Participant scenario

21. What has been learned about the missing employee?

Nothing.

Have off-shift ER personnel been called in to assist?

No

22. The Fire Chief calls for the regional hazmat team. What is your responsibility now?

Transfer command

23. If the incident continues, will Ralph be alive when he is found?

He may have left the scene—not enough information

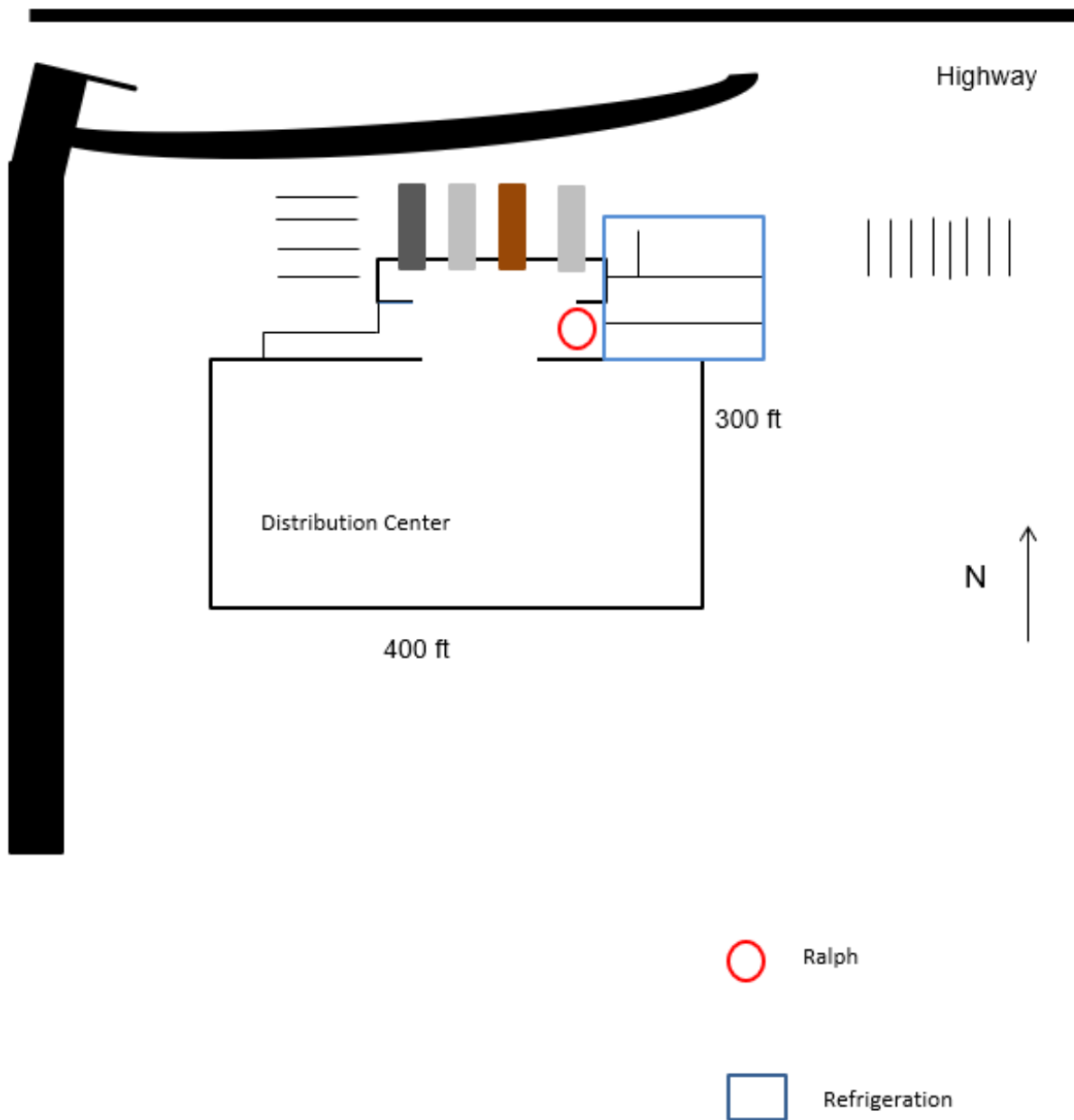


Figure A



Figure B

Exercise D Participant Guide

Spill Response Tabletop Exercise #1

Working in small groups, read the information below and answer the questions. Select a record keeper in your group who will take notes and report the work of the group back to the other participants for a critique.

The Scene

1. Time/date: 3 p.m., Monday afternoon in July
2. In-plant HazMat team has been trained to the Technician level
3. Resources
 - Encapsulating suits, levels A and B
 - Level C suits
 - 4 SCBAs and 4 spare air tanks
 - Air monitor for the hazard
 - Spill control products from the spill cart and ERT tool crib
 - Decon supplies from the ERT tool crib
 - NIOSH Pocket Guide (CD, online, hardcopy), SDS, Internet
 - Other support equipment (to be identified)

The Incident

The temperature at 80 degrees F. There is a 2-3 mph wind out of the WNW. An employee, Ole, radios in report of a spill at a semi-trailer that is being unloaded.

Scott, the HazMat team leader is summoned to the scene. He finds that Herb, a forklift driver, and the semi driver are inside receiving. The semi driver is being tended to after walking through the spilled chemical. On the ground at the back of the semi-trailer, a 400-gallon tote is resting on its side, with the valve down. A corrosive placard is visible on the side, but no other label. A 30-foot watery white circle of liquid envelops the tote and back wheels of the trailer. Several fingers of liquid, 5 to 20 feet long are running away with the grade and spreading, indicating the tote is still leaking. Ole joins Scott, reporting the driver has mild burns on his feet and is complaining of severe respiratory irritation, but he thinks he will be OK. 911 has been called. Herb has mild burns on his hands and his respiratory irritation has gone. Details are sketchy at this point on what happened.

Scott decides to assemble the HazMat team.

Your Assignment

Turn the page and answer all questions on that page. Do Not go to the next page until each page is complete. Remember, the decisions are not necessarily the best/correct approach. Feel free to disagree and comment but move on with the exercise.

Initial goal: provide for safety of all personnel

A. Size-up and Incident Command

1. Who is/will be the incident commander?
2. How will Scott summon the team and where should they assemble?
 - a.
 - b.
3. What information is needed to do an initial hazard evaluation (what questions should be asked?) Where will it come from?

Question/information

Source

4. Where will you do size-up? And from what distance?
5. Is this a hazmat incident? Justify your answer.

If yes: how will you secure the area?

6. What if any calls might be or should be made now?

Is evacuation needed?

A group of concerned employees (6 in total) has assembled at Point A.

7. What do you do regarding the assembled employees?

One employee, Sven, reports he exited the area at point B and noticed a 'pickling odor' so he ducked back inside and came out by the rest of the group. Should Sven be sent to medical?

Yes	No	Not relevant
-----	----	--------------

B. Hazard and Risk Assessment

The semi-driver and Herb agree that the tote contained hydrochloric acid (HCl). The driver reports other corrosives and flammables in totes, 55-gallon drums and bags are in the trailer.

8. How does this information affect your answers to questions 3-7? (revisit previous page briefly) Make notes below:

Based on this information, Scott decides to initiate a hazardous material response by the in-plant team.

9. Do you agree or disagree with his decision? List the risks:

(Do not spend too much time; as IC, he is in charge!)

10. What other information would be of value? Where/how would you get it?

Information

Where/how

11. Show the location of the hot, warm and cold zones. Show the criteria used to designate the zones. Locate and design your decon line stations.

12. The ambulance arrives out on the highway. Who sends someone out to direct them to the right location?

13. Is the SDS for HCl available to the medical responders?

C. Review Goals and Objectives

Initial goals and objectives were:

1. Protect employees, contractors and visitors by securing the area.
2. Evacuate the hot zone and confirm with a head count.
3. Evaluate exposed employees and the driver for medical outcomes, assess driver decontamination and provide medical care, as needed.

Secondary goals and objectives are: (do you agree?)

4. Protect responders with PPE, air monitoring, decon
5. Stop the spread of HCl.
6. Retrieve the shipping papers.

(righting the tote may stop the leak: can it be done safely? Do you have the resources?

Has anyone suggested donning boots, gloves and covering mouth with wet cloth and setting it up right?)

14. What minimum level of PPE should your entry team be in? Why?

What level of PPE should the decon team wear? Why?

15. Show the specific PPE for the entry team:

Show the specific PPE for the decon team:

16. What air monitor(s) should be in use for entry?

What air monitor(s) should be in use for decon?

What air monitor(s) should be in use at the perimeter?

(identify any needed monitors that are not available)

17. What is needed for stopping the spread of the HCl spill? (5, above)

The Maintenance Supervisor was last seen in the spill area and is presently unaccounted for.

18. How does this information affect your response?

The fire department arrives and stages at the plant entrance. The Chief is directed to Scott as the on-scene IC; Scott requests that he remain IC. The Chief agrees but will remain on scene in case support is needed.

The first entry team approaches the leading edge of the fastest spreading liquid finger. Right at the spill, the 4-gas meter reads:

Oxygen—20.7%
LEL—0%
CO—1 ppm
H₂S—0 ppm

19. How should the IC react to this data? Can the entry team safely continue?

An employee has a pallet of oil dry staged up wind to assist with diking and damming.

20. Can he enter the hot zone to deliver the oil dry? Why?

A call from the trucking company indicates the following is a list of chemicals on the semi:

Hydrochloric Acid	400-gal tote	(1)
Nitric Acid	400-gal tote	(1)
Hydrochloric Acid	55-gal drum	(6)
Sodium Hydroxide, 50%	55-gal drum	(6)
Sodium Hydroxide flakes	50 lb bags	(40)
Citric Acid	60 pd bags	(10)
Xylene	55-gal drum	(12)
Toluene	55-gal drum	(24)
Acetone	55-gal drum	(2)
Plastilok 23	25-gal drum	(4)

21. How does this information affect your H&R analysis and response objectives?

A call is made to the safety department at Verso Paper concerning the Plastilok, where the safety manager reports that it is a proprietary chemical with a flash point of 160° F, vapor pressure of 2 mm Hg at 25° C and insoluble in water. It has not been tested for carcinogenicity, but the major components are not carcinogens. He reports the health hazard is low, between 0 and 1 on the HMIS and NFPA scales, and a 0 for reactivity.

22. Can you safely proceed with your goals and objectives? Do you have the needed resources?

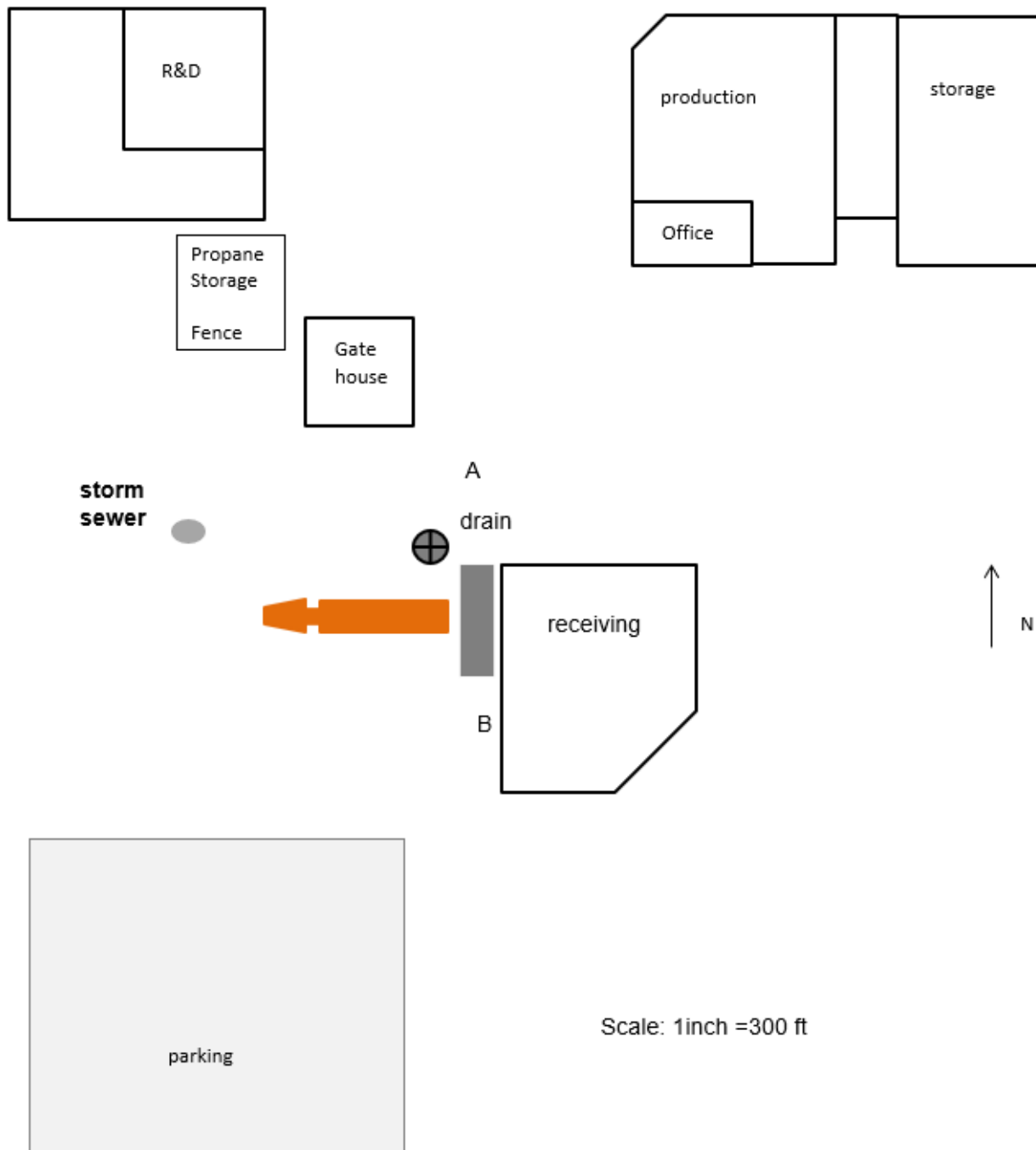
The spread of the HCl has been stopped. Make a new list of goals and objectives now.

23. How long will it take to achieve each?

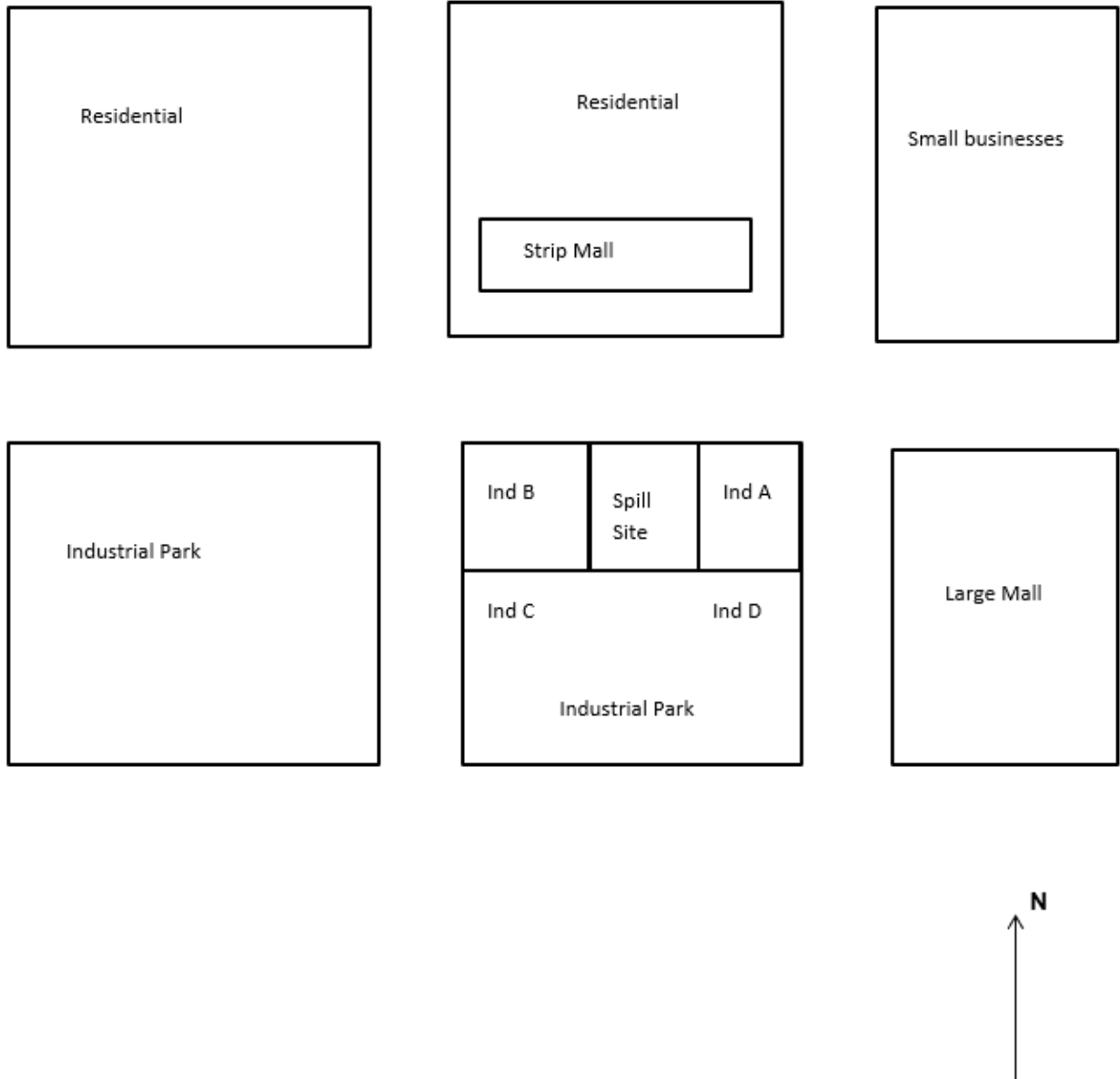
24. Will in-plant personnel do the cleanup, or will a contractor be called?

25. Identify termination steps.

Plant Map



Community/Area Map



Additional Questions

A. Did you call the environmental department? (Chief there has 15 minutes to make contacts.)

B. At what point does the IC report to the Fire Chief that it is safe for him and the crew to leave?

C. What if the second entry team went to retrieve the shipping papers and notices a pencil-sized liquid stream running out of the front of the trailer?

D. Who will remediate the contaminated semi?

E. What would change if it was December 13 and 10° F?

What if it was snowing?

F. What if it was raining on July 13?

Exercise D Facilitator Guide

Spill Response Tabletop Exercise #1

Draw or use a diorama that includes the layout of the facility.

Identify Point A—where concerned workers assemble (attached)

Identify Point B—where Sven smells a ‘pickling odor’ when he attempts to exit

For item 11, be ready to show where Scott has established the IC.

Working in small groups, read the information below and answer the questions. Select a record keeper in your group who will take notes and report the work of the group back to the other participants for a critique.

The Scene

1. Time/date: 3 p.m., Monday afternoon in July
2. In-plant HazMat team has been trained to the Technician level
3. Resources
 - Encapsulating suits, levels A and B
 - Level C suits
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 - Air monitor for the hazard
 - Spill control products from the spill cart and ERT tool crib
 - Decon supplies from the ERT tool crib
 - NIOSH Pocket Guide (CD, online, hardcopy), SDS, Internet
 - Other support equipment (to be identified)

The Incident

The temperature at 80 degrees F. There is a 2-3 mph wind out of the WNW. An employee, Ole, radios in report of a spill at a semi-trailer that is being unloaded.

Scott, the HazMat team leader is summoned to the scene. He finds that Herb, a forklift driver, and the semi driver are inside receiving. The semi driver is being tended to after walking through the spilled chemical. On the ground at the back of the semi-trailer, a 400-gallon tote is resting on its side, with the valve down. A corrosive placard is visible on the side, but no other label. A 30-foot watery white circle of liquid envelops the tote and back wheels of the trailer. Several fingers of liquid, 5 to 20 feet long are running away with the grade and spreading, indicating the tote is still leaking. Ole joins Scott, reporting the driver has mild burns on his feet and is complaining of severe respiratory

irritation, but he thinks he will be OK. 911 has been called. Herb has mild burns on his hands and his respiratory irritation has gone. Details are sketchy at this point on what happened.

Scott decides to assemble the HazMat team.

Your Assignment

Turn the page and answer all questions on that page. Do Not go to the next page until this is complete. Remember, the decisions are not necessarily the best/correct

Initial goal: provide for safety of all personnel

A. Size-up and Incident Command

1. Who is/will be the incident commander?

Scott, as first person on the scene, is the person-in-charge. If Scott has had IC training, then he would be IC. (Discussion might include the fact that the Plant Manager could be the IC of the plant actions, but he cannot be the IC of the HazMat response without Operations and IC training.)

Option: include a list of employees on each shift with their training.

First shift

IC—Frieda

Technicians—Scott, Bill Emma, George, Hilda

Operations—Gomer, Jazmin, Zeb, Ida

Now: Scott is in charge until Frieda arrives to be IC.

2. How will Scott summon the team and where should they assemble?

a. Pagers, PA system, radios are all options. For an industry usually one option is used. For an open enrollment class, participants may discuss what works at their facility.

b. given wind direction:

R&D—first choice but see the propane storage area as an issue.
Upwind, 600 feet away.

Office—second choice

Gatehouse—third choice (initially)

3. What information is needed to do an initial hazard evaluation (what questions should be asked?) Where will it come from?

Question/information	Source
Bill of lading	on/in semi-tractor
What is in trailer?	Trucking company
What trucking company?	Decal on truck, talk with driver

4. Where will you do size-up? And from what distance?

Approach from Gatehouse with wind at your back. You should be able to get within 50 feet or less of the spill without PPE.

5. Is this a hazmat incident? Justify your answer.

Yes: quantity involved; corrosive label; injury to driver and Herb; drain at risk

If yes: how will you secure the area?

Run a ribbon (red?) East to West from the Gatehouse initially to stop people from going to South area of the plant.

6. What if any calls might be or should be made now?

Plant Management, neighboring facilities to the SE.

If drain goes to the plant waste treatment plant—call them; if drain goes to city, call city department of public works.

Receiving

If going off site, call appropriate state and local agencies.

Fire Department or Duty Officer

Trucking Company, Local Government

Is evacuation needed?

Evacuate Receiving (or shelter in place may be best option—open for discussion).

A group of concerned employees (6 in total) has assembled at Point A.

7. What do you do regarding the assembled employees?

Request that they report to the office area or to their headcount assembly point if from Receiving.

One employee, Sven, reports he exited the area at point B and noticed a ‘pickling odor’ so he ducked back inside and came out by the rest of the group. Should Sven be sent to medical? Yes

B. Hazard and Risk Assessment

The semi-driver and Herb agree that the tote contained hydrochloric acid (HCl). The driver reports other corrosives and flammables in totes, 55-gallon drums and bags are in the trailer.

8. How does this information affect your answers to questions 3-7? (re-visit previous page briefly) Make notes below:

#5. You should collapse the area secured, but keep people out

#6. Definitely want to evacuate Receiving.

Only the tote is leaking—no fire risk at this time, or reactivity issues.

Based on this information, Scott decides to initiate a hazardous material response by the in-plant team.

9. Do you agree or disagree with his decision? YES

List the risks: single chemical, not in trailer, nothing else known to be leaking or mixing

If the HazMat team did a plant H&R assessment, they should have proper PPE on-site.

(Do not spend too much time; as IC, he is in charge!)

10. What other information would be of value? Where/how would you get it?

Information

Where/how

Drain and sewer discharge to where? See question 6; obtain from plant environmental coordinator

Note: an interesting start to the tabletop is to have the facilitator identify where they discharge. Example, storm water goes to creek south of the industrial park on

community/area map and drain goes to the city municipal Wastewater Treatment plant.
(or) storm water goes to the city treatment plant and the drain goes to the plant
wastewater treatment plant.

SDS safety dept coordinator

11. Show the location of the hot, warm and cold zones. Show the criteria used to designate the zones. Locate and design your decon line stations.

Assuming slope of terrain is toward the drain and storm sewer:

Criteria: wind direction

How far spill has travelled

Receiving (if evacuated) could be hot or warm

How far to SE the zones will go will be finalized by monitoring—not critical now if area is secure.

See last page, showing wind and security line. Spill is approaching drain and is under half of the semi. Hot Zone should include Receiving, drain, semi and extend south.

Facilitator may want to hand out several maps (or have white board/overhead) for the participants to use as the zones may change during the response.

Decon should include 1 or 2 water rinse stations, as HCl is very water soluble.

12. The ambulance arrives out on the highway. Who sends someone out to direct them to the right location?

Person meeting the ambulance will vary according to plant rules. Examples include the guard, a first responder, a HazMat team member, Human Resources rep or company nurse. It is important to discuss the need to identify this person (they should have a radio to communicate with plant personnel) in this case where there are several victims AND to confirm that someone has been sent after the 911 call.

13. Is the SDS for HCl available to the medical responders?

SDS should be available by now. Whose job was it? Provide to ambulance crew.

C. Review Goals and Objectives

Initial goals and objectives were:

1. Protect employees, contractors and visitors by securing the area.
2. Evacuate the hot zone and confirm with a head count.
3. Evaluate exposed employees and the driver for medical outcomes, assess driver decontamination and provide medical care, as needed.

Secondary goals and objectives are: (do you agree?)

4. Protect responders with PPE, air monitoring, decon
5. Stop the spread of HCl.
6. Retrieve the shipping papers.

(righting the tote may stop the leak: can it be done safely? Do you have the resources? Has anyone suggested donning boots, gloves and covering mouth with wet cloth and setting it up right?)

Upright tote question: full tote weighs $sp.gr \times 8.34 \times 400gal = TOO$ much to upright by hand. So cannot move until almost empty or have machinery assist.

Do you want to get HCl on an expensive piece of machinery?

14. What minimum level of PPE should your entry team be in? Why?

Level A if diking and damming will take them into the vapor cloud. HCl is a resp and skin hazard.

What level of PPE should the decon team wear? Why?

NOTE: if entry did not have to walk in the spill and/or stayed up wind, given the temperature, decon could be done in Level C. The drawback is what if the entry member trips/falls in the spill; then C might be inadequate.

If it was decided in question 11 that decon should be closer to reduce tracking HCl from the spill area to decon, Level B would be more critical due to the effect of a wind shift.

15. Show the specific PPE for the entry team:

Neoprene, nitrile, chlorinated polyethylene, PVA, Saranax.

Might go to a web data base of a manufacturer (DuPont, Labeland, Kappler) for selection OR print off the info from one of the databases and use as a handout. Selection might be specific to a client. For example, if they have Kappler suits, Edmond Wilson gloves and HazProof boots.

NOTE: HCl acid may have very different PPE selection shown, compared to the gas Hydrogen chloride.

Know your audience and research the answer as part of facilitator preparation.

Generic list

Level A—entry team

Suit	Responder/Tychem
Inner glove	Nitrile
Outer glove	neoprene or silver shield
Boots	Neoprene

Show the specific PPE for the decon team:

Generic list

Level B

Suit	Responder/Tychem
Inner glove	Nitrile
Outer glove	neoprene or silver shield
Boots	Neoprene

16. Monitoring

Choices

1. Electrochemical meter for HCl
2. Colorimetric Tube
3. 4-gas meter. (LEL, O₂, CO, H₂S) will not detect HCl outside (enough vapors to displace O₂ would have killed semi driver, Herb and Sven).

Could be used to detect vapors in the drain where H₂S, H₂ or who-knows-what might be released

4. pH paper

What air monitor(s) should be in use for entry?

In level A, only hazard/risk would be explosion from reaction in drains, so #3

#1 would be useful to better determine placement of work zones

What air monitor(s) should be in use for decon?

#4 to check

#1 to check

What air monitor(s) should be in use at the perimeter?

#1 or 2

(identify any needed monitors that are not available)

17. What is needed for stopping the spread of the HCl spill? (5, above)

Drain stopper/Mat to cover drain and storm sewer

Alternative: large, heavy-duty plastic bag partially filled with water that you place over the drain; must be large enough to cover space larger than the grate.

Alternative: flexible, reusable dikes/socks/similar to put around drain/sewer

Alternative: combination of Plug 'n Dike, plastic shielding and oil dry

Oil Dry (lots of it)

Polypropylene socks (lots)

Dirt

The Maintenance Supervisor, Sally Ride, was last seen in the spill area, and is presently unaccounted for.

18. How does this information affect your response?

You need to explore all avenues as to Sally's location before committing resources to do a search and rescue. Did anyone see Sally in the Receiving area? Was she trained to evacuate given the warning properties of HCl? Is there a door open on the W side of Receiving to allow a high concentration of HCl in? Does she always carry a communication device when she leaves Maintenance?

This is a tough call—and why the IC needs to make a decision on resource usage.

The fire department arrives and stages at the plant entrance. The Chief is directed to Scott as the on-scene IC; Scott requests that he remain IC. The Chief agrees but will remain on scene in case support is needed.

The first entry team approaches the leading edge of the fastest spreading liquid finger. Right at the spill, the 4-gas meter reads:

Oxygen—20.7%
LEL—0%
CO—1 ppm
H₂S—0 ppm

19. How should the IC react to this data? Can the entry team safely continue?

This is as expected, approaching an HCl spill from upwind. Yes, continue with the response.

The 20.7% O₂ is probably due to meter noise, as the response is usually +/- 0.02 of calibration. Further drops in O₂ may indicate a bad O₂ cell (acid gases do shorten the life of O₂ cells in some meters).

An employee has a pallet of oil dry staged up wind to assist with diking and damming.

20. Can he enter the hot zone to deliver the oil dry? Why?

No, he cannot enter if not hazmat trained. He can deliver to the edge of the Warm Zone.

OSHA does allow 'special actions' to be identified in the ERP as long as the employee is trained to do them safely. For example, in this scenario, an Operations-level employee trained to wear an SCBA in level B may deliver the oil dry to the Hot Zone IF the ERP identifies the training and limitations. Also there would have to be a backup/rescue for the worker. A Tech-level person could deliver the oil dry to the Hot Zone with a backup/rescue.

A call from the trucking company indicates the following is a list of chemicals on the semi:

Hydrochloric Acid	400-gal tote	(1)
Nitric Acid	400-gal tote	(1)
Hydrochloric Acid	55-gal drum	(6)
Sodium Hydroxide, 50%	55-gal drum	(6)
Sodium Hydroxide flakes	50 lb bags	(40)
Citric Acid	60 pd bags	(10)
Xylene	55-gal drum	(12)
Toluene	55-gal drum	(24)
Acetone	55-gal drum	(2)
Plastilok 23	25-gal drum	(4)

21. How does this information affect your H&R analysis and response objectives?

As long as these chemicals are contained, and not leaking/spilling the response objectives are not changed.

NOTE: Early on in the tabletop, somebody may question why a person may not stay up wind and retrieve the papers without PPE. This is an IC/safety call and you may want to address the risks/what-ifs including:

- Spill surrounded the semi cab before the paperwork is found

- Wind shifts

- They slip/fall entering/exiting the cab

- Can I actually get the info just as quick from the trucking company dispatch?

This could be listed as the first mission of the entry team by the IC.

NOTE: The Plastilok 23 is a fake chemical (although there are other Plastilok compounds), so there is no SDS. This is added to challenge the participant. As shown it can be added to shipping papers, with a destination in the region.

A call is made to the safety department at Verso Paper concerning the Plastilok, where the safety manager reports that it is a proprietary chemical with a flash point of 160 °F, vapor pressure of 2 mm Hg at 25° C and insoluble in water. It has not been tested for carcinogenicity, but the major components are not carcinogens. He reports the health hazard is low, between 0 and 1 on the HMIS and NFPA scales, and a 0 for reactivity.

22. Can you safely proceed with your goals and objectives? Do you have the needed resources?

Yes—nothing else is spilling that you can observe or has been reported to IC.

The spread of the HCl has been stopped. Make a new list of goals and objectives now.

Where is Sally Ride? May need to sweep the Receiving Building.

Cleanup spilled material

Upright tote—patch/fix/transfer depending on assessment of damage

- Or call cleanup contractor

Secure area

Continue monitoring

23. How long will it take to achieve each?

Depends on resources. Estimate 2-4 hours (longer if waiting for contractor).

24. Will in-plant personnel do the cleanup, or will a contractor be called?

Depends on company policy and ERP

25. Identify termination steps.

1. Debrief—as per ERP

Review HCI toxicology with responders. Some teams will do a post-medical check

Label wastes and contact environmental on what and where to place

Assign folks to clean equipment that has been deconned

Assign folks to replace expendables used

Confirm that environmental reporting is assigned/in process

Confirm medical follow-up for exposed personnel

Confirm legal and insurance notified

Confirm trucking company is handling semi issues

Does OSHA need to be contacted?

Collect all paperwork/notes

Assign completion of reconstruction and critique

Assign contacts to community organizations/individuals that may have been affected

Assign ‘thank you’ to all parties that were involved

2. Reconstruction

Using paperwork, notes and interviews with individuals and at team meetings, develop a timeline of events, including decisions, Goals and Objectives and outcomes.

COMPARE with the ERP to identify what went well and where change or improvement is needed

Example:

At 3:05 p.m., Ole contacts Scott with spill info and Scott responds

Per ERP, Ole was supposed to call the guards who implement a response and call list

RESULT: review response procedures with employees

3. Review (Critique)

Parties involved will vary, but could include:

HazMat Team

Company responders

Company management

Fire Dept

Community personnel (engineers, wastewater, police...)

LEPC

The Review may be done all together or in groups, largely depending on how the response went and organization.

EXAMPLE: Review (Internal)—first three groups, above

Review (external)—all outside personnel and select company personnel

Agenda

Highlight what went well

Identify areas for improvement

Make assignments

4. Follow up

Develop timeline for each assignment in Review

Ensure assignments from Review are completed

EXAMPLE: place drain covers/supplies strategically closer to drains

Review Hazard Assessment to identify all chemicals that could leak at the drain site (1 week)

Identify drain cover material for each (concurrently)

NOTE: this should already be in ERP; if not, fill info gaps

Identify location for storage near drain (concurrent)

Purchase storage cabinets and label, purchase any supplies needed (1 month)

RETRAIN responders on supply location (within 1 week, when in place)

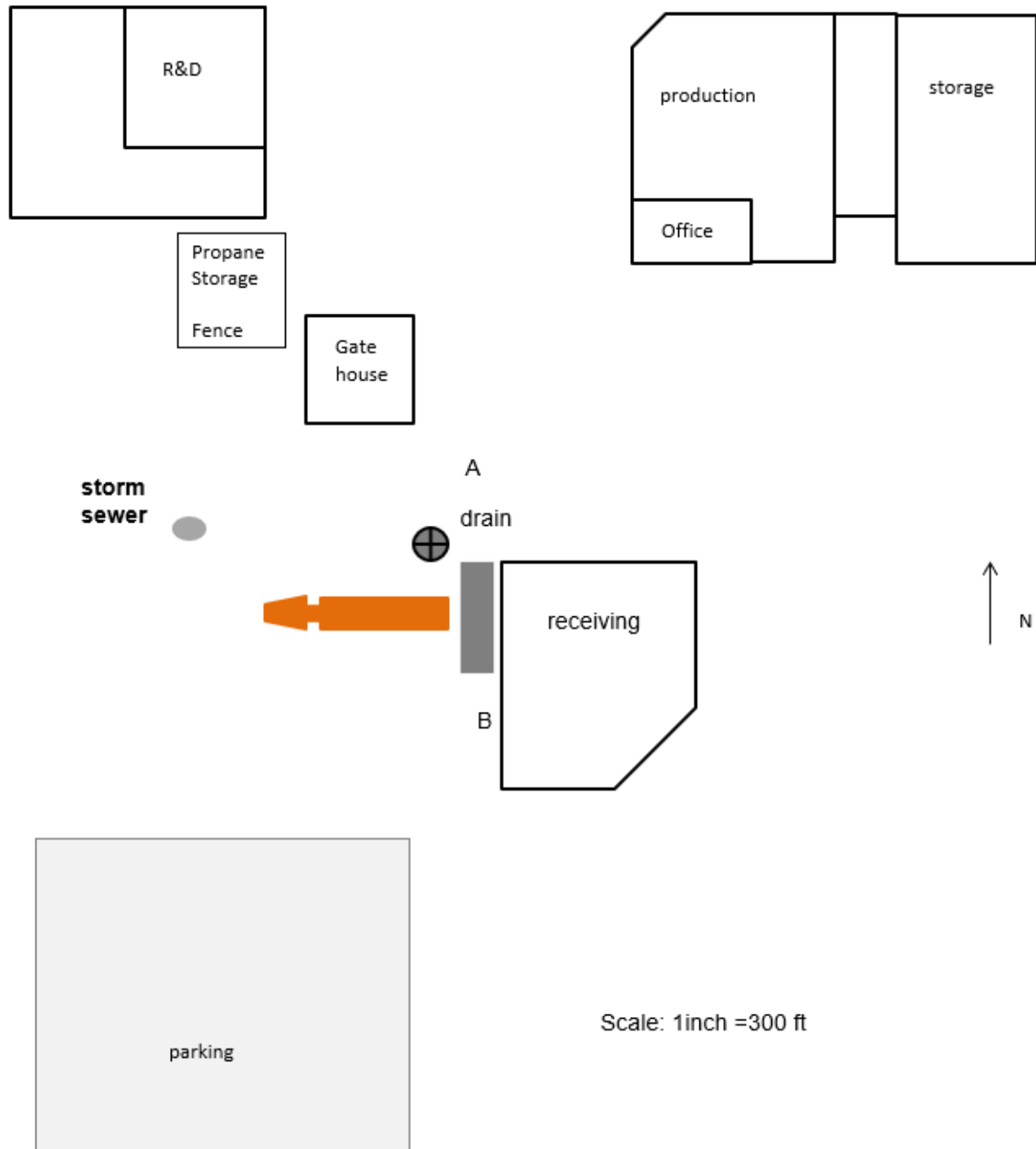
Update ERP, as needed (within 1 week, when in place)

EXAMPLE: spill reporting protocol

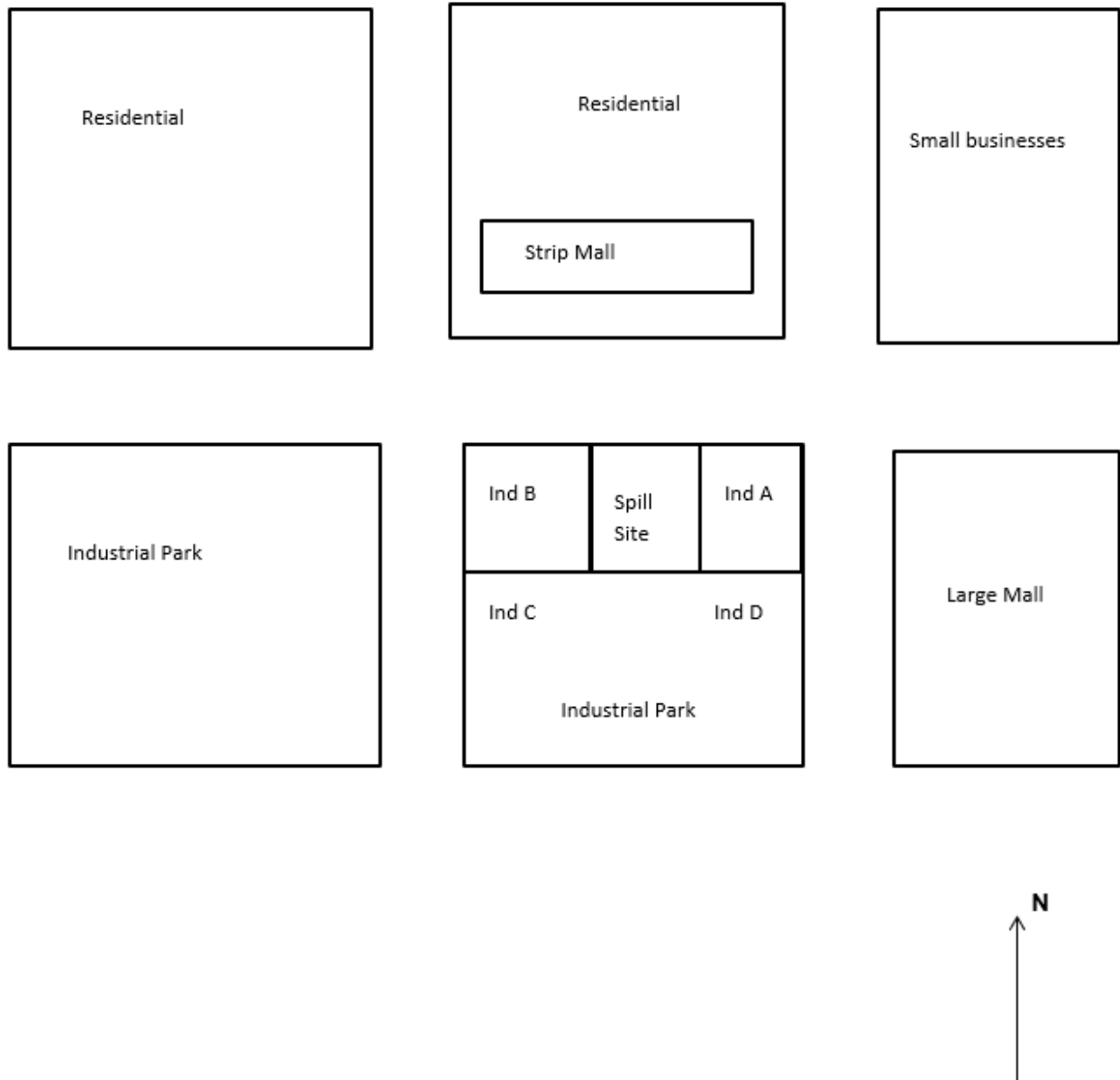
Ensure ERP is up to date (1 week)

Supervisors review procedure with all workers at pre-shift meeting (immediately, perhaps review periodically)

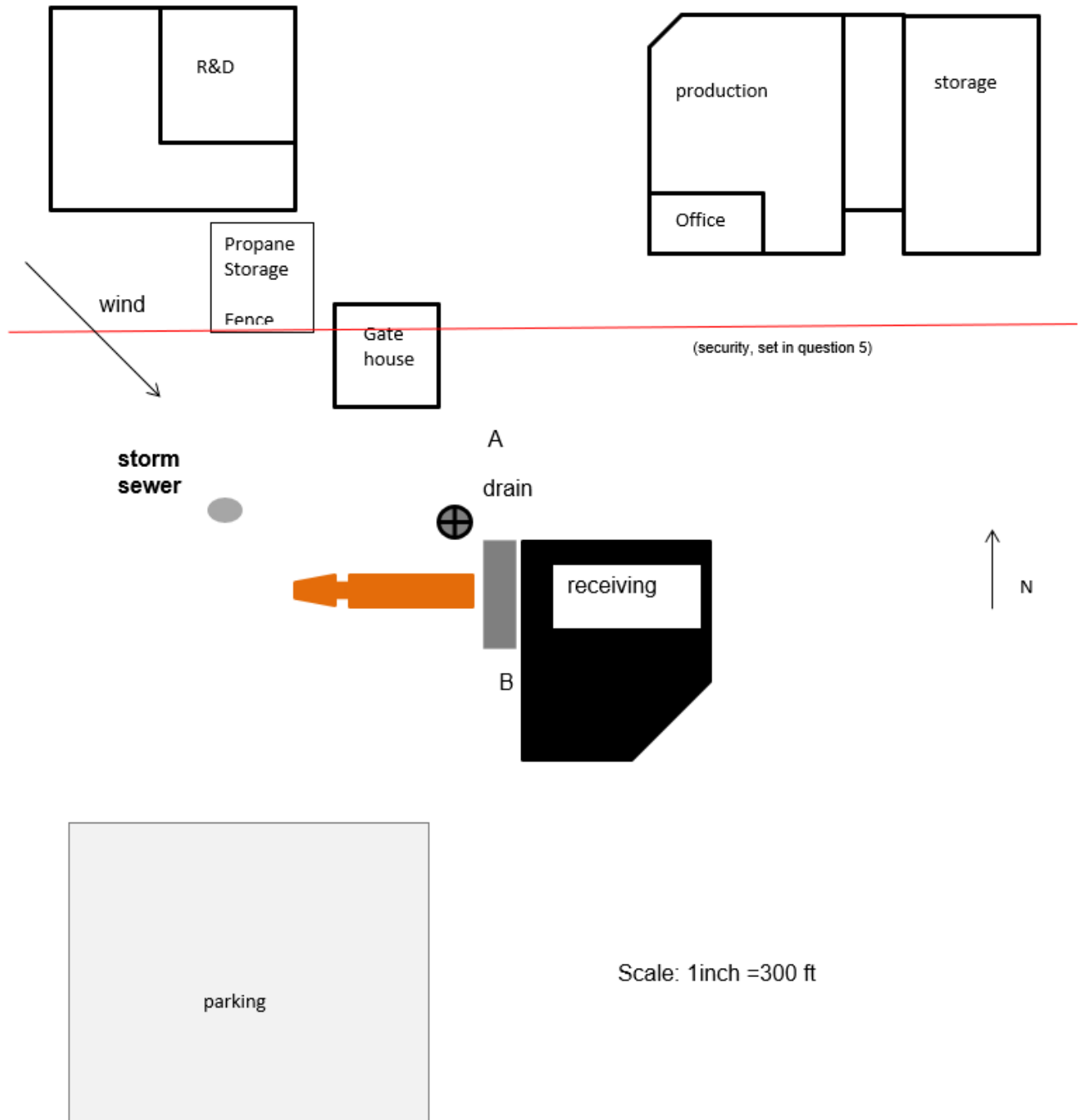
Plant Map



Community/Area Map



Plant Map—showing established security boundary and wind direction



Additional Questions

A. Did you call the environmental department? (Chief there has 15 minutes to make contacts.)

Yes

B. At what point does the IC report to the Fire Chief that it is safe for him and the crew to leave?

When spill is stopped

C. What if the second entry team went to retrieve the shipping papers and notices a pencil-sized liquid stream running out of the front of the trailer?

This changes everything. Potential hazards and risks increase. Fire. Chemical Reactions.

D. Who will remediate the contaminated semi?

Who caused the spill? (this will determine who pays and liability)

The company is probably not prepared to decon the tires that now need to be replaced, so a tire company will be called to change tires on-site. This crew must be informed of hazards and adequately protected. Trucking company may manage this aspect.

E. What would change if it was December 13 and 10° F?

Lower VP for HCl

Hypothermia potential must be considered

Set up decon in heated area

What if it was snowing?

How much and how long will it snow?

Consider dike and protect the rain and sewer, confirm nothing else is leaking and wait for snow to stop.

Contaminated snow will be a larger challenge to store/treat.

F. What if it was raining on July 13?

It now becomes an environmental response, handling the HCl going down the sewer and drain.

Response may focus on stopping leak at tote, depending on how hard it is raining.

Exercise E Participant Guide

Spill Response Tabletop Exercise #2

Working in small groups, read the information below and answer the questions. Select a record keeper in your group who will take notes and report the work of the group back to the other participants for a critique.

The Scene

1. Time/date: 4 p.m., Monday afternoon in July
2. In-plant HazMat team has been trained to the Technician level
3. Resources
 - Diagrams of the area, or diorama
 - SDS
 - PPE and spill control products as needed (but within a budget)
 - DOT Guidebook
 - NIOSH Pocket Guide (CD, online, hardcopy)

The Incident

The temperature at 80 degrees F. There is a 5 mph wind out of the NNE. An employee in the northeast dock area (see figure) calls in reporting a spill incident in a semi-trailer that is being unloaded.

Don Gruber is on vacation and Sara Late is visiting another site, Fred is called to evaluate the situation. He finds that the tow motor driver and the semi driver have notified dock area employees to keep away from the semi. He finds that a pallet with four fiber drums of potassium hypochlorite (KClO) was being removed from the semi when the driver lifted the pallet and it broke—two drums fell inside the semi. When the driver got off the forklift to investigate, he noticed a ‘swimming pool odor’ in the trailer and a gash in a metal drum which a pencil-sized stream was leaking. He immediately withdrew the forklift and warned the semi driver not to enter the trailer. Fred notifies the hazardous material team members to report to the safety department and wait for further instructions.

Your Assignment

Turn the page and answer all questions on that page. Do Not go to the next page until this is complete. Remember, the decisions are not necessarily the best/correct approach. Feel free to disagree and comment but move on with the exercise.

Initial goal: provide for safety of all personnel

A. Size-up and Incident Command

1. Who is the emergency coordinator (incident commander)?

2. What information is needed to do an initial hazard evaluation? Where will it come from? What questions should be asked?

Question/information

Source

3. Where will you do size-up? (locate on diagram)

4. Is this a hazmat incident? Justify your answer.

If yes: How will you secure the area?

Locate the exclusion zone on the diagram.

5. What if any calls might be or should be made now (in plant, outside)?

Is evacuation needed?

What are the initial objectives that need to be accomplished to provide for safety to all personnel?

B. Hazard and Risk Assessment

The semi-driver has retrieved the shipping papers from his cab. They indicate that his load consists of

Caustic Soda (50%)	55-gal drum	10
Mineral Spirits	55-gal drum	4
Plastilok 455	55-gal drum	18
Toluol	55-gal drum	2
Potassium Hypochlorite	200# drum	4

6. Revisit the questions on the previous page (1 to 5). Does the contents information change any of the initial decisions? If so, adjust them accordingly.

Make notes below:

A call is made to the safety department of the manufacturer concerning Plastilok. The contact reports that it is a proprietary chemical with a flash point of 160° F, vapor pressure of 2 mm Hg at 25° C and insoluble in water. It has not been tested for carcinogenicity, but the major components are not carcinogens. He reports the health hazard is low, between 0 and 1 on the HMIS and NFPA scales, and a 0 for reactivity.

Based on this information, Fred decides to initiate a hazardous material response by the in-plant team.

7. Do you agree or disagree with his decision? List the risks:

(Do not spend too much time; as IC, he is in charge!)

8. What other information would be of value? Where/how would you get it?

Information

Where/how

9. Establish the IC post and the hot, warm and cold zones. Show the criteria used to designate the zones. Locate and design your decon line stations. Show on the map.

10. Revisit Question 5. Note updates below:

11. What minimum level of PPE should your entry team be in? Why?

What level of PPE should the decon team wear? Why?

12. Show the specific PPE for the entry team:

Complete the worksheet for the Best or for what is available.

Show the specific PPE for the decon team:

Complete the worksheet for the Best or for what is available.

13. What air monitor(s) should be in use for entry?

What air monitor(s) should be in use for decon?

What air monitor(s) should be in use at the perimeter?

(identify any needed monitors that are not available)

14. List the objectives for the first entry team (or teams).

The decision is made to send a three-member team in Level B to examine the spill situation and try to identify what is leaking. They have a Lumidore tri-gas meter for LEL, O₂, and CO. One entry team member has a 20-pound multipurpose dry chemical extinguisher.

The fire department has arrived and is staged one block east of the plant near the large mall. Six of the county hazardous material team members are also available by this time. Fred requests joint command with the fire chief but would like to maintain control and proceed according to his plan. The Chief agrees, with reservations, about Fred's decision to put the main office personnel on alert but not to evacuate them at this time.

15. Draw the IC structure that exists now.

At the back of the semi-trailer, the following readings are relayed to the operations leader by the entry team:

O ₂	20.7 %
LEL	0-1 %
CO	2 ppm

16. What should the three-person team do at this point?

The team continues into the trailer with one member remaining at the back. Approximately eight feet from the broken drums, the readings are:

O₂ 20.7 %
LEL 1-2 %
CO 2 ppm

They report the liquid is no longer flowing from the hole in the steel drum and a corner of the red and white label is visible on the drum, but no other identification can be seen. The drum next to it has a label that reads TOLUOL. By these drums there is a mixture of plastic and steel 55-gallon drums.

An employer from another company arrives with a Draeger pump and colorimetric tubes for toluene (requested by the IC). The entry team is told to return. Entry team two is sent in the Draeger pump after briefing on proper use. At the back of the trailer, a 100 ppm reading is recorded. Eight feet from the drums, the concentration exceeds 1000 ppm.

17. What should the entry team do now?

18. Was the level of PPE and fabric/material selected to provide adequate protection?

19. List the options/decisions that now have to be made, particularly:

- Follow up monitoring
- Evacuation
- Spill control/offensive activities
- Entry objectives versus withdrawal
- Reporting
- Outside resource requirements
- Media

Fred decided to withdraw the hazardous materials team due to the potential for fire resulting from the mixing of Solvox KY and the solvent toluene. Any further offensive activities are surrendered to the fire department and the county/city hazardous materials team.

20. What is the responsibility of the in-plant team now?

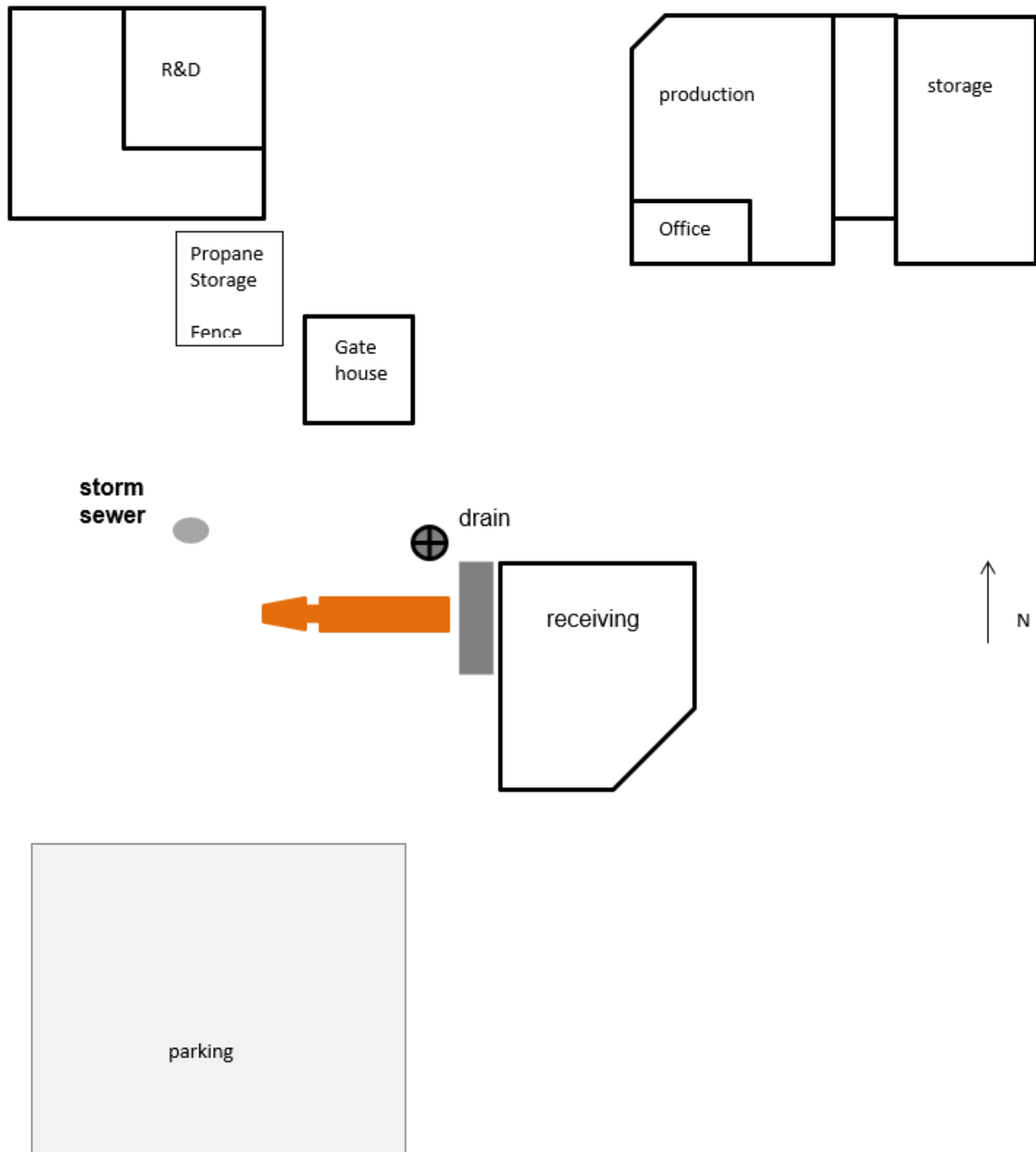
21. What does the design of the incident command look like now?

22. Who is charge of termination procedures?

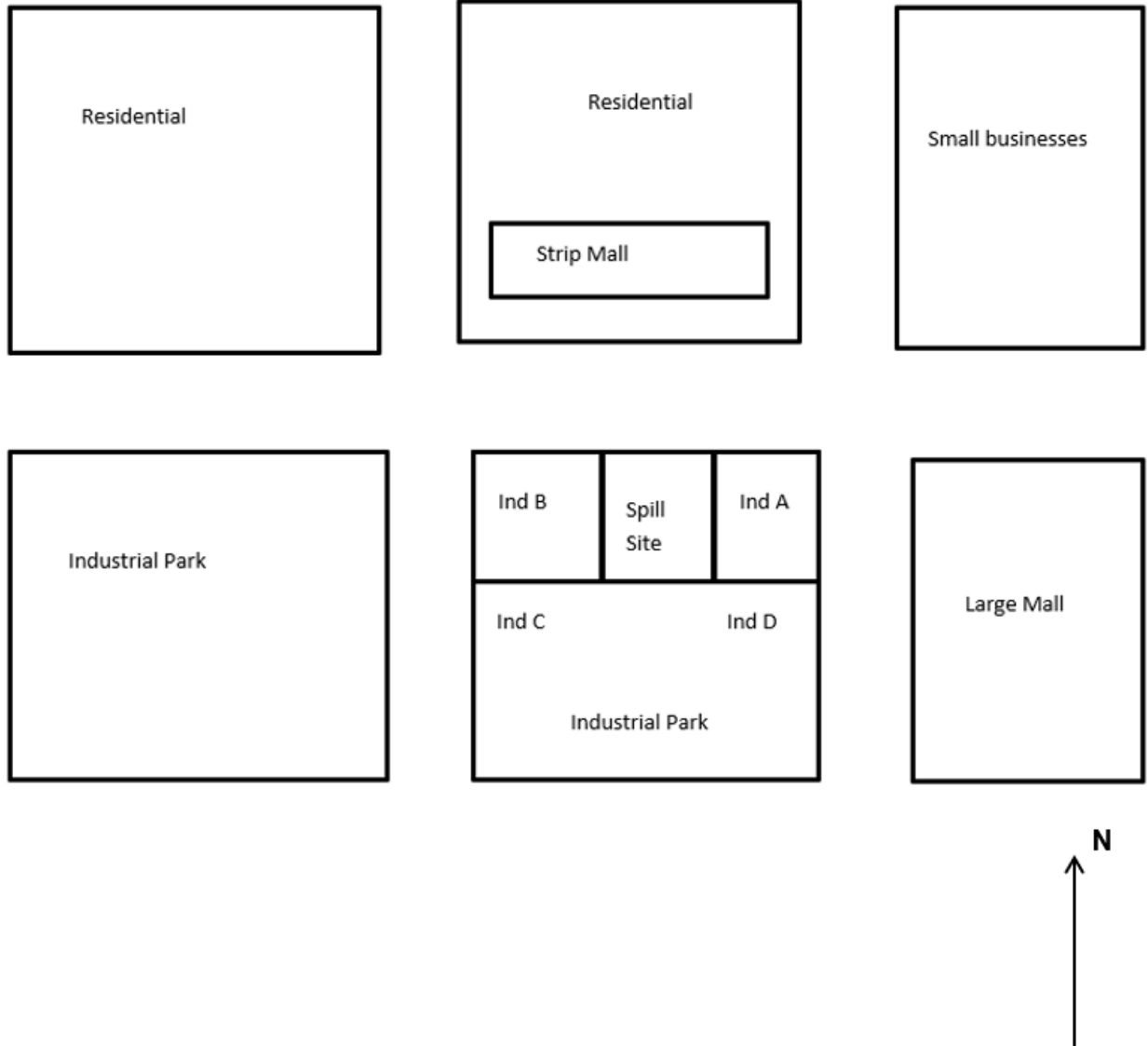
23. How long do you think this incident will last?

24. What are the steps in termination?

Facility Map



Community/Area Map



Exercise E Worksheet

	Caustic Soda	Mineral Spirits	Plastilok	Toluene	KClO
Entry team Gloves material					
Entry team Boot material					
Entry team Suit material					
Decon Gloves material					
Decon Boot material					
Decon Suit material					

Exercise E Facilitator Guide

Spill Response Tabletop Exercise #2

Working in small groups, read the information below and answer the questions. Select a record keeper in your group who will take notes and report the work of the group back to the other participants for a critique.

The Scene

1. Time/date: 4 p.m., Monday afternoon in July
2. In-plant HazMat team has been trained to the Technician level
3. Resources
 - Diagrams of the area, or diorama
 - SDS
 - PPE and spill control products as needed (but within a budget)
 - DOT Guidebook
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The Incident

The temperature at 80 degrees F. There is a 5 mph wind out of the NNE. An employee in the northeast dock area (see figure) calls in reporting a spill incident in a semi-trailer that is being unloaded.

Don Gruber is on vacation and Sara Late is visiting another site, Fred is called to evaluate the situation. He finds that the tow motor driver and the semi driver have notified dock area employees to keep away from the semi. He finds that a pallet with four fiber drums of potassium hypochlorite (KClO) was being removed from the semi when the driver lifted the pallet and it broke—two drums fell inside the semi. When the driver got off the forklift to investigate, he noticed a ‘swimming pool odor’ in the trailer and a gash in a metal drum from which a pencil-sized stream was leaking. He immediately withdrew the forklift and warned the semi driver not to enter the trailer. Fred notifies the hazardous material team members to report to the safety department and wait for further instructions.

Your Assignment

Turn the page and answer all questions on that page. Do Not go to the next page until this is complete. Remember, the decisions are not necessarily the best/correct approach. Feel free to disagree and comment but move on with the exercise.

Initial goal: provide for safety of all personnel

NOTE: there are other answers and discussion that may arise.

A. Size-up and Incident Command

1. Who is the emergency coordinator (incident commander)?

Fred is the person-in-charge as first on the scene. He may be the IC, if he has IC training and has been certified by his employer.

2. What information is needed to do an initial hazard evaluation? Where will it come from? What questions should be asked?

Question/information	Source
Who is on the semi?	Semi Driver
What/how much is on the semi?	Bill of Lading, on tractor
What is the trucking Company?	Graphic/Logo on truck
How does forklift driver feel now?	driver

3. Where will you do size-up? (locate on diagram)

pt A, in Receiving (see diagram)

pt B, outside to see if liquid is escaping the trailer (see diagram)

4. Is this a hazmat incident? Justify your answer.

Yes, because there is a chemical spill. The question is whether it will be upgraded to a HazMat emergency. For that, more information is needed.

If yes: How will you secure the area?

At this time, secure the area by notifying employees in Receiving and alerting the Gate House to warn incoming traffic. (You may choose to put cones up around the semi; not sure this is necessary at this time.) It would be prudent to station somebody at the dock area or perhaps put a tape up.

Locate the exclusion zone on the diagram.

Starting at the loading dock, several feet back into Receiving to pt A; then into the yard, to the edge of the drain and then all around the semi and back to the dock.

5. What if any calls might be or should be made now (in plant, outside)?

Alert: Safety (should know by now)

Shipping/Receiving

Environmental

Human Resources

Trucking company

Medical

Is evacuation needed?

Depends on whether you have retrieved the shipping papers OR if the driver was able to provide accurate information on contents of the trailer and location.

If you have no additional information, securing the area is all that is needed at this time.

What are the initial objectives that need to be accomplished to provide for safety to all personnel?

Gather as much information as you can safely.

Keep people away by securing an area.

B. Hazard and Risk Assessment

The semi-driver has retrieved the shipping papers from his cab. They indicate that his load consists of

Caustic Soda (50%)	55-gal drum	10
Mineral Spirits	55-gal drum	4
Plastilok 455	55-gal drum	18
Toluol	55-gal drum	2
Potassium Hypochlorite	200# drum	4

6. Revisit the questions on the previous page (1 to 5). Does the contents information change any of the initial decisions? If so, adjust them accordingly.

Make notes below:

Questions 3 and 4

KClO and Caustic Soda are OK

KClO and Mineral Spirits – risk of fire

KCIO and Plastilok--?

KCIO and toluene—risk of fire

We need information on Plastilok!

Given the fire hazard, expand exclusion zone to a larger area: all of the receiving building, N of the drain and around the semi.

Could discuss whether to evacuate Receiving now. One issue is the quantity and types of flammables in the building (not part of the shipment).

Question 5

Alert: Fire Dept

Upper management

Gate House—definitely keep traffic out of area

Medical

Secure a larger area and inform employees of potential hazards and risks.

A call is made to the safety department of the manufacturer concerning Plastilok. The contact reports that it is a proprietary chemical with a flash point of 160° F, vapor pressure of 2 mm Hg at 25° C and insoluble in water. It has not been tested for carcinogenicity, but the major components are not carcinogens. He reports the health hazard is low, between 0 and 1 on the HMIS and NFPA scales, and a 0 for reactivity.

Based on this information, Fred decides to initiate a hazardous material response by the in-plant team.

7. Do you agree or disagree with his decision? List the risks:

Plastilok is combustible, so there is still a risk of fire if mixed with the KCIO.

Risk: FIRE mixing any of the materials with KCIO!

(Do not spend too much time; as IC, he is in charge!)

8. What other information would be of value? Where/how would you get it?

Information	Where/how
Reaction time for fire for any combination	Manufacturer materials
What is leaking	Send in recon team

9. Establish the IC post and the hot, warm and cold zones. Show the criteria used to designate the zones. Locate and design your decon line stations. Show on the map.

The group may opt to put decon in Storage, due to fire risk and the 80-degree temp—the concern is the long walk to the incident. An option is inside Receiving on the East

Decon is efficient at the E end of Receiving, with easy access from the response outside or inside Receiving and with immediate protection from fire by the E wall of Receiving. In case of fire, there is quick access to evacuation upwind.

Decon line due to water solubility should include a soap wash, water rinse with a back-up plan for dry decon as it is not known about the Plastilok.

10. Revisit Question 5. Note updates below:

Make sure medical and transport are available (FD will probably be stationed at the Gate House).

11. What minimum level of PPE should your entry team be in? Why?

A—some unknowns and you cannot monitor for some of the chemicals in real time.

OR—discuss turnout gear

What level of PPE should the decon team wear? Why?

B—one level lower, and because of unknowns

12. Show the specific PPE for the entry team:

Some of the new Level A suits offer some fire protection but are relatively expensive.

Options:

- Fire protective and chemical protective Level A
- Level A suit with Flashover, aluminized suit
- Level A with Nomex coveralls or turnout gear underneath

(second option likely best)

Complete the worksheet for the Best or for what is available.

Show the specific PPE for the decon team:

Level B, one level down from entry

Complete the worksheet for the Best or for what is available.

13. What air monitor(s) should be in use for entry?

LEL, O₂, CO, Cl₂

PID or colorimetric tubes for Toluene, Chlorine

What air monitor(s) should be in use for decon?

pH paper

PID

What air monitor(s) should be in use at the perimeter?

PID

(identify any needed monitors that are not available)

14. List the objectives for the first entry team (or teams).

Identify what is leaking and not leaking, and how many

Map the layout inside trailer IF it is safe

Try NOT to get any chemical on you

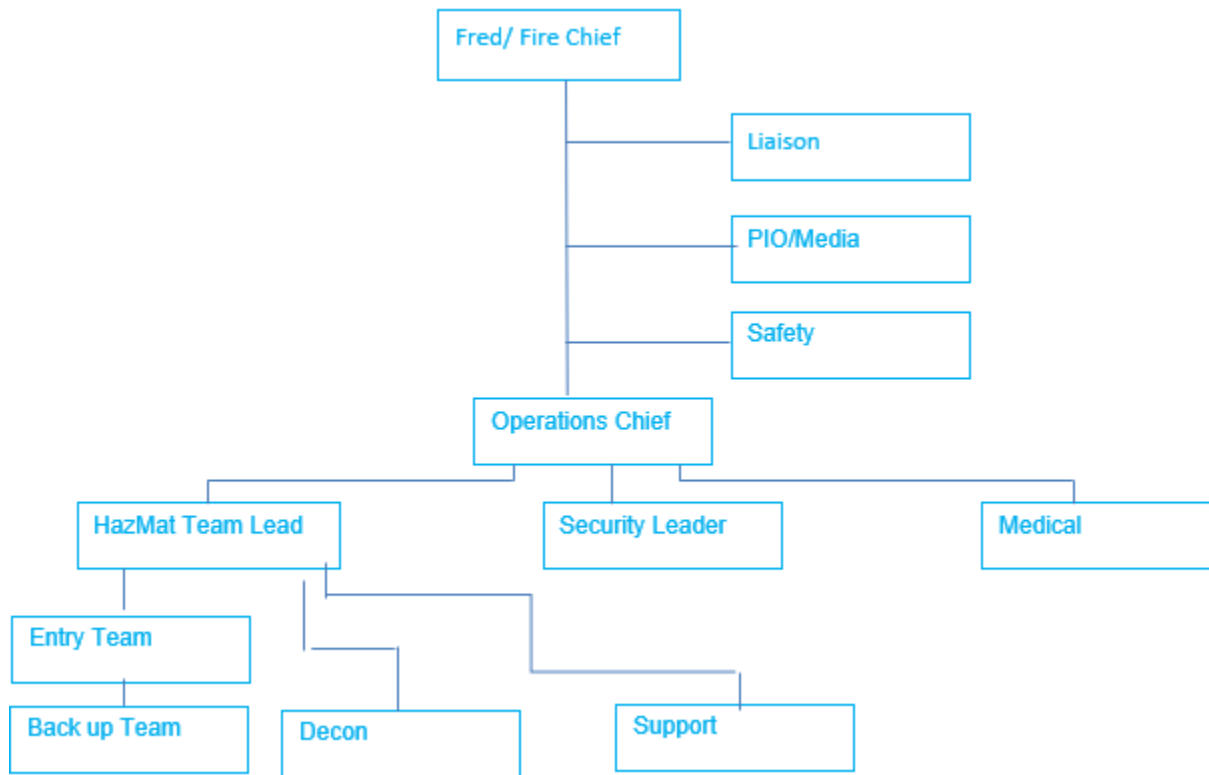
Do a pH of the liquid

If the leaking material is caustic, can the drum be patched or laid on its side to stop the leak?

The decision is made to send a three-member team in Level B to examine the spill situation and try to identify what is leaking. They have a Lumidore tri-gas meter for LEL, O₂, and CO. One entry team member has a 20-pound multipurpose dry chemical extinguisher.

The fire department has arrived and is staged one block east of the plant near the large mall. Six of the county hazardous material team members are also available by this time. Fred requests joint command with the fire chief but would like to maintain control and proceed according to his plan. The Chief agrees, with reservations, about Fred's decision to put the main office personnel on alert but not to evacuate them at this time.

15. Draw the IC structure that exists now.



At the back of the semi-trailer, the following readings are relayed to the operation chief by the entry team:

O₂ 20.7 %
 LEL 0-1 %
 CO 2 ppm

16. What should the three-person team do at this point?

Move closer if necessary to gather required information.

The team continues into the trailer with one member remaining at the back. Approximately eight feet from the broken drums, the readings are:

O₂ 20.7 %
 LEL 1-2 %
 CO 2 ppm

They report the liquid is no longer flowing from the hole in the steel drum and a corner of the red and white label is visible on the drum, but no other identification can be seen.

The drum next to it has a label that reads TOLUOL. By these drums there is a mixture of plastic and steel 55-gallon drums.

An employer from another company arrives with a Draeger pump and colorimetric tubes for toluene (requested by the IC). The entry team is told to return. Entry team two is sent in the Draeger pump after briefing on proper use. At the back of the trailer, a 100 ppm reading is recorded. Eight feet from the drums, the concentration exceeds 1000 ppm.

17. What should the entry team do now?

KCIO + Toluene is a fire risk

Assumption: only toluene drum is leaking

Is the toluene mixing with KCIO? This needs to be determined to evaluate risk.

NOTE: Most industrial HazMat teams are not prepared to deal safely with high risk fire situations and will turn it over to the Fire Department or external HazMat, SO, answers may vary for remaining questions.

Might recommend withdrawing and turning it over to Fire Department even if KCIO and toluene are not mixing. But it would be nice to be able to tell Fire Department if mixing was occurring.

18. Was the level of PPE and fabric/material selected to provide adequate protection?

Material is not critical if good work practices were used and no one stepped in KCIO and the toluene is not leaking.

NOTE: from here, assume Fire Department or external group takes over

19. List the options/decisions that now have to be made, particularly:

Follow up monitoring—to be done by Fire Department, external HazMat group and clean up contractor

Evacuation—probably no change. FD may evacuate the Gate House without any fire. DOT ERG shows 150 feet initially (could expand to 1000 ft downwind if some toluene was involved).

Spill control/offensive activities—Suggest dike the drain and sewer as precaution. Who does it is up to FD.

Entry objectives versus withdrawal –withdraw

Reporting—nothing released to environment (yet); call corporate

Outside resource requirements—notify outside clean up contractor

Media—joint statements with FD media person and company media person

NOTE: local news agencies are usually more comfortable talking with FD media person (who they interact with routinely) and know better than company representative.

Because Fred decided to withdraw the hazardous materials team due to the potential for fire resulting from the mixing of KClO and the solvent toluene, any further offensive activities are surrendered to the fire department and the county/city hazardous materials team.

20. What is the responsibility of the in-plant team now?

Standby; may also do some cleanup after Fire Department determines the emergency is over.

21. What does the design of the incident command look like now?

Classic Fire Department/HazMat IC options will vary by community and the structure will be dynamic as the Fire Department works with HazMat and then the cleanup contractor.

22. Who is charge of termination procedures?

Fire Department

Fire Department and Company

Company only

Fire Department and HazMat

(what about the semi company?)

This will depend on whether the external HazMat team is city, county or state; it could also be a private contractor in some communities.

Fred would be in charge of setting up the company termination activities.

23. How long do you think this incident will last?

2-8 hours, depending on:

Arrival of the cleanup contractor

Arrival of HazMat

Quantity of material spilled/leaked

Floor material in the semi

Is off loading of semi needed?

Time for product segregation, cleaning, disposal, transfer

24. What are the steps in Termination?

Assignment and Delegation of Tasks (Debriefing) such as:

- Disposal needs
- Area Decon
- Equipment cleanup and/or replacement
- Refill bottles of air
- Paperwork and reporting
- Brief review of chemicals involved and toxicity
- Acknowledge contributions by saying 'thank you'. Plus....
- Recommend that a checklist be included in the ERP for the IC, customized to the organization.

Reconstruction

With good notes/documentation, develop a timeline of the response, with outcomes. You may choose to assemble key people to help in reconstruction especially with sketchy data. If an incident action plan was developed (required by in 1910.120), it is the core of the reconstructed incident.

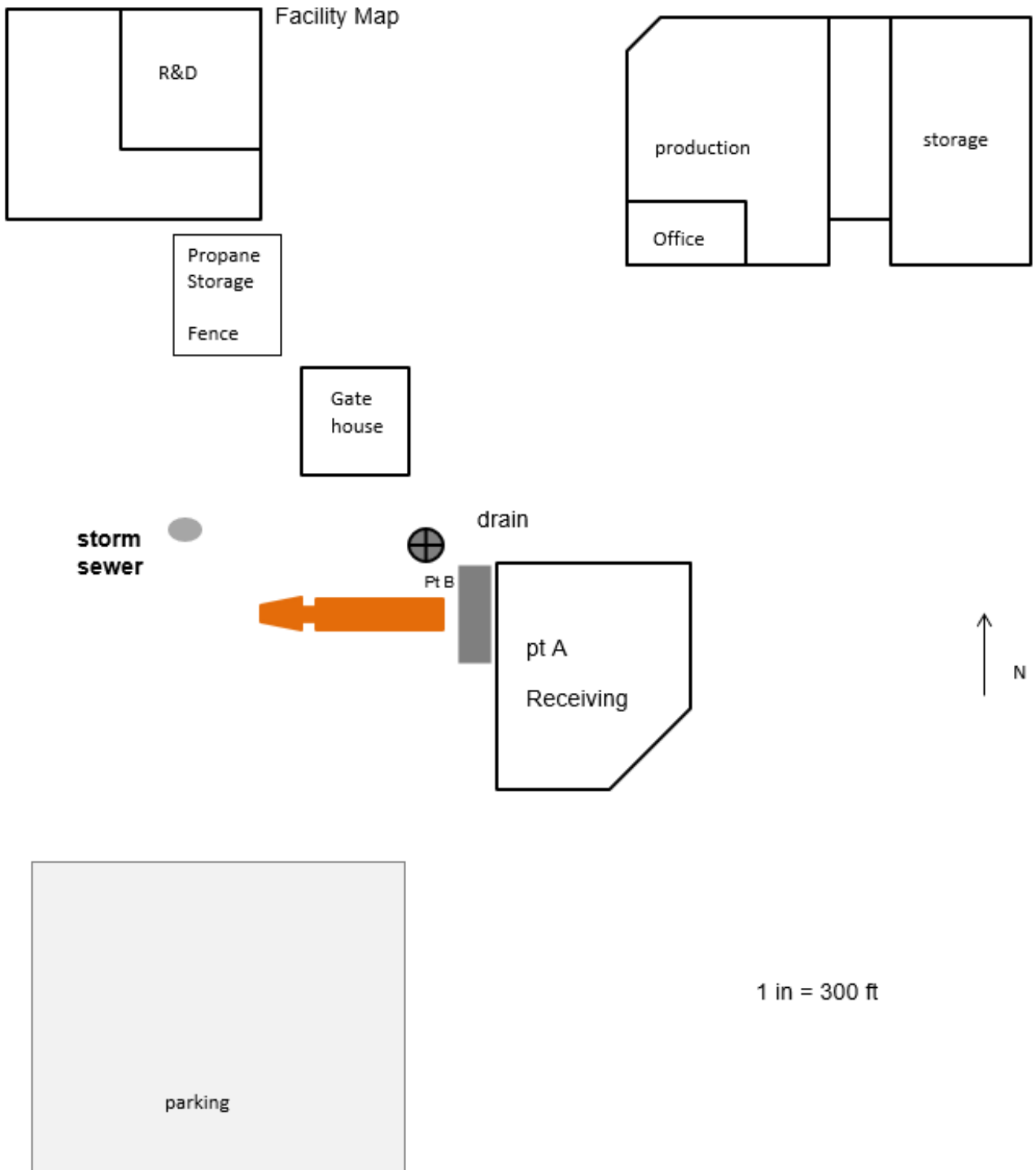
Critique (or Review) by 'to be selected' participants.

- Compare the reconstruction with the company/organization ERP
- Identify successes and problems
- Identify areas for improvement

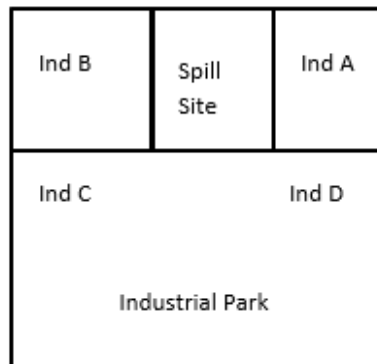
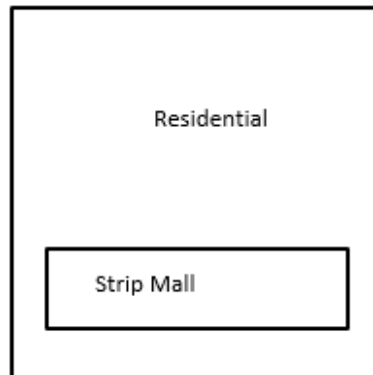
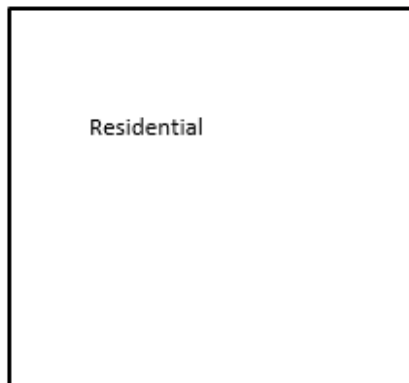
Correction

If any item is identified for improvement or remediation in the Review, make assignments to FIX. Any plan needs a timeline!

Facility Map



Community/Area Map



Exercise F Participant Guide

Spill Response Exercise #3

Working in small groups, read the information below and answer the questions. Select a record keeper in each group who will take notes and report the work of the group back to the other participants for a critique.

Initially you will respond as the IC, but then organize as first responders at the scene

Throughout the scenario, try to be realistic about times needed for actions and decision-making.

The Scene

1. Time/date: 2:15 p.m., Friday afternoon in October
2. 150 employees/ per shift, three shift operation
3. Resources
 - SOPs provided
4. The Fire Department is trained to the Operations Level, and has limited PPE
5. The nearest HazMat team is 15 miles away, trained to Level B

The Incident

The temperature is 40° F. There is a 2-4 mph wind out of the SW. A dock worker calls.

A semi driver was waiting to unload at the south dock. As he pulled out to back in, he noticed a white van approaching on his right, but he figured he had sufficient time. He was out of his parking spot when there was a tremendous jolt to his semi, almost throwing him out of his seat. He regained control and shut it down before doing anything. Shaken, he exited his door and walk around the front of his tractor, finding the white van wedged into the front six feet of his trailer. The van was crumpled about a foot on the driver's corner, the windshield was gone, and the driver was pinned to his seat by the trailer and his seat belt. There was blood all over and the van operator did not respond to call from the driver. The van was not running.

The driver identifies himself as Vern and reports that he called 911 on his cell phone and then headed to the dock to report the accident to company personnel. He now wants to return to the rig to check for damage before calling his employer. He recalls that the placard on the trailer is as shown below:

1. What should the dock worker do?

Can the dock worker tell Vern what to do?



2. List the calls you have to make AND the actions you need to take/direct

Calls:

Actions:

3. What information is needed to do an initial hazard evaluation (what questions should be asked?) Where will it come from?

Question/information

Source

T = 1 minute

Vern says he drives for Yancy Trucking out of Minneapolis. He has chemicals for delivery at your plant and to several other companies that he picked up at the IHaveWhatYouNeed distribution center. His shipping papers are in a brown leather case stowed between the seats of the semi.

4. How can/will you obtain the shipping papers?

T = 3 minutes

The medical responder and dock worker sent to the scene as a result of the 911 call come to the dock to report that the van is from the Able Plumbing Company; the workers have been working 12-hour shifts on a process upgrade. From the security guard you learned that 2 Able employees named Burt and Benny checked in at 7:10 a.m.

As you talk, the guard calls in that the police car has pulled up to the front gate and asks if he should go and meet them.

5. What is your response to the guard?

Who is currently in control?

If the Police officer asks you what you want him to do, what is your response?

Can you deny entry to the Police?

6. How many employees will it take to secure the area?

Have you (or when will you) turn this over to an IC? Who?

T = 4 minutes

The medical responders report that they do not think they should move the victim but will enter through the passenger door and check him out, administering what aid they can. They see only one person in the van.

The other responder now reports that there is a clear liquid running out of a tear in the side of the trailer and it is running out onto the side of the van and pooling on the ground. It is about 3 feet across now, but there is a pencil-sized stream flowing continuously.

7. If you have not yet called the HazMat team, would you do so now?

If already mobilized, do you need to summon more personnel?

Or, will you wait for the Fire Department to arrive? (Did you call them, and will they arrive with an ambulance?)

T = 5 Minutes

The cavalry arrives:

Another police car

Ambulance

Fire Truck.

They are directed to the scene and informed that they may want to stage a safe distance away, because you have reason to believe there may be leaking chemicals involved.

7a. Did you update the guard and person meeting the responders about the leak?

T = 6 Minutes

The lieutenant, using a radio from your medical responder requests to talk with you and asks that company IC come to his fire truck.

8. Who is the IC now?

Is there someone else better prepared to represent the company?

Do you have to do what the IC asks?

T = 7 Minutes

The Lieutenant reports that the medics do not think they can extricate the driver without accessing the driver's side. His firefighters do not think that the van should be moved until the semi-trailer is braced and he asks if you can provide trailer jacks or similar equipment as his is 10 minutes away.

He also wants to know what is in the trailer and if he can talk with the driver as his firefighters confirm that there is something leaking from the trailer.

9. Can you help him?

Will you help him? If so, how?

Or must the trucking company be the source of information?

Interject

You inform the Lieutenant him that you sent the Vern and a company employee to retrieve the shipping papers just before he asked to speak with you. They should be on their way back to the command post now.

10. Where have you established the command post?

11. Did you require them to wear PPE?

The Lieutenant requests that they return with the information to his temporary command post—the fire truck. The 7 bills of lading indicate that there are four different IHaveWhatYouNeed products on the semi, in both 5- and 55-gallon containers. The products are:

Vortexx
Oxy-pac
Quadexx 100
Lubri-Klenz LF

You inform the Lieutenant that you can obtain the SDSs for the products.

12. Where will you obtain this information?

13. How long will this take you?

Decision Time

Given: The limited information you have at this time

The Lieutenant's concern that he does not want to commit personnel to the extrication until the HazMat situation is addressed by a HazMat team. OR he consults with someone with experience.

The EMTs report the victim is stable with superficial cuts, left side injuries including a broken arm and may have internal injuries. He is going in and out of consciousness.

Options (add others): Discuss and Prioritize

A. Wait for outside HazMat allowing the Fire Department to run the show.

Your job is company Security and providing information to the Fire Department and company management

B. Wait for outside HazMat, then work with them on controlling the leak, allowing the Fire Department to run the show.

C. Do joint command with the Fire Department, with the Company taking the lead on HazMat and the Fire Department doing the incident stabilization, control and extrication.

T = 9 Minutes

The Lieutenant is concerned about the victim, as the EMTs report he is in shock and would suggest expediting extrication. He asks if you are comfortable/capable of handling the HazMat, since these ARE your chemicals.

14. List the reasons you would or would not be able to handle the HazMat?

15. Would you advise the Lieutenant request outside HazMat assistance?

T = 9 Minutes

You inform the Lieutenant that you will start a HazMat response but will stop if you feel the incident is beyond your capabilities.

16. Diagram an incident command structure that you feel represents this situation, at the current time.

17. Are there communication issues? List them and resolve, if necessary.

18. Address how weather and resource needs will affect your decision to respond at this time.

19. Given the SDSs, list the potential and actual hazards and actual hazards and risks to entry personnel you send in.

20. What about having the fire fighters help stabilize the trailer?

21. EMT duties?

22. What advice could you give the Lieutenant concerning potential contamination of those under his command?

23. Should EMS be withdrawn from the hot zone?

24. How might you identify the leaking chemical(s) without going into the trailer?

Can you?

25. How would you prepare for the entry team to identify the chemical?

(Locate the zones and decon line on the map).

26. Show the current location of the command post. Has it been moved? If so, why?

T = 15 minutes

27. Realistically, how long will it be before you can send in an entry team, having back up and decon in place?

T = 20 minutes

You have delivered trailer stabilizers to the edge of the hot zone.

- 28. Can fire fighters place them under the semi-trailer safely or should it be done by the Company HazMat team?
- 29. What precautions might be taken to ensure safety? OR should they wait until you identify the chemicals?

Time = _____

(Time will vary from here on, depending on goals and objectives and resources.)

Entry Team 1, dressed in Level A is briefed on the Goals and Objectives:

Obtain pH of the material with pH paper.

If the pH is 14, place the trailer jacks as noted by the fire fighter in charge of stabilization.

Has the area of the spill been increasing/changing?

Do not step in the material if at all possible.

Collect several drops of the stream from the trailer in a glass jar, using the plastic handle used to get the pH reading.

Try to determine if the liquid is clear or has a yellow tint.

Report Back: the pH is 14, therefore the material leaking is _____.

The Lieutenant asks if you think it is safe to use a city dump truck and a manual winch to pull the van away from the semi-trailer.

30. Specifically, can a fire fighter hook up the van or will it need to be done by your HazMat personnel?

31. Would the dump truck driver need PPE?

A 50-foot cable is hooked to the van by _____, the EMT in the van puts the van in neutral and the van is pulled away from the semi by the extraction team. The van is hosed down and the victim extricated.

32. Did you locate a separate decon for non-company personnel or is everyone using the same decon line? Show on the diagram.

The Company HazMat team was asked to stand-by during the extrication which only took 5 minutes. The incident now reverts to a hazmat spill on your property. An outside HazMat team has just arrived on site.

33. Will you continue to actively to control and remediate the situation? Why or why not?

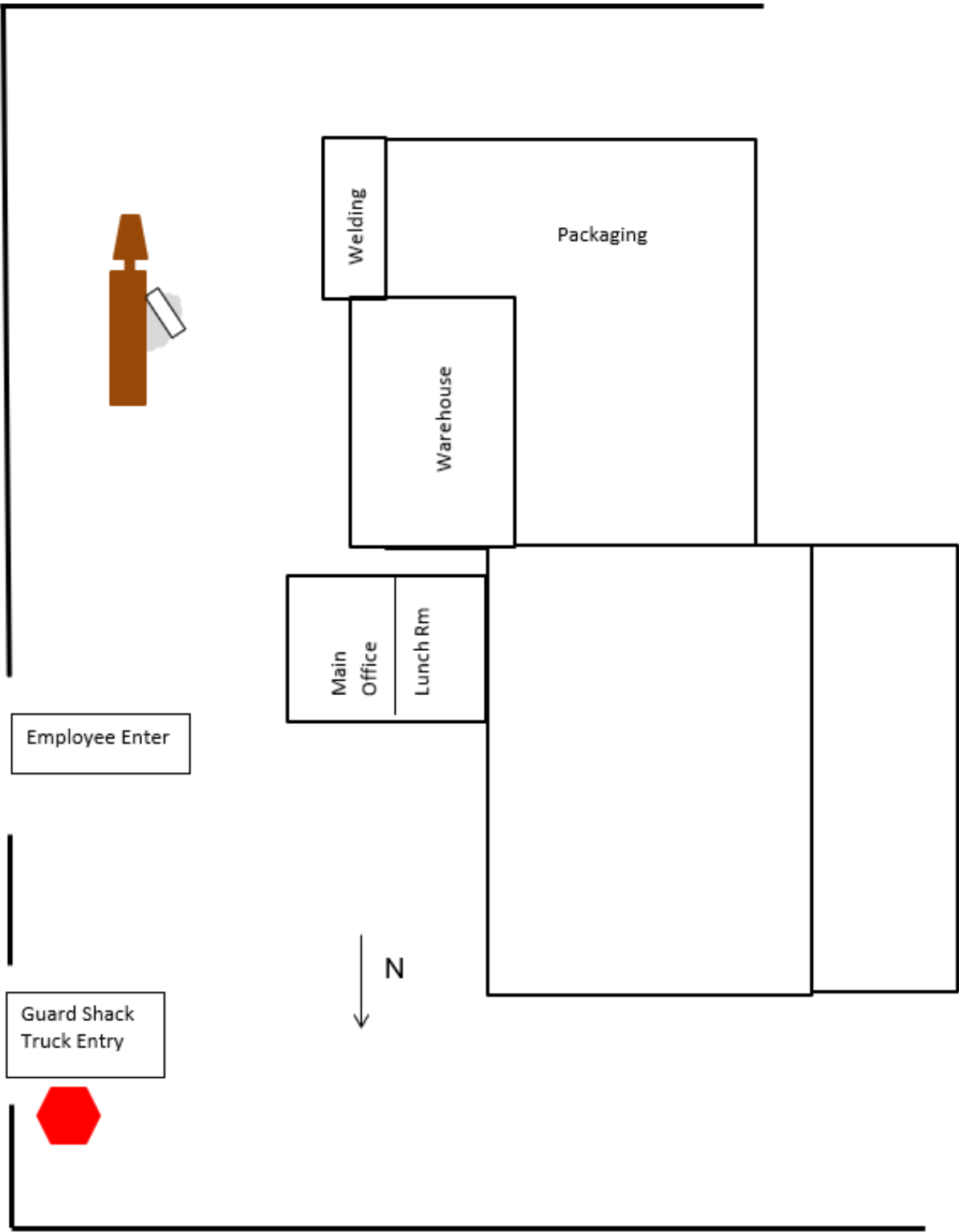
You decide to continue to do the work.

Make a list of the Goals and Objectives to bring closure to the incident.

Goals and Objectives:

For each activity/entry, identify the Hazards and Risks and the needed PPE, air monitoring, duration and resources for each step. Use the worksheet provided.

34. What are the steps needed for Termination?



Exercise F Worksheet

Activity/entry	Hazard and Risks	PPE	Monitoring	Time to achieve	Resources Needed

Exercise F Facilitator Guide

Spill Response Exercise #3

Working in small groups, read the information below and answer the questions. Select a record keeper in each group who will take notes and report the work of the group back to the other participants for a critique.

Initially you will respond as the IC, but then organize as first responders at the scene.

Throughout the scenario, try to be realistic about times needed for actions and decision-making.

The Scene

1. Time/date: 2:15 p.m., Friday afternoon in October
2. 150 employees/ per shift, three shift operation
3. Resources
 - SOPs provided
4. The Fire Department is trained to the Operations Level, and has limited PPE
5. The nearest HazMat team is 15 miles away, trained to Level B

The Incident

The temperature is 40° F. A dock worker named Jeff is at the scene. There is a 2-4 mph wind out of the SW. Jeff makes the first call.

A semi driver was waiting to unload at the south dock. As he pulled out to back in, he noticed a white van approaching on his right, but he figured he had sufficient time. He was out of his parking spot when there was a tremendous jolt to his semi, almost throwing him out of his seat. He regained control and shut it down before doing anything. Shaken, he exited his door and walk around the front of his tractor, finding the white van wedged into the front six feet of his trailer. The van was crumpled about a foot on the driver's corner, the windshield was gone, and the driver was pinned to his seat by the trailer and his seat belt. There was blood all over and the van operator did not respond to call from the driver. The van was not running.

The driver identifies himself as Vern and reports that he called 911 on his cell phone and then headed to the dock to report the accident to company personnel. He now wants to return to the rig to check for damage before calling his employer. He recalls that the placard on the trailer is as shown below:

1. What should Jeff do?

Notify employees

Call for medical attention

Find the Bill of Lading



Can Vern tell Jeff what to do?

Yes, Vern is IC, so he can tell Jeff. He would have authority over the incident.

2. List the calls you have to make AND the actions you need to take/direct

Calls:

Fire Department

HazMat team-Yes, given the size/capacity for response from most companies.

EMS

Safety Director (or designee) for the Company

Actions:

Look up chemical

Provide medical care if safe

Assist in transfer of command

3. What information is needed to do an initial hazard evaluation (what questions should be asked?) Where will it come from?

Question/information	Source
Safety at scene to render care.	IC
Chemicals	Bill of lading, ERG, NPG,
Check other containers in van	responders' observations

T = 1 minute

Vern says he drives for Yancy Trucking out of Minneapolis. He has chemicals for delivery at your plant and to several other companies that he picked up at the IHaveWhatYouNeed distribution center. His shipping papers are in a brown leather case stowed between the seats of the semi.

4. How can/will you obtain the shipping papers?

Depending on initial size-up, obtain from vehicle or call.

T = 3 minutes

The medical responder and dock worker sent to the scene as a result of the 911 call report from the dock that the van is from the Able Plumbing Company; the workers have been working 12-hour shifts on a process upgrade. From the security guard you learned that 2 Able employees named Burt and Benny checked in at 7:10 a.m..

As you talk, the guard calls in that the police car has pulled up to the front gate and asks if he should go and meet them.

5. What is your response to the guard?

Yes – meet them

Who is currently in control?

Person who received the 911 call or his/her designee per the ERP.

If the Police officer asks you what you want him to do, what is your response?

Assist in getting resources, relay information, perimeter control and access to scene

Can you deny entry to the Police?

(given situation) Yes, given severity of scene and hazmat experience of police officer and level of training.

6. How many employees will it take to secure the area?

2—one for each gate

Have you (or when will you) turn this over to an IC? Who?

Discussion of appropriate IC?

Consider transferring IC command to Police Office, Reference the Company ERP.

Police or forklift operator. Police. ERP would also be referenced as noted.

T = 4 minutes

The medical responders report that they do not think they should move the victim but will enter through the passenger door and check him out, administering what aid they can. They see only one person in the van.

The other responder now reports that there is a clear liquid running out of a tear in the side of the trailer and it is running out onto the side of the van and pooling on the ground. It is about 3 feet across now, but there is a pencil-sized stream flowing continuously.

7. If you have not yet called the HazMat team, would you do so now?

Call the Hazmat team; attempt to identify chemical. No entry until chemical identified.

If already mobilized, do you need to summon more personnel?

Depends on company resources. Have the class discuss the options on this.

Or, will you wait for the Fire Department to arrive? (Did you call them, and will they arrive with an ambulance?)

Depends on company resources. Class discussion on availability of ambulance. Ask class if they know who covers their facility.

T = 5 Minutes

The cavalry arrives:

Another police car

Ambulance

Fire Truck

They are directed to the scene and informed that they may want to stage a safe distance away, because you have reason to believe there may be leaking chemicals involved.

7a. Did you update the guard and person meeting the responders about the leak?

Asked the Police Officer to do that.

T = 6 Minutes

The lieutenant, using a radio from your medical responder requests to talk with you and asks that company IC come to his fire truck.

8. Who is the IC now?

Transferred command to Fire Dept (LT) or company designee based on ERP.

Is there someone else better prepared to represent the company?

Transfer command to fire officer (Lt) or company designee based on ERP.

Do you have to do what the IC asks?

Yes.

T = 7 Minutes

The Lieutenant reports that the medics do not think they can extricate the driver without accessing the driver's side. His firefighters do not think that the van should be moved until the semi-trailer is braced and he asks if you can provide trailer jacks or similar equipment as his is 10 minutes away.

He also wants to know what is in the trailer and if he can talk with the driver as his firefighters confirm that there is something leaking from the trailer.

9. Can you help him?

No. Because there is a question of resources, PPE, training, among other concerns

Will you help him? If so, how?

Depends on whether we can make entry or not, depending on product involved.

Or must the trucking company be the source of information?

Trucking placards, company order slip would all be sources of information.

Interject

You inform the Lieutenant that you sent Vern and a company employee to retrieve the shipping papers just before he asked to speak with you. They should be on their way back to the command post now.

10. Where have you established the command post?

At the guard station

11. Did you require them to wear PPE?

Depends, following company ERP as noted

The Lieutenant requests that they return with the information to his temporary command post—the fire truck. The 7 bills of lading indicate that there are four different I Have What You Need products on the semi, in both 5- and 55-gallon containers. The products are:

Vortexx
Oxy-pac
Quadexx 700
Lubri-Klenz LF

You inform the Lieutenant that you can obtain the SDSs for the products.

12. Where will you obtain this information?

Internet - SDS

Vortexx http://chemstarworks.com/wp-content/uploads/2021/08/VORTEXX_English.pdf

Oxy-pac <https://www.midlab.com/wp-content/uploads/SDS-323700.pdf>

Quadexx 700 https://portlandcleanair.org/files/merge/msds/QUADEXX_700.PDF

Lubri-Klenz LF <https://myhealthbox.eu/web/cache/2586665.pdf>

13. How long will this take you?

10 minutes max

All products are cleaning compounds. Severe injury to skin and eyes is possible. Vortexx is a powder, others are shipped as liquids. Spray or mist could be irritating to the respiratory tract, but the most serious concern is eye/skin contact.

Decision Time

Given: The limited information you have at this time

The Lieutenant's concern that he does not want to commit personnel to the extrication until the HazMat situation is addressed by a HazMat team. OR he consults with someone with experience.

The EMTs report that the victim's bp is stable with superficial cuts, left side injuries including a broken arm and may have internal injuries.

Options (add others): Discuss and choose the appropriate action

A. Wait for outside HazMat allowing the Fire Department to mitigate the incident.

Your job is company security. You provide information to the Fire Department and company management

B. Wait for outside HazMat, then work with them on controlling the leak, allowing the Fire Department to mitigate the incident.

C. Do joint command with the Fire Department, with the Company taking the lead on HazMat and the Fire Department doing the incident stabilization, control and extrication.

T = 9 Minutes

The Lieutenant is concerned about the victim, as the EMTs report he is now in shock and would suggest expediting extrication. He asks if you are comfortable/capable of handling the HazMat incident, since these ARE your chemicals.

14. List the reasons you would or would not be able to handle the HazMat.

Do not know what my responsibility would be

Chemicals not yet identified

Level of training is Op and IC, not Technician.

Isn't this a 40T course?

We have Level A PPE to prevent skin/eye contact and any inhalation exposure to unknown chemicals

Access to water for decon

SOP shows that ERT is trained to Technician Level

15. Would you advise the Lieutenant to request outside HazMat assistance?

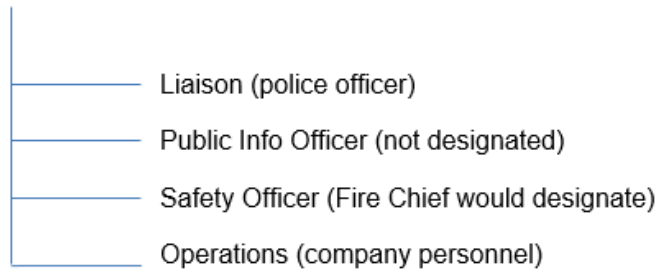
Yes. So we have a municipal funded responder available-that could potentially leave company groups and pose a public safety threat.

T = 11 minutes

You inform the Lieutenant that you will start a HazMat response but will stop if you feel the incident is beyond your capabilities.

16. Diagram an incident command structure that you feel represents this situation, at the current time.

IC is the Fire Lt.



17. Are there communication issues? List them and resolve, if necessary.

These are questions for class discussion-depends on what responsibility each person holds.

Class discussion.

Has command been transferred?

How is communication with the Fire Chief made?

Need a PIO, as some communications may have been transmitted on the local scanner

Is the Lt in contact with the outside HazMat team?

What alerting system is in place to call the other team members?

18. Address how weather and resource needs will affect your decision to respond at this time.

Weather: cold and a light wind. Responders will need rehab and appropriate PPE for the weather.

Resources: Short staffed, this will slow our ability to be offensive.

19. Given the SDSs, list the potential and actual hazards and risks to entry personnel you send in. This table is to assist in determining what product is leaking.

Chemical/Color	Potential hazards	Actual Hazards	Actual risks	Chemical state of matter? (S/L/G)
Vortexx				
Oxy-pac				

Chemical/Color	Potential hazards	Actual Hazards	Actual risks	Chemical state of matter? (S/L/G)
Quadexx 700				
Lubri-Klenz-LF				

20. What about having the fire fighters help stabilize the trailer?

Yes, as long as able to stay clear of product.

21. What should EMT responsibility be?

Check chemical exposure, identity of product.

22. What advice could you give the Lieutenant concerning potential contamination of those under his command?

After research on SDS, contact precautions are all that are needed, as long as responders have appropriate PPE, they can function safely in hot zone.

23. Should EMS be withdrawn from the hot zone?

No, as long as they don't expose themselves to chemical product. If available, they can don PPE.

24. How might you identify the leaking chemical(s) without going into the trailer?

Check PH. Research the chemicals to see which ones fit the situation.

Can you?

Yes, through research of SDS of each of the chemicals-participants can review to id which chemical it is.

25. How would you prepare for the entry team to identify the chemical?

Sample pH to determine which chemical it is.

(Locate the zones and decon line on the map to be drawn by participants).

26. Show the current location of the command post. Has it been moved? If so, why?

Moving it will depend on a number of conditions—wind, access of needed vehicles, unexpected event....

T = 15 minutes

27. Realistically, how long will it be before you can send in an entry team, having back up and decon in place?

Time will include: We estimate 30 minutes to 1 hour for the following

2 in, 2 out

Equipment mobilization

Staging area

T = 203 minutes

You have delivered trailer stabilizers to the edge of the hot zone.

28. Can fire fighters place them under the semi-trailer safely or should it be done by the Company HazMat team?

The company can do in CPC, so would not need the County Team unless company was not able to complete in CPC

29. What precautions might be taken to ensure safety? OR should they wait until you identify the chemicals?

Yes, they can as long as they stay out of product, no respiratory hazard.

Time = _____

(Time will vary from here on, depending on goals and objectives and resources.)

Entry Team 1, dressed in Level A is briefed on the Goals and Objectives:

Obtain pH of the material with pH paper.

If the pH is 14, place the trailer jacks as noted by the fire fighter in charge of stabilization.

Has the area of the spill been increasing/changing? Spill area stayed the same.

Do not step in the material if at all possible.

Collect several drops of the stream from the trailer in a glass jar, using the plastic handle used to get the pH reading.

Try to determine if the liquid is clear or has a yellow tint.

Report Back: the pH is 14, therefore the material leaking is [Quadexx 700](#).

The Lieutenant asks if you think it is safe to use a city dump truck and a manual winch to pull the van away from the semi-trailer.

30. Specifically, can a fire fighter hook up the van or will it need to be done by your HazMat personnel?

[Fire fighter can do if uphill to stay out of product](#)

31. Would the dump truck driver need PPE?

[Shouldn't as long as he is in the truck. Non respiratory. He is staying in the truck.](#)

A 50-foot cable is hooked to the van by the Hazmat Team, the EMT in the van puts the van in neutral and the van is pulled away from the semi by the extraction team. The van is hosed down and the victim extricated.

32. Did you locate a separate decon for non-company personnel or is everyone using the same decon line?

[We would have an emergency decon line for patients, 2nd technical decon line for responders.](#)

The Company HazMat team was asked to stand-by during the extrication which only took 5 minutes. The incident now reverts to a hazmat spill on your property. An outside HazMat team has just arrived on site.

33. Will you continue to actively control and remediate the situation? Why or why not?

[No, transfer responsibility to the HazMat team.](#)

You decide to continue to do the work.

Make a list of the Goals and Process to bring closure to the incident.

Goals and process

Goal: [Safety first. Everyone goes home safely](#)

Process:

- Stop leak/contain run off
- Unload trailer
- Decontamination trailer
- After action, consult with all.
- Appropriate communication
- Complete paperwork

For each activity/entry, identify the Hazards and Risks and the needed PPE, air monitoring, duration and resources for each step. Use the worksheet provided.

34. What are the steps needed for Termination?

They can follow manual with the participants. Steps will be listed there.

