Course Learning Outcomes for Unit III

Upon completion of this unit, students should be able to:

1. Identify and apply appropriate regulations and best practices in the development of effective spill prevention and response plans.
2. Apply a hazard prediction model when conducting hazard assessments for spill prevention and control plans.
3. Use established levels of protection criteria to determine personal protective equipment required to contain or cleanup a hazardous material spill or release.
4. Prepare a site layout for a hazardous material spill response operation.

Reading Assignment

Chapter 2: Hazardous Materials Spills and Response, pp. 59-79

Unit Lesson

You have just been assigned the task of developing and writing your organization’s hazardous material spill prevention and response plan. Where do you start? Perhaps with a look at the regulations that require such plans? You start your research, and you quickly become overwhelmed by the number of different agencies and regulations involved. Putting aside the regulatory issues for a few minutes, we can look at the problem as a logical series of steps:

First, you need to conduct a hazard assessment. Identify the hazardous materials you have, as well as the hazardous materials that are generated by the processes in your workplaces. Remember that hazardous wastes are simply hazardous materials that are discarded. The presumption here is that you understand the various definitions of hazardous material. Once you know what you have, you can determine what would happen if any of these materials were spilled or released into the environment (air, water, soil). Would there be adverse effects on people, property, or the environment? You then need to decide the probability of that spill or release happening. That completes the hazard assessment. It sounds simple but requires a substantial amount of knowledge and can take a long time to complete. Fortunately, there are many resources available that can help.

EPA, OHSA, and DOT regulations all publish definitions and lists of substances that are considered hazardous. Perhaps the best source of information about any chemical is its Material Safety Data Sheet (MSDS, or just SDS, Safety Data Sheet). We will discuss these sheets in more detail in upcoming units, but for now, know that organizations must have an MSDS on hand for every chemical or hazardous substance handled, stored, or used.

Once we know what we have, how can we determine what the consequences of a spill or release might be? The MSDS does not take into account local use of the substance or the local environment where it may have an adverse effect. A useful tool to use is the General Behavior Model (GEBMO) ((Haight, 2010))
Following the GEBMO sequence for each hazardous material will help complete the hazard assessment by leading you to the severity of the consequences of a spill and the probability of such an event happening.

(Graphic below is on page 60 of your textbook)

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<td>(thermal, chemical, mechanical, human)</td>
<td>(detonating, rapid release, leak)</td>
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<td>(dispersion: path, pattern, distance)</td>
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<td>(first aid, fire fighting, chemical decontamination)</td>
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FIGURE 1. General Behavior Model (GEBMO)  
(Haight, 2013)

The Next Step

All that work completed, and we have only finished the first step! Now you have to take the hazard assessment and create written plans and procedures to be used in the event of a spill or release. As with the hazard assessment, there is a logical sequence to these plans:

- **Facility or Site Description** – What is in and around the facility?
- **Personnel Roles and Communication** – Who does what in the event of a spill; who is in charge?
- **Evacuation Routes and Procedures** – How does everyone get out safely? How is everyone accounted for?
- **Emergency Procedures** – This includes details of every action from the discovery of a spill to the end of the cleanup.
- **Post-Response Actions** – Reporting, evaluation, and critique. What did we learn; what can we do better? (Haight, 2013)

The National Response Team publication NRT-1, Hazardous Materials Emergency Response Planning Guide is an excellent resource for helping ensure that your plans and procedures comply with the myriad of regulations.
We are not done yet. Once the plans are in writing, everyone needs to be trained on their responsibilities under the plan. Certainly, personnel who are expected to respond to a spill and take action must have training, but do not forget evacuation procedures. Do they know when, how, and where?

For the first responders, those responsible for cleanup, and those directing the response and cleanup operations, various levels of training are prescribed in OSHA’s Hazard Communication Standard (29 CFR 1910.1200) and OSHA’s Hazardous Waste Operations and Emergency Response standard (29 CFR 1910.120q). Also be sure to check with state and local agencies for additional requirements.

Almost done, but not quite. The final step is to execute the plan. This does not mean that the plan sits on a shelf until an incident occurs, and then everyone frantically tries to remember who is supposed to do what (although this is often the case). Periodic refresher training is not enough either. Plans must be tested through tabletop exercises and simulated response actions. This is the only effective way to identify and correct weaknesses and ensure the most effective response. When determining the best frequency for undertaking these exercises, take into account that personnel and situations change often. Sports teams practice between games, right? Considering the dangers inherent in spill response, your team deserves no less.

There is actually another step after the hazard assessment and before the writing of the plans. Since the goals of RCRA and the EPA include protecting human health, protecting the environment, and reducing the amount of hazardous waste generated, this is a good opportunity to reexamine processes to determine if lower-hazard or non-hazardous substances can be substituted or if processes can be changed so that hazardous substances are not produced as by-products. If these changes are not possible, then examine the controls in place for adequacy. The cost of improving control measures will often be much less than the cost of spill response and cleanup, as well as the likely penalties and fines.

As mentioned in Unit I, we started the course with the end in mind, and in these first three units we have discussed hazardous wastes and spill response, which are at or near the end of the “cradle to grave” concept. In the next unit, we will go back to the cradle and begin our exploration of the rules and best practices for the day-to-day safe management and use of hazardous materials.

References


Suggested Reading

The following resources will be useful for applying what you have learned while completing the non-graded Learning Activities:


Additional Resources:


Learn more about this unit’s topics by researching in the CSU Online Library. The following are examples of articles you will find in the Academic OneFile database:

- “The Corporate Emergency Response Plan: A Smart Strategy,” by David B. Graham and Thomas D. Johns, is a Fall 2012 article in *Natural Resources & Environment* that discusses the need for corporate executives to plan ahead for emergency situations. Incidents discussed include the Deepwater Horizon explosion and the Gulf oil spill in April 2010, as well as a gas pipeline explosion in California in September 2010 and the Fukushima reactor disaster and the tsunami that devastated Japan. As the article says, “Possessing a well-constructed Plan is not the end state; it must be implemented as the incident unfolds” (p. 3).
- “Before and After Disaster Strikes: Developing an Emergency Procedures Manual Fourth Edition” provides an excerpt from Chapter 2 of a textbook by the same name as the article name, provided by the *Journal of Property Management*. The focus of the excerpt is building and training an emergency management team.
- “To Be Continued? Five Steps You Can Take to Make Sure Your Company Survives Catastrophe,” is a March 2012 article by Yasmin Ghahremani that appeared in *CFO, The Magazine for Senior Financial Executives*. The article provides a look at the financial viewpoint of disasters ranging from tsunamis to a nuclear meltdown and discusses how social media have changed the face of communications during disasters.

Cleaning up following the earthquake and tsunami that hit Japan in 2011 is the focus of “Damage limitation,” a March 2012 cover story for *Nuclear Engineering International*. The nuclear reactor meltdown at Fukushima Daiiichi resulted from these two natural disasters, and cleanup plans are long term.
Learning Activities (Non-Graded)

Chapter 2 Study Questions, Part 2

Check your mastery of this unit’s content by answering the following questions. The answers are provided in a link after the last question.

1. Which of the following should be used as the last resort: engineering controls, administrative controls/safe work practices, or personal protective equipment?
2. What is the first step in development of an effective spill response plan?
3. Which kind of hazards pose an internal or external physiological threat to one or more parts of the human body?
4. Name the key elements of a spill prevention and response plan.
5. What does “PID” stand for, and what is it used for?
6. What is the minimum number of hours of training required for workers who will respond to hazardous material spills and releases?
7. Must all employees engaged in HAZWOPER work be enrolled in a medical screening or surveillance program?
8. Name the three main factors that influence the selection of personal protective equipment.
9. What is the process of stopping a release or preventing its spread through mechanical means called?
10. What is the process by which contaminants adhere to the surface of a material called?
11. What is the primary purpose of decontamination?
12. What factors influence the extent of permeation?
13. In most situations, is it best to delay medical treatment until the victim has been decontaminated? Why?

Click here for the answers to the above questions.

Weather Conditions and Hazardous Spills

Visit one of your local gas stations, and make a sketch of the layout and surrounding area. Using this sketch and information about the weather conditions on the day you visited the station, develop a site layout for a large aboveground gasoline spill from a tank truck that was refilling one of the storage tanks.

(Note: www.wunderground.com is a good source for current and historical weather data)

Hazards Around the House

Using the inventory of household cleaning products you created in the Unit I non-graded Learning Activities, determine the level of personal protection that would be required if there was a spill or release of a large quantity of one or more of the products.

Does this information make you feel any different about going to your local big box store and stocking up with numerous large containers of cleaning products? Why, or why not? Write a minimum one-page paper explaining your response. Use correct APA formatting.

Non-graded Learning Activities are provided to aid students in their course of study. You do not have to submit them. If you have questions, contact your instructor for further guidance and information.

Key Terms

1. Cold zone
2. General Behavior Model
3. Hazard assessment
4. Hot zone
5. Levels A, B, C, and D protection
6. Warm zone