
Unit 5: Prioritize and Manage Hazards and Risks

STUDENT GUIDE

Objectives

By the end of this unit, students will be able to:

- Describe several techniques that can be used to prioritize hazards for mitigation, as well as several types of mitigation and accident prevention
- Identify methods used to prioritize hazards
- List the categories of mitigation that are used to prevent accidents

Methodology

This unit uses lecture, exercises, and discussion.

Content from this unit will be tested through the Final Exam, as well as through the facilitation of Exercises 5 and 6. The purpose of Exercise 5 is to provide participants with an opportunity to prioritize hazards and risks. This exercise will last approximately 45 minutes. Participants will gather in small groups to discuss the items on the Hazard or Risk Worksheet and determine what level of priority to give each hazard and risk. Each group will present their findings to the rest of the group.

The purpose of Exercise 6 is to provide participants with an opportunity to suggest potential mitigations for hazards and risks. This exercise will last approximately 45 minutes. Participants will gather in small groups to discuss the list of hazards and risks identified in Exercise 4 and suggest potential mitigations for each. Each group will present their findings to the rest of the group.

Time Plan

A suggested time plan for this unit is shown below. More or less time may be required, based on the experience level of the group.

Topic	Time
Lesson	2 hours
Exercise 5	45 minutes
Exercise 6	45 minutes
Total Time	3 hours 30 minutes

TopicUnit Title Slide

**Key Points**

Scope Statement

Through this unit, students will gain a general understanding of the importance of prioritizing hazards and risks, and several methods that can be used to assist the Safety Officer with making priority determinations. In addition, the unit will explore how the preventability of hazards and risks influences the prioritization process, and students will learn several methods for mitigating the hazards and risks posed by tactical operations.

Unit Terminal Objectives

Describe several techniques that can be used to prioritize hazards for mitigation, as well as several types of mitigation and accident prevention.

**Key Points**

Unit Terminal Objective

Describe several techniques that can be used to prioritize hazards for mitigation, as well as several types of mitigation and accident prevention.

Unit Enabling Objectives

- Identify methods used to prioritize hazards
- List the categories of mitigation that are used to prevent accidents

**Key Points**

This unit explains the importance of hazard and risk prioritization and suggests some methods for prioritization. It also introduces the concept of mitigation and describes methods for reducing the potential impact of hazards and risks.

Topic Risk Management

Risk Management

- **Hazards:** Things in the environment that can cause harm to people or equipment
- **Risks:** The chances that people take in relationship to hazards

A hazard is what exists at an incident; a risk is the result of actions by personnel at the incident

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Visual 5-4

Key Points

Hazards are things in the environment that can cause harm to people or equipment; risks are the chances that people take in relationship to hazards.

A hazard is what exists at an incident site. A risk is the result of actions by personnel at the incident site.

Topic Risk Management (cont.)

Risk Management (cont.)

- **Monitor:** To check, test, and observe for safe operations at an incident
- **Mitigation:** Regulations and controls to ensure safety

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Visual 5-5

Key Points

The Safety Officer's role is to:

- Identify and prevent unsafe acts by checking, testing, and observing for safe operations
- Ensure that safe procedures exist, create specific safety measures, and monitor to ensure that safe procedures are being followed

Topic Risk Management (cont.)

Risk Management (cont.)

What are the three steps in risk management?

- **Identify hazards and risks**
- **Prioritize hazards and risks**
- **Mitigate hazards and risks to reduce the potential for harm to people and property**

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Visual 5-6

Key Points

Topic Risk Management Concepts

Risk Management Concepts

- All projects have hazards connected with them

- Identified hazards can be controlled or mitigated

- It is not possible to identify and control ALL hazards

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Key Points

All projects have hazards connected with them. Even clerical work has hazards (for example, the financial impact of documentation errors, budgetary impacts).

Identified hazards can be controlled or mitigated. Thinking about hazards is more than academic; it must lead to action to help keep people safe.

It is not possible to identify and control ALL hazards because there is never enough time or resources. The IMT's job is to address the most important hazards. This is why prioritization is key.

Topic Risk Management Concepts (cont.)

Risk Management Concepts (cont.)

- The incident must balance the risks and the benefits of taking them
- Some hazards are worse than others
- Priority for monitoring and mitigation should be given to the “killer” items

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Visual 5-8

Key Points

The project must balance the risks and the benefits. Ultimately, this is the call of the Incident Commander. A risk may be accepted when the benefits outweigh the potential costs:

- Risk a lot to save lives, risk a little to save property, and risk nothing when there is no benefit
- Sometimes, doing nothing is the best option (for example, some hazardous materials operations are not worth undertaking)
- “Killer” items are the most important priorities

Topic Priority: Unimproved Helispots



Key Points

Unimproved helispots are an example of a “killer” item that is a hazard that the Safety Officer can and should mitigate.

- Sometimes this becomes a necessary risk, or a risk worth taking
- Take action to make an unsafe operation as safe as possible

Topic Priority: Flood Operations

Priority: Flood Operations



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Visual 5-10

Key Points

Topic Priority: Confined Space Operations

Priority: Confined Space Operations



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Visual 5-11

Key Points

Operations undertaken in a confined space are always a serious risk that must be monitored closely.

Topic Hazard and Risk Prioritization

Hazard and Risk Prioritization

Several **hazard and risk prioritization** methods are presented here, but a Safety Officer may use any logical process.

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Visual 5-12

Key Points

There are as many hazard and risk prioritization methods that the Safety Officer can use. This course cannot teach exactly how to prioritize hazards and risks or give a checklist for every case.

The Safety Officer does not have to choose use any of these methods; just use some logical process so that you can explain your decision to personnel, the Incident Commander, or after-action investigators. You can use multiple processes in the course of an incident or even combine them.

Topic Hazard and Risk Prioritization (cont.)

Hazard and Risk Prioritization (cont.)

Most hazard analysis procedures look at the same three elements:

- Probability
- Magnitude
- Preventability

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Visual 5-13

Key Points

If you walk past a hazard, you have accepted it! You may not have time to do anything about it, but make the decision to do something else more pressing, not a decision not to act.

Topic Hazard and Risk Prioritization (cont.)

Hazard and Risk Prioritization (cont.)

- **Methods for prioritizing hazards:**
 - **The Priority Cross**
 - **The Priority Cube**
 - **The Priority Ladder**
 - **Risk Assessment Code (RAC)**
 - **Training, knowledge, experience**

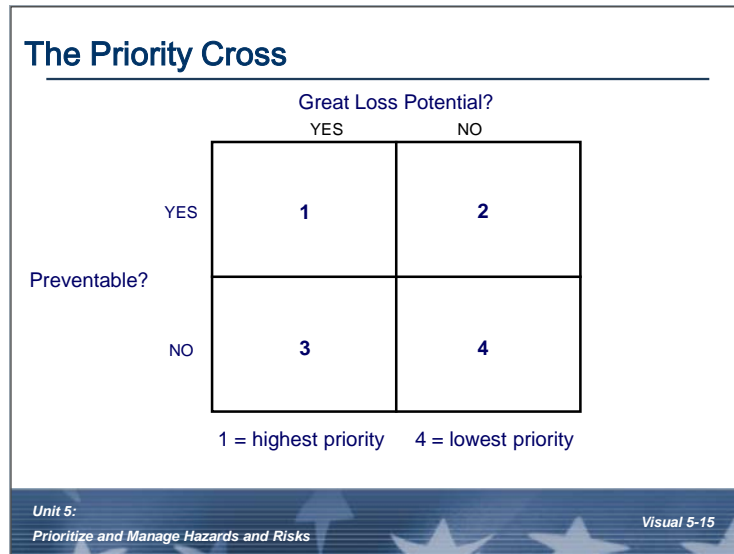
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Key Points

These are some methods for prioritizing hazards that will be discussed in this unit:

- The Priority Cross
- The Priority Cube
- The Priority Ladder
- Risk Assessment Code (RAC)
- Training, knowledge, and experience

Any logical method can be used.

Topic The Priority Cross

Key Points

With regard to prioritizing, we will use a flood as an example:

Increased traffic as people evacuate:

- This could potentially be a great loss, but this is unlikely; so “no” moves you to the right side of the cross
- This is pretty easily monitored and prevented by using defined routes for evacuation and responders, a traffic plan, and law enforcement direction; so “yes” moves you to the top line

This item is priority level 2.

Flooded roadways:

- This could potentially be a great loss for responders who try to drive through water
- The loss is easily prevented by monitoring and using roadblocks and defined routes

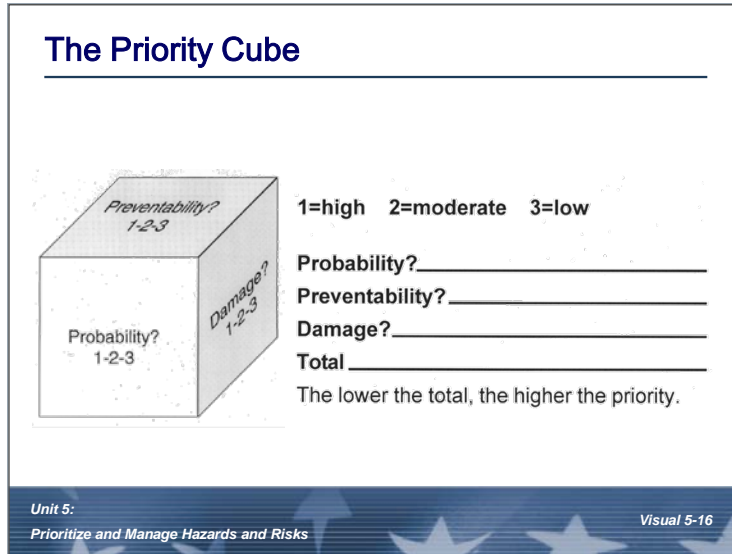
A great loss that is easily prevented makes this item priority level 1.

Chemical fire:

- This is potentially a great loss
- Hazardous materials operations can be monitored but not really mitigated

This item is priority level 3.

Topic The Priority Cube



Key Points

Using a flood as an example:

Increased traffic as people evacuate:

- Probability: High, 1
- Preventability (easy to mitigate; can control traffic even if you can't stop the flood): High, 1
- Damage: Low, 3

Total score: 5, moderate priority

Flooded roadways:

- Probability: High, 1
- Preventability (can block the roads even if you can't stop the flood): High, 1
- Damage (major problem if responders try to cross flooded roads): High, 1

Total score: 3, high priority

Chemical fire:

- Probability (during a flood): Low, 3

- Preventability (you may or may not be able to predict this, so this may not be possible): 2, moderate
- Damage: Extremely high, 1

Total score: 6, so this is your lowest priority of the three. Time is better spent mitigating likely and preventable hazards than worrying about unlikely hazards that you can't do much to make safe.

Topic The Priority Ladder

High Risk Operations	Lacking in Training and Experience?	Fatigue?	Great Loss Potential	Priority Ranking
YES NO	YES NO	YES NO	YES NO	
				1
				2
X				3
Start Here				4
				5

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Key Points

Using a flood as an example:

The Safety Officer needs to know the training, experience, and level of rest (or fatigue) of the personnel involved in order to rank priorities. To demonstrate the Priority Ladder, we will walk through the same flood example. Assume that you are dealing with experienced law enforcement personnel who start with adequate rest, but will become fatigued as the incident wears on (and as you move through the three sample hazards).

Increased traffic as people evacuate (any operation regarding the evacuation of civilians):

- Is it high risk?
 - No
- Personnel lacking in training or experience?
 - Law enforcement personnel are probably used to working near people and would be executing the evacuation, so they probably are trained
- Fatigued?
 - Not at the outset of the incident

- Great loss potential?

- No

Result: Line 5, lowest priority

Flooded roads (crossing flooded roads):

- High risk?
 - Yes, can lose control of vehicle
- Lacking in training or experience?
 - Yes, no one drives through water often
- Fatigued?
 - Not yet
- Great loss potential?
 - Yes

Result: Line 2, relatively high priority

Chemical fire:

- High risk?
 - Always
- Trained and experienced?
 - Probably not for law enforcement because HAZMAT is usually a fire department responsibility (however, they would be experienced with regard to site control)
- Fatigued?
 - Yes, by this point using our assumptions
- Great loss potential?
 - Yes

Result: Line 1, highest priority

Topic Risk Assessment Code

Hazard Severity		Mishap Probability →				A = likely to occur immediately or within a short period B = probably will occur in time C = may occur in time D = unlikely to occur
		A	B	C	D	
I = Catastrophic	I	1	1	2	3	1 = Critical 2 = Serious 3 = Moderate 4 = Minor 5 = Negligible
II = Critical	II	1	2	3	4	
III = Marginal	III	2	3	4	5	
IV = Negligible	IV	3	4	5	5	

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Key Points

Using a flood as an example:

Increased traffic as people evacuate:

- Mishap probability is moderate
 - While increased traffic is likely, it won't always result in an accident; however it may occur in time: C
- Hazard severity is marginal
 - III (it could be negligible, IV)

Result: Column C and row III meet in a cell with a value of 4, minor priority (not a big deal with regard to incident safety).

Flooded roadways:

- An accident involving flooded roadways isn't guaranteed; however, it probably will occur in time: B
- Hazard severity is critical, II, because serious damage can occur, but it is not catastrophic

Result: The intersection is 2, serious priority.

Chemical fire:

- Mishap probability is unlikely to occur, D, because chemical fires can happen during a flood but are not expected to occur
- Hazard severity is catastrophic: I

Result: The intersection is 3, moderate priority.

Topic Methods Summary

Methods Summary				
Hazard	Method			
	<u>Cross</u>	<u>Cube</u>	<u>Ladder</u>	<u>RAC</u>
Scale (highest to lowest priority)	1 to 4	3 to 9	1 to 5	1 to 5
Traffic	2	5	5	4
Flooded Road	1	3	2	2
Chemical Fire	3	6	1	3

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Key Points

Different methods will result in different solutions. You need to understand the biases of the method that you choose and be prepared for the results. Use whatever method makes the most sense to you.

The Safety Officer can change the methods for different situations, for example:

- Use the Priority Ladder or Priority Cross for a quick assessment, but the RAC or Priority Cube for pre-planning
- Use the Priority Ladder when you have specific factors in mind
- Use the Priority Cross or RAC when you are determining which hazards and risks should be monitored closely, but are not dealing with preventability
- Use the Priority Cross when you can mitigate some, but not all, of the hazards and risks, and need to decide where to focus your resources

Topic Training, Knowledge, Experience

Training, Knowledge, Experience

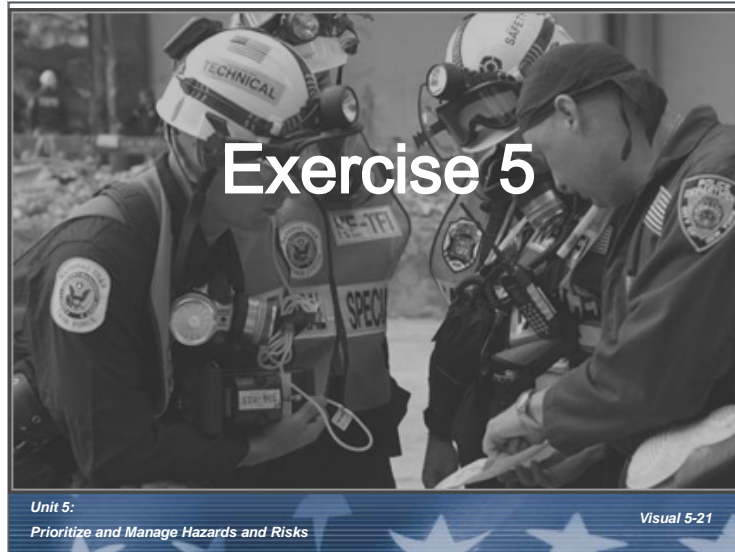
- This is the simplest method for prioritizing hazards because it means you have internalized the process and are able to do it instinctively

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Visual 5-20

Key Points

The Safety Officer should not rely on any particular method as a crutch, but should learn from his or her experiences and rely on training, knowledge, and experience.



Key Points

Follow directions from the instructor on how to complete this exercise.

Hazard and Risk Mitigation

- **The Incident Management Team must take prompt action to correct hazards and implement protective measures**

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Visual 5-22

Key Points

The Incident Management Team must take prompt action to correct hazards and implement protective measures.

Topic Hazard and Risk Mitigation (cont.)

Hazard and Risk Mitigation (cont.)

Most corrective actions will fall into one of the following categories:

- Design Out
- Safety Devices
- Warning Devices
- Special Procedures
- Barrier Tape

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Visual 5-23

Key Points

Most corrective actions will fall into one of the following categories:


- Design Out: Change the design of equipment to eliminate the hazard (for example, add better sound mufflers to minimize noise damage), or change a process so that you can work around the hazard
- Safety Devices: Personal protective equipment, guard, etc.
- Warning Devices: Signage, alarm, traffic lighting, traffic cones, etc.
- Special Procedures: Have a backer when moving equipment backwards
- Barrier Tape: Keeps responders out of unsafe areas

Topic Ways to Prevent an Accident

Ways to Prevent an Accident

Traffic Plan

- Utilize one-way traffic
- Speed limit signs
- Traffic control personnel



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Visual 5-24

Key Points

Along with mitigation, there are many other ways to prevent an accident.

Direct interventions include setting up guidelines and policies around the incident, such as a Traffic Plan. The Ground Support Unit can set up one-way roads, incident speed limit signs, and traffic controllers at key points to ensure safety.

Indirection interventions include bulletin boards, briefings, Safety Messages, and personal contacts. Preventing an accident may be as simple as warning people about a hazard. All personnel should be informed of hazards and mitigation efforts at the incident site.

Barrier tape is one of the most effective methods for keeping responders out of unsafe areas.

Identify the Safety Officer. If incident personnel see the Safety Officer, they may be more likely to bring information to him or her.

Structure Fire

- What hazards and risks do you see here?
- How could they be mitigated?



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Visual 5-25

Key Points

Topic Hazard and Risk Mitigation (cont.)

Hazard and Risk Mitigation (cont.)

If corrective actions will not reduce the hazard, two other options remain:

- Reduce exposure
- Avoidance

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Key Points

The Safety Officer may find that one particular part of an operation has more risks and hazards than can be mitigated. The Safety Officer should ask the Operations Section if there is another way to accomplish the operation.

If corrective actions will not reduce the hazard, two other options remain:

- Reduce exposure:
 - Use smaller crews to subject fewer responders to a risk or hazard
 - Limit the amount of time that responders spend in operations (for example, when working with hazardous materials or in extreme temperatures)
 - Increase shielding and protection to the highest levels
 - Use the most experienced, best trained, and best equipped crews
- Avoidance:
 - Find something else to do or another way to do the job

Topic Reduce Exposure

Reduce Exposure

For example:

Use proper Personal Protective Equipment



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Visual 5-27

Key Points

Topic

Avoidance

Avoidance

- There are times when it's OK to say "NO" to an assignment
- See Handout 5-1: How to Properly Refuse Risk

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Visual 5-28

Key Points

Refer to Handout 5-1: How to Properly Refuse Risk.

There are times when it's OK to say "No" to an assignment. A responder who takes an action that he or she feels is unsafe is a safety risk.

Ultimately, everyone is their own Safety Officer and cannot be forced to undertake an action that they believe to be unsafe. When a responder believes that the operation will result in certain harm, he or she has the right to refuse the risk.

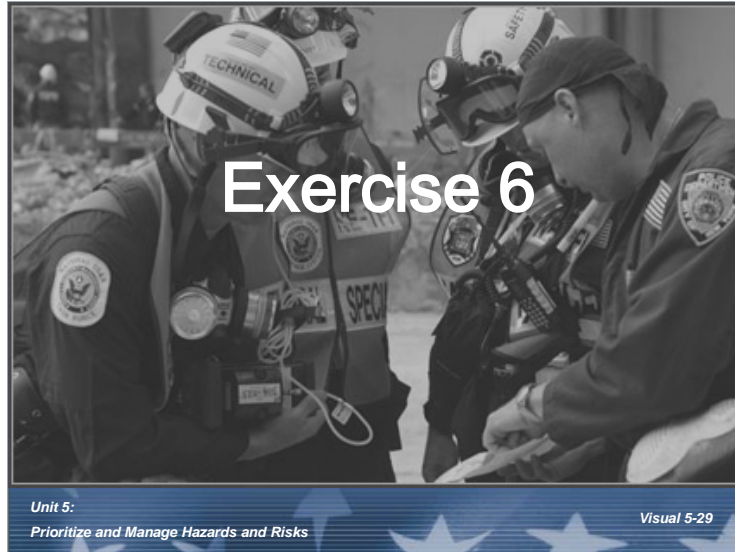
The job of responders is to accept risk and operate where their safety is not guaranteed. There are times when a responder will take a risk to complete the operation, for example, to save lives. The right to refuse a risk does not mean that the responder must refuse a risk.

The Safety Officer (along with the individual's Supervisor) is responsible for listening to the explanation from anyone who refuses a risk. There are several possible outcomes:

- The operation may simply be unsafe and should be stopped
- A simple modification could satisfy the concerns of the individual
- There may be a better way to accomplish the objective
- A different responder may be better trained for the operation

- The individual may not understand the reason that the Supervisor accepted the risk and may agree to the risk if he or she is given more information

Supervisors need to be willing to listen to the concerns of responders and to their suggested alternatives. The responders who take the risks may be the most knowledgeable about how safe an action really is.



Key Points

Follow directions from the instructor on how to complete this exercise.

Objectives Review

1. *What methods are used to prioritize hazards, and how do they work?*
2. *What are the four categories of mitigation?*

Key Points
