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**EMERGENCY MANAGEMENT INSTITUTE**



**Module A**  
**Awareness And Preparedness**



**FEDERAL EMERGENCY  
MANAGEMENT AGENCY**

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**A note on the "Animals in Disaster" Independent Study Course:**

**This course is in two modules:**

- **IS-010, Animals in Disaster: Module A, Awareness and Preparedness**
- **IS-011, Animals in Disaster: Module B, Community Planning**

**For administrative purposes, the two modules have been designated as separate Independent Study courses. Upon successful completion you will receive a Certificate of Achievement for each course. You will also be eligible for one college credit per course.**

**You must apply each course.**

A Two Module  
Course

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# Animals in Disasters

Module A  
Awareness and Preparedness

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# Federal Emergency Management Agency

Washington, D.C. 20472

Dear Participant:

Whenever and wherever disaster strikes, people and their property are affected. Over the years, we have seen whole communities destroyed and lives devastated. A problem that is increasingly being recognized is that disasters also affect animals. In times of crises, people worry not only about their family but also about the family pet; farmers worry about the livestock they are stewards of; the horse owner worries about their prize show horse or backyard pony. More and more, emergency management and agriculture officials are having to include animal issues in planning and preparedness.

We are pleased to present the Federal Emergency Management Agency's (FEMA) new two-module independent study course, "Animals in Disaster." For the first time, FEMA is addressing this important issue through training and education. A major theme throughout the course is that individuals must prepare and plan for their animals. In a flood or earthquake, State and local government must first of all take care of people; government officials will not have time to deal with all animal problems. Therefore, it is up to the individual to see that their animals are taken care of as best as possible. It is also imperative that animal owners work with one another through mutual interest groups such as kennel clubs and horse associations, agricultural organizations, county extension agencies and humane societies to develop plans for their animals.

This course will help you prepare to take care of animals. It will not provide answers to all of your questions or concerns but will help you formulate answers specific to your own situation. We are pleased that you care enough to take this course.

Sincerely,

James L. Witt  
Director

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# Table of Contents

## Module A Awareness and Preparedness

### Unit 1 – Overview

Preface.....	A-1-1
The purpose of this course.....	A-1-1
Summary of the groups that make up the animal-care community and examples of local groups that may represent them.....	A-1-2
Course overview .....	A-1-3
How to complete the course .....	A-1-5

### Unit 2 – Introduction

Overview.....	A-2-1
Objectives .....	A-2-1
Disaster preparedness.....	A-2-1
Animals in society.....	A-2-2
How people respond to animals in disasters.....	A-2-4
Animal ownership.....	A-2-5
The human-animal bond.....	A-2-6
Animals and the family.....	A-2-6
Animal care and emergency management .....	A-2-7
Scenarios.....	A-2-7
Learning check .....	A-2-14
Summary.....	A-2-15



### Unit 3 – The Four Phases of Emergency Management

Overview.....	A-3-1
Objectives .....	A-3-1
Historical background on emergency management.....	A-3-2
Legal responsibilities .....	A-3-3
The four phases of emergency management.....	A-3-3
Mitigation.....	A-3-4
Preparedness.....	A-3-4
Response.....	A-3-4
Recovery .....	A-3-4
What makes emergency management work?.....	A-3-6
Personal responsibilities .....	A-3-6
Local government responsibilities.....	A-3-6
State government responsibilities.....	A-3-8
Federal government responsibilities.....	A-3-8
Voluntary agencies and organizations.....	A-3-9
Scenario.....	A-3-10
Centerville: The four phases in action.....	A-3-11
How were the citizens of Centerville protected?.....	A-3-12
Some personal examples.....	A-3-13
The horse show that didn't happen.....	A-3-13
The puppy that conquered firecrackers .....	A-3-15
Learning check .....	A-3-16
Summary.....	A-3-17

### Unit 4 – Meteorological Hazards: Applying the Four Phases

Overview.....	A-4-1
Objectives .....	A-4-1
Types of disasters.....	A-4-1

Thunderstorms.....	A-4-2
Mitigation.....	A-4-3
Preparedness.....	A-4-3
Response .....	A-4-4
Recovery .....	A-4-5
Learning check.....	A-4-6
Floods .....	A-4-7
Mitigation.....	A-4-8
Preparedness.....	A-4-8
Response .....	A-4-9
Recovery .....	A-4-11
Learning check.....	A-4-13
Tornadoes.....	A-4-14
Mitigation.....	A-4-14
Preparedness.....	A-4-15
Response .....	A-4-16
Recovery .....	A-4-17
Learning check.....	A-4-18
Hurricanes.....	A-4-19
Mitigation.....	A-4-20
Preparedness.....	A-4-22
Response .....	A-4-23
Recovery .....	A-4-24
Learning check.....	A-4-25
Winter Storms.....	A-4-26
Mitigation.....	A-4-27
Preparedness.....	A-4-27
Response .....	A-4-29
Recovery .....	A-4-30
Learning check.....	A-4-32

Drought and Extreme Heat .....	A-4-33
Mitigation.....	A-4-33
Preparedness.....	A-4-34
Response .....	A-4-34
Recovery .....	A-4-35
Learning check.....	A-4-36
Wildfires.....	A-4-37
Mitigation.....	A-4-37
Preparedness.....	A-4-38
Response .....	A-4-38
Recovery .....	A-4-40
Learning check.....	A-4-41
Summary.....	A-4-42

## Unit 5 – Geological Hazards: Applying the Four Phases

Overview.....	A-5-1
Objectives .....	A-5-1
Landslides and mudflows .....	A-5-1
Mitigation.....	A-5-2
Preparedness.....	A-5-2
Response .....	A-5-3
Recovery .....	A-5-4
Learning check.....	A-5-5
Earthquakes.....	A-5-6
Mitigation.....	A-5-6
Preparedness.....	A-5-7
Response .....	A-5-8
Recovery .....	A-5-9
Learning check.....	A-5-11

Tsunamis .....	A-5-12
Mitigation.....	A-5-12
Preparedness.....	A-5-12
Response .....	A-5-12
Recovery .....	A-5-13
Learning check.....	A-5-14
Volcanoes .....	A-5-15
Mitigation.....	A-5-15
Preparedness.....	A-5-16
Response .....	A-5-16
Recovery .....	A-5-17
Learning check.....	A-5-18
Summary.....	A-5-19

## Unit 6 – Technological Hazards: Applying the Four Phases

Overview.....	A-6-1
Objectives .....	A-6-1
Hazardous materials.....	A-6-1
Mitigation.....	A-6-2
Preparedness.....	A-6-2
Response .....	A-6-2
Recovery .....	A-6-3
Learning check.....	A-6-6
Radiation hazards.....	A-6-7
Mitigation.....	A-6-11
Preparedness.....	A-6-11
Response .....	A-6-12
Recovery .....	A-6-12
Learning check.....	A-6-13
Glossary of Radiation Terms .....	A-6-14
Summary.....	A-6-16

## Unit 7 – The Care of Pets in Disasters

Overview.....	A-7-1
Objectives .....	A-7-1
The care of pets in disasters.....	A-7-1
Disasters can strike quickly and unannounced.....	A-7-2
Mitigation.....	A-7-2
To prevent losing your pet in a disaster .....	A-7-2
Preparedness.....	A-7-3
Develop an emergency plan and practice it .....	A-7-3
Accustom your pets to sudden actions as would be needed in a disaster .....	A-7-4
Prepare a disaster kit for each pet .....	A-7-5
Your pet’s health.....	A-7-6
Special recommendations for birds.....	A-7-6
Response.....	A-7-7
Special recommendations for birds.....	A-7-8
Recovery .....	A-7-9
Checklist for disaster preparedness for pets.....	A-7-11
Learning check .....	A-7-12
Summary.....	A-7-13

## Unit 8 – The Care of Livestock and Horses in Disasters

Overview.....	A-8-1
Objectives .....	A-8-1
The care of livestock and horses in disasters.....	A-8-1
Mitigation.....	A-8-2
Flooding .....	A-8-3
Fire safety .....	A-8-4
Power supply and miscellaneous repairs .....	A-8-5
Preparedness.....	A-8-5
Safety in animal transport .....	A-8-5

Communications .....	A-8-5
Veterinary preparations for a disaster .....	A-8-6
Response.....	A-8-7
Evacuation.....	A-8-7
Feeding.....	A-8-7
Identification of animals .....	A-8-8
Hazardous materials.....	A-8-8
Recovery .....	A-8-9
Relocation .....	A-8-10
Restoration of farms as businesses .....	A-8-10
Learning check .....	A-8-11
Summary.....	A-8-12
Review.....	A-8-13
Instructions .....	A-8-13

#### Unit 9 – Module A Final Examination

How to take the Module A final examination .....	A-9-1
--	-------

#### Unit 10 – Appendices

Appendix A – Independent study courses available through FEMA .....	A-10-2
Appendix B – Recommendations on how to deal with contaminated water .....	A-10-4
Appendix C – References.....	A-10-5
Appendix D – Modified Mercalli Scale of Earthquake Intensities .....	A-10-6
Appendix E – Wind Speed Measurement – Land and Water Comparison .....	A-10-7
Appendix F – Wind Chill Measurement Table.....	A-10-8
Appendix G – Wind Speed Matrix.....	A-10-9
Appendix H – Learning Checks Answer Key .....	A-10-10
Appendix I – FEMA-related acronyms.....	A-10-12

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# Animals in Disasters

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## MODULE A UNIT 1

## Overview

### Preface

Why should emergency management officials be concerned with animals in disasters? After all, they are responsible for the safety of humans, not animals. However, according to the American Veterinary Medical Association, 58.9 percent of all U.S. households own animals. For this reason, the care of animals in disasters is important to the care of humans.

This course aims to bring together emergency management officials and the animal-care community to share resources, authority and expertise. A collaborative effort between emergency management and animal-care providers can improve a community's successful disaster preparedness and response.

This course does not intend to provide details on the care of animals in disasters, but to promote personal responsibility of animal owners and care providers. It also guides emergency managers in the recruitment and use of local community resources to define, develop, teach, and implement a disaster response. **Each community must tailor its plan to meet its own needs.**

### The purpose of this course

The purpose of this course is two-fold. Module A is intended to increase awareness and preparedness among animal owners and care providers. It includes sections on typical hazards, how these affect animals and what can be done by responsible owners to reduce the impact of disasters. It is also intended to help animal owners, care providers and industries to better understand emergency management. Module A will heighten awareness of the special issues that emergency managers need to consider when incorporating animal-care annexes into their emergency operations plans.



Module B is intended to guide emergency management officials and animal owners, care providers, and industries in preparing community disaster plans. The goal of Module B is to provide sufficient information for both groups to meet and develop meaningful and effective plans that improve the care of animals, their owners, and the animal-care industries in disasters. This course provides the basic background knowledge needed to develop a coordinated response to a disaster in which animals and their owners are affected. Further training with local or State emergency management programs is essential.

Summary of the groups that make up the animal-care community and examples of local groups that may represent them	Type of Organization	Examples
	Private owners	Pet owners, livestock producers
	Public owners	Native wildlife (tax payers own wildlife, which are managed by the natural resources department)
	Businesses	Veterinarians, pet stores, feed stores, farmers cooperatives, animal accessory stores, department stores, boarding kennels, grooming parlors, animal transport companies, pest control companies, racetracks, renderers, slaughterhouses, circuses
	Humane organizations	Humane shelters, SPCA, volunteers groups
	Educational institutions	Veterinary schools, veterinary technician schools, animal science and agriculture schools and departments, zoos, aquaria
	Governmental agencies	Animal care and control, U.S. Department of Agriculture, health departments, natural resources department, Cooperative Extension Services, public health services
	Professional associations	Veterinary medical associations, registered veterinarian health technician associations
	Other associations	Livestock producer associations, breeding clubs, riding schools, search and rescue teams, wildlife rehabilitators, youth and 4H groups

**Course overview** Module A is divided into an overview, seven units of instruction, a final exam and appendices. A description of each unit is provided.

Unit 1: Overview. Preface, purpose of the course, and information on the course. **(This unit is the same in both modules.)**

Unit 2: Introduction. Why are animals an important consideration in disasters? This unit describes the animal-care community, the societal impact of animal ownership and introduces the concept of the human-animal bond as a major factor affecting animal owners in disasters. **(This unit is the same in both modules.)**

Unit 3: The four phases of emergency management. This unit introduces the activities of mitigation, preparedness, response and recovery and addresses government and individual responsibilities for carrying out these activities.

Units 4 through 6: Defining the risks and applying the four phases of emergency management. These units describe the major natural and technological hazards in the United States and provide information on typical animal-related issues that may arise in these circumstances.

Units 7 and 8: The care of animals in disasters. These units contain specific information on how to provide care for animals in disasters.

Unit 9: Module A final examination. By completing this unit and passing the exam, you may receive a certificate of completion from the Emergency Management Institute.

Unit 10: Appendices. This unit contains reference materials that supplement the course materials and indicates where further information can be obtained.

## Course overview (continued)

Module B is divided into an overview, six units of instruction, a final exam and appendices. A brief description of each unit is provided to follow.

Unit 1: Overview. Preface, purpose of the course, and information on the course. **(This unit is the same in both modules.)**

Unit 2: Introduction. Why are animals an important consideration in disasters? This unit describes the animal-care industries, their societal impact and introduces the concept of the human-animal bond as a major factor affecting animal owners in disasters. **(This unit is the same in both modules.)**

Unit 3: Disaster preparedness through planning and collaboration. This unit outlines the steps needed to develop a community disaster plan that takes special consideration for animals and their owners. Suggestions are made as to how emergency management and the animal-care community can collaborate to develop an effective plan.

Unit 4: Analyzing risks affecting animals and their owners. This unit outlines the principles of identifying risks that are relevant to animals and their owners.

Unit 5: The organization of the response to disasters. This unit provides information on the official and proven methods of response to disasters. The Incident Command System and other established elements of response are described.

Unit 6: Recovering from a disaster. This unit outlines considerations for effective recovery from disasters. It also describes major sources of disaster relief.

Unit 7: Developing community support for the disaster preparedness plan. This unit suggests ways in which the community, government and citizens can be informed and inspired to support and participate in disaster planning.

Unit 8: Module B final examination. By completing this unit and passing the exam, you may receive a certificate of completion from the Emergency Management Institute.

Unit 9: Appendices. This unit contains reference materials that supplement the course materials and indicate where further information can be obtained.

## How to complete the course

You will remember the material best if you do not rush through it. Take a break at the end of each section and give yourself time to think about the material. Once you feel familiar enough with the material, take the quiz at the end of the unit or section. The answers to the quizzes are provided in an appendix. There is a final examination at the end of each module.

The purpose of the final examination is to ensure you have a complete understanding of the material. An answer sheet is supplied with the course materials. Mail the completed answer sheet to the address on the form; your test will be evaluated and results will be mailed to you within a few weeks. If your score is 75 percent or above, a certificate of completion will be mailed to you. Interested students who have successfully completed the course and passed the final examination may apply for one semester hour of college credit through the FEMA Independent Study Program Office.

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# Animals in Disasters

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## MODULE A UNIT 2

## Introduction

### Overview

This unit examines the reasons why animal care during disasters is a concern for the animal owners, animal industries, emergency management, and the general public. It describes the animal-care community, examines the societal impacts of animal ownership, and introduces the concept of the human-animal bond as a major factor affecting animal owners and care providers in a disaster.

**This unit is the same in both Module A and Module B.** If you are already familiar with the material, you may review it, or skip ahead to Unit 3.

### Objectives

Upon completion of this unit you should be able to:

- ▶ List the major reasons why it is important to consider animals in disasters
- ▶ Describe the magnitude of animal ownership in the United States
- ▶ Define the human-animal bond
- ▶ Describe the ways in which animal care and emergency management are related

### Disaster preparedness

Our world is dangerous – earthquakes, tornadoes, fires, floods, hazardous chemicals, and nuclear wastes threaten us. The best disaster preparedness starts with personal protection and safety. An attitude of personal responsibility allows individuals and interest groups to identify, prioritize and mitigate issues that arise in disasters. When individuals and interest groups collaborate with emergency management officials in their communities, programs based on the community's needs, expertise and resources can be developed.

## Animals in society

Our society benefits from improved efficiency and health care in livestock production systems. Emergency management and other Federal and State departments have traditionally protected these benefits in disasters. Support for animal agriculture is warranted, as the U.S. animal agriculture industry generates nearly \$90 billion each year. Because agriculture now depends on fewer people to produce our nation's food supply, emergency management systems are of high priority.

In addition to livestock production, society recognizes other benefits from animals. One benefit is the improved quality of life that animal owners and care providers get from living and working with animals that are considered companions, confidants, health facilitators and status symbols. This is partly reflected by an increase in the revenue the pet industry generates. In the mid-1990s, this industry was estimated to generate between \$20 and \$30 billion per year.

The importance of animals in the United States is evidenced by:

- ▶ An increasing appreciation of pets as human companions, and
- ▶ A decreasing portion of the population employed in agriculture. Because of this, food production in the United States relies on fewer people.

Reflecting these changes, the media often reports the needs of animals, both domestic and wild, affected by disasters. The needs of animals and their owners have been prominent issues in several U.S. disasters.

We encourage emergency managers and the animal-care community to share their emergency plans. By doing so, expertise and resources necessary for successful disaster response may also be shared.

The following table lists examples of issues that arise because of animals in disasters.

## Animals in Disasters – Issues

- ▶ After the Three Mile Island, PA, nuclear accident in 1979, many misinformed owners left animals to stray resulting in traffic accidents and an overloading of humane shelters and veterinary practices.
- ▶ During the evacuation from a large white phosphorus and liquid sulfur spill in Dayton, OH, in 1984, pet owners attempting to rescue their pets created traffic jams by driving in the opposite direction to the evacuating traffic.
- ▶ Following floods in Snohomish Valley, WA, in 1991, some farmers felt so grief-stricken by the drowning of their cows that they left agriculture altogether.
- ▶ Following the Oakland, CA, firestorm in 1991, hundreds of cats and dogs were never reunited with their owners because their owners could not be found.
- ▶ After Hurricane Andrew struck Southern Florida, in 1992, many victims were distressed when they discovered that they could not stay at public shelters if they had pets with them.
- ▶ After a tornado in West Lafayette, IN, in 1994, several animal owners in public shelters showed psychosomatic symptoms as a result of not knowing the whereabouts of their pets.
- ▶ During Georgia floods in 1994, some pet owners refused to evacuate in a timely and safe manner because they could not take their pets with them. Others were prevented from attempting to rescue their pets from flooded houses using boats.
- ▶ After a propane gas spill caused by a train derailment in 1996, all citizens of Weyauwega, WI, were evacuated. Many pets and livestock were left behind. Emergency management initiated a rescue effort.



## How people respond to animals in disasters

The previous table provides examples of how animal owners and care givers may respond when animals are involved in disasters. Traditional concerns involving animals during disasters include the following:

- ▶ The spoilage of the human food and water supply;
- ▶ Animal bites; and
- ▶ Outbreaks of zoonoses (diseases transmitted between animals and people) such as rabies.

Other problems include the significant impact on public mental health due to the emotions owners feel for their animals. These issues are particularly evident in seniors and children.

Mental health issues include:

- ▶ Feelings of guilt,
- ▶ Bereavement, and
- ▶ Anger.

Some people are more concerned for their animals in disasters than they are for themselves. This may impair their ability to make sensible decisions about their own safety and that of rescue workers. Examples include:

- ▶ Evacuation failures and re-entry attempts, and
- ▶ Unsafe rescue attempts.

There are also reports of pet owners being injured or killed attempting to rescue their animals from burning or flooded houses.

These behaviors are a major concern for emergency management personnel to whom saving human life is the highest priority. The new paradigm is that animals cannot be viewed simply as inanimate property.

## Animal ownership

Approximately 50 percent of all U.S. households own a pet. This implies that during large-scale disasters, pet ownership may affect the behavior of large segments of the population at risk. Strong attachments also exist between farmers and their livestock. The potential magnitude of behavior-related problems is high, as shown in the following tables.

Species	Percent of U.S. households owning pets
All pets	58.9
Dogs	31.6
Cats	27.3
Birds	4.6
Horses	1.5
Other pets	10.7

Source: U.S. Pet Ownership and Demographics Sourcebook, Center for Information Management. American Veterinary Medical Association. Schaumburg, IL. 1997

Species	Average number of pets per pet-owning household
Dogs	1.69
Cats	2.19
Birds	2.74
Horses	2.67

Source: U.S. Pet Ownership and Demographics Sourcebook, Center for Information Management. American Veterinary Medical Association. Schaumburg, IL. 1997

## The human-animal bond

The human-animal bond is a term used to describe the fundamental relationship between humans and animals. The term bonding refers to the formation of close relationships, such as those between parent and child or husband and wife. Behaviors that communicate bonding among humans are also used between humans and animals. The term human-animal bond can be applied to interactions between humans and many species, including companion animals, livestock, and wildlife. The human-animal bond involves the care for animals, and the quality of life for animals and humans.

## Animals and the family

Studies show that more than 60 percent of pet owners consider their pets to be very or extremely important to their families. The majority of livestock producers have similar feelings toward their animals. The main reasons for pet ownership include:

- ▶ Personal pleasure and companionship;
- ▶ An educational experience for children (birth and death);
- ▶ Replacement of persons in their lives;
- ▶ Personal and property protection; and
- ▶ The rescue of an animal from neglect.

Livestock producers chose to support their families through the care of animals and depend on animals for their livelihood. Our nation depends on livestock producers to deliver safe, wholesome food, a healthy economy, and international trade. U.S. agricultural and domestic animal husbandry systems also contribute significantly to our country's cultural heritage and identity.

## Animal care and emergency management

In disasters, some may use the way animals are cared for to measure the quality of human care provided by emergency management teams. While the care of animals in disasters should never take precedence over the care of people, providing care for animals may facilitate the personal safety and care of a large segment of the human population.

The care of animals in disasters is consistent with the American Veterinary Medical Association policy on animal welfare which states:

“Animal welfare is a human responsibility that encompasses all aspects of animal well-being, including proper housing, management, nutrition, disease prevention and treatment, responsible care, humane handling, and, when necessary, humane euthanasia.”

Emergency management officials and animal-care communities should work together to define plans for the care of animals and their owners in disasters. Plans should respect the concerns of animal owners and the concerns of persons that do not own animals or have medical or psychological reasons to distance themselves from animals. Unnecessary exposure of persons with allergies or phobias against animals should be avoided. These reasons, along with food hygiene and other public health concerns, are the major reasons why animals are not allowed into human shelters.

Plans that deal with animals are also important to emergency management officials because many rescue workers will encounter animals while working in disasters. During the response, rescue workers may be pleased to find animals, but become concerned about animal care as they return to their tasks. Thus, their rescue efforts may be delayed or compromised because of their concern for the well-being of animals.

## Scenarios

Let's start thinking about some emergency situations that involve animals. At this stage you are not expected to know all the answers to these questions. Although questions are given for emergency managers and owners (assume you are either an emergency manager or an owner), start thinking about how you might address solutions from the other person's point of view too. When you start to develop your community plan you may like to start with a session that tries to answer some of these questions and others from your own experience.

## Scenarios

**Directions:** Answer the following questions in terms of: 1. What would you do to resolve these situations?, and 2. If you do not know the answers, who could help you find the answers?

---

1. A train carrying propane derailed and prompts the immediate evacuation of 1000 households in a 2-mile radius. You estimate that approximately 50 percent of families in the evacuation area own animals.

Emergency Managers: Do you have an action plan to evacuate people with their animals, and know where to house the animals? Describe.

Animal owners: How would you evacuate with your animals? What supplies would you take for your pets? Where would you shelter your animals?

## Scenarios

2. During Hurricane Jackie many persons become separated from their horses.

Emergency Managers: How would you reunite the horses and their owners?

Animal owners: There are 35 bay mares in a temporary enclosure for horses. If one of them were yours, how would you positively identify it to a security guard at the pasture?

## Scenarios

3. In a tornado, a tank of herbicide is knocked over. It may have contaminated the grain bin on a dairy farm and been sprayed onto the skin of some pigs at a neighboring farm.

Emergency Managers: What are the potential public health risks associated with contaminated livestock feed and food-producing animals?

Animal owners: Who would you contact to determine the safety of your cows' feed and to determine the potential contamination of the milk?

The pigs do not appear to be affected – Who can determine the withdrawal times for safe slaughter of the pigs for human consumption?

## Scenarios

4. Many farms are in low-lying areas close to rivers. Flooding is a problem that can result in animals drowning, and difficulty in supplying feed to stranded animals.

Emergency Managers: How many farms in your community are potentially affected by floods and what types and numbers of animals do they have? How would you obtain this information?

Animal owners: How could the problem of recurrent flooding be prevented? What department in your State could help you in this regard?



## Scenarios

5. During a heat wave there is a local power failure that results in the death of 500,000 chickens in two adjacent barns.

Emergency Managers: What emergency power supplies could have been mobilized and prevented this costly loss?

Animal owners: How would you dispose of this large mass of dead birds?

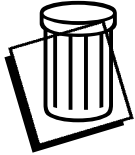
## Scenarios

6. A brush fire precipitates the escape of a large private collection of exotic animals. The animals include lions, tigers and bears. There is great risk of people being injured. The animals are very valuable and belong to an influential local resident.

Emergency Managers: Should the escaped animals be killed or captured? Discuss.

List factors that would help you reach the most appropriate decision.

Animal owners: Whom would you call in your jurisdiction to help you with this situation?



## LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT ANIMALS IN DISASTERS?

This activity is designed to assess your understanding of the information presented in this unit.

**Directions:** Answer the questions – use the Answer Key in Unit 10 to check your answers.

---

### True or False

1. The best disaster preparedness starts with personal protection and safety.
2. Private individuals and corporations coordinate the most effective protection against disasters, without the help of Federal and State departments.
3. The U.S. animal agriculture industry generates nearly \$90 billion each year.
4. Traditional concerns involving animals in disasters include the spoilage of the human food and water supply.
5. There is no evidence to indicate that the human-animal bond affects public mental health in times of disaster.
6. Care for animals during disasters has no effect on the safety and care of humans.
7. The care of animals in disasters should take precedence over the care of people.
8. In disasters consideration has to be given to avoid unnecessary exposure of persons with allergies or phobias against animals.

### Multiple Choice

9. The importance of animal ownership in the United States is evidenced by:
  - a. A decreased appreciation of pets as human companions
  - b. Increased revenue of the pet industry
  - c. An increase in the portion of the population employed in agriculture
  - d. Less than half of all Americans now own pets
10. According to survey results, what percent of pet owners consider their pets to be very or extremely important to their families?

a. 10 percent	c. 60 percent
b. 30 percent	d. 100 percent

## Summary

In this unit, you examined the relationship between humans and animals and how this relationship may potentially affect emergency management. This unit described the animal-care community, examined the societal impacts of animal ownership, and introduced the concept of the human-animal bond as a major factor affecting animal owners and care providers in a disaster.

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# Animals in Disasters

## MODULE A UNIT 3

## The Four Phases of Emergency Management

### Overview

This unit covers ways in which emergency management can be applied to individuals and communities. It implies that much of what will happen in an emergency or a disaster can be predicted. This knowledge allows individuals and communities to anticipate the types of disasters that are likely to affect them, and to think of ways to reduce the impact, or prevent disasters altogether.

Family and community disaster preparedness is often referred to as emergency preparedness, and involves thinking about hazards that threaten your safety at home and in your community and developing a preparedness plan for your family. For many, animals are an important part of their families and their livelihood. Therefore, animals should be included in a preparedness plan.

### Objectives

Upon completion of this unit you should be able to:

- ▶ Define emergency management
- ▶ Define the four phases of emergency management and describe activities associated with each phase
- ▶ Describe the organization of emergency management at the local, State and Federal levels
- ▶ Discuss the ways in which emergency management at the local, State and Federal levels work together and form a partnership

## Historical background on emergency management

Emergency management was institutionalized in 1979 with the creation of the Federal Emergency Management Agency (FEMA). Five Federal agencies that dealt with many types of emergencies consolidated to form FEMA. Since that time, many State and local organizations have changed the names of their organizations to include the words: emergency management.

The name change indicates a change in orientation from specialized preparedness for single or narrowly defined categories of hazards toward an *all-hazards* approach that includes potential threats to life and property through environmental and technological hazards, and domestic and foreign attacks. This change reflects not a *reduction* in security, but an increased emphasis on making the nation's emergency management capability responsive to any major emergency.

The concept of *emergency management* consists of three interrelated components, as shown in this table.

All types of hazards	There are many common features of technological and natural disasters and attack, suggesting that many of the same management strategies can apply to all emergencies.
An emergency management partnership	Finding resources for disaster management requires a partnership among all levels of government (local, State, and Federal) and the private sector (business and industry, voluntary organizations, and the public). This approach also allows the disaster victims to contribute to emergency management solutions. Emergency managers and the animal-care community can collaborate in such a partnership.
An emergency life cycle	Disasters do not just appear one day – they exist throughout time and have a life cycle of occurrence. This cycle is matched by a series of management phases: establish strategies to mitigate hazards; prepare for and respond to emergencies; and recover from effects.

## Legal responsibilities

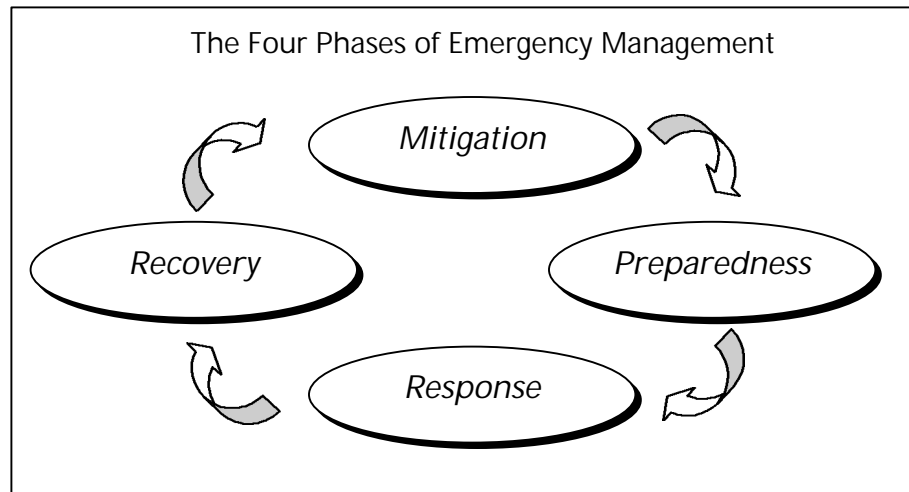
Many States require that local jurisdictions provide for the position of emergency program manager. At each level of government, laws define the responsibility and authority of emergency managers and management programs.

If you know how emergency management works at the various governmental levels, you can coordinate your personal preparedness plans with official community plans. You may even become a part of your local or State emergency management program. Coordination of knowledge, resources and expertise between government officials and the private sector is a basic principle of emergency management.

## The four phases of emergency management

Since World War II emergency management has focused primarily on preparedness. Often this involved preparing for enemy attack. Community preparedness for all disasters requires identifying resources and expertise in advance, and planning how these can be used in a disaster. However, preparedness is only one phase of emergency management. Current thinking defines four phases of emergency management: mitigation, preparedness, response, and recovery. There are entire courses on each of these phases.

The following diagram illustrates the four phases of emergency management.



The following table briefly describes each of these phases.



The Four Phases of Emergency Management	
<p><b>Mitigation</b> Preventing future emergencies or minimizing their effects</p>	<ul style="list-style-type: none"> <li>▶ Includes any activities that prevent an emergency, reduce the chance of an emergency happening, or reduce the damaging effects of unavoidable emergencies.</li> <li>▶ Buying flood and fire insurance for your home is a mitigation activity.</li> <li>▶ Mitigation activities take place <b>before</b> and <b>after</b> emergencies.</li> </ul>
<p><b>Preparedness</b> Preparing to handle an emergency</p>	<ul style="list-style-type: none"> <li>▶ Includes plans or preparations made to save lives and to help response and rescue operations.</li> <li>▶ Evacuation plans and stocking food and water are both examples of preparedness.</li> <li>▶ Preparedness activities take place <b>before</b> an emergency occurs.</li> </ul>
<p><b>Response</b> Responding safely to an emergency</p>	<ul style="list-style-type: none"> <li>▶ Includes actions taken to save lives and prevent further property damage in an emergency situation. Response is putting your preparedness plans into action.</li> <li>▶ Seeking shelter from a tornado or turning off gas valves in an earthquake are both response activities.</li> <li>▶ Response activities take place <b>during</b> an emergency.</li> </ul>
<p><b>Recovery</b> Recovering from an emergency</p>	<ul style="list-style-type: none"> <li>▶ Includes actions taken to return to a normal or an even safer situation following an emergency.</li> <li>▶ Recovery includes getting financial assistance to help pay for the repairs.</li> <li>▶ Recovery activities take place <b>after</b> an emergency.</li> </ul>

## Mitigation

This phase includes any activities that prevent an emergency, reduce the likelihood of occurrence, or reduce the damaging effects of unavoidable hazards. Mitigation activities should be considered long before an emergency.

For example, to mitigate fire in your home, follow safety standards in selecting building materials, wiring, and appliances. But, an accident involving fire could happen. To protect yourself and your animals from the costly burden of rebuilding after a fire, you should buy fire insurance. These actions reduce the danger and damaging effects of fire.

## Preparedness

This phase includes developing plans for what to do, where to go, or who to call for help before an event occurs; actions that will improve your chances of successfully dealing with an emergency. For instance, posting emergency telephone numbers, holding disaster drills, and installing smoke detectors are all preparedness measures. Other examples include identifying where you would be able to shelter your animals in a disaster. You should also consider preparing a disaster kit with essential supplies for your family and animals.

## Response

Your safety and well-being in an emergency depend on how prepared you are and on how you respond to a crisis. By being able to act responsibly and safely, you will be able to protect yourself, your family, others around you and your animals. Taking cover and holding tight in an earthquake, moving to the basement with your pets in a tornado, and safely leading horses away from a wildfire are examples of safe response. These actions can save lives.

## Recovery

After an emergency and once the immediate danger is over, your continued safety and well-being will depend on your ability to cope with rearranging your life and environment. During the recovery period, you must take care of yourself and your animals to prevent stress-related illnesses and excessive financial burdens. During recovery, you should also consider things to do that would lessen (mitigate) the effects of future disasters.

## What makes emergency management work?

Emergency management works when you and your local, State and Federal government fulfill emergency management responsibilities. Voluntary organizations also have important responsibilities during disasters. This next section describes responsibilities at each of these levels.

### Personal responsibilities

Animals owners have the ultimate responsibility for their animals. Community disaster preparedness plans try to incorporate the care of animals and their owners in their plans, but plans can only coordinate care – they cannot always provide it. The best way to be prepared is to create a personal emergency plan that includes provisions to care for your animals. You can learn how to prepare such a plan from your local American Red Cross office, your local emergency management agency and numerous other groups. Some classes are listed in the appendix. Once you develop your personal emergency management plan, you may:

- ▶ Be prepared to deal with the four phases of most emergencies;
- ▶ Find it much easier to understand the actions of official emergency managers; and
- ▶ Help with the official response.

### Local government responsibilities

Local governments make plans and provide resources to protect their citizens from the hazards that threaten their communities. This is done through mitigation activities, preparedness plans, response to emergencies, and recovery operations. Wherever you live within the United States, a county or municipal agency has been designated as your local emergency management agency. The local government level is the most important at which to develop emergency management plans because local governments serve as the link between you and the State and Federal agencies in the emergency management network.

Local law will specify a chain of command in emergencies. It will spell out who reports to whom. The chief executive officer or jurisdiction manager is charged with creating effective emergency services.

The following table lists responsibilities of local governments in terms of emergency management.

## Local Government Responsibilities

- ▶ Identifying hazards and assessing their potential risk to the community.
- ▶ Determining the community's capability to mitigate against, prepare for, respond to, and recover from major emergencies.
- ▶ Identifying and employing methods to improve the community's emergency management capability through efficient use of resources, improved coordination, and cooperation with other communities and with the State and Federal governments.
- ▶ Establishing mitigation measures such as building codes, zoning ordinances, or land-use management programs.
- ▶ Developing and coordinating preparedness plans.
- ▶ Establishing warning systems.
- ▶ Stocking emergency supplies and equipment.
- ▶ Educating the public and training emergency personnel.
- ▶ Assessing damage caused by the emergency.
- ▶ Activating response plans and rescue operations.
- ▶ Ensuring that shelter and medical assistance are provided.
- ▶ Recovering from the emergency and helping citizens return to normal life as soon as possible.

You can assist your community in developing and improving community disaster plans for the care of animals and their owners by doing the following.

- ▶ Find out who your emergency manager and animal industry representatives are;
- ▶ Determine how these groups perceive hazards in your community;
- ▶ Review with the emergency manager and animal-care groups in your community the most important areas of need to provide care for animals and their owners in disasters; and
- ▶ Determine where you might fit in and be able to help your community as a whole.

Working with local emergency managers before a disaster strikes can help all animal owners during a disaster.

State government responsibilities

The State emergency management office is responsible for protecting communities and citizens within the State. The State office carries out statewide emergency management activities, helps coordinate emergency management activities involving more than one community, or assists individual communities when they need help. If any community lacks the resources needed to protect itself or to recover from a disaster, the State may help with money, personnel, or other resources.

Financial assistance is available on a supplemental basis through an application process. The Governor reviews the local government's application, studies the damage estimates and, if appropriate, declares the area a State disaster. This official declaration makes State resources available. However, if damages are so extensive that the combined local and State resources are not sufficient, the Governor applies to the President for Federal disaster assistance. If the need for Federal assistance funds is justified, the President issues a major disaster declaration and Federal resources are made available. This system ensures that the State and Federal limited resources are used wisely and fairly, and the needs of disaster victims are met.

State emergency management offices often have various names and procedures for operating. Titles commonly used include Emergency Management, Civil Defense, Civil Preparedness, and Disaster Services. In this text, the term emergency management is used to refer to these State offices. The State is the pivotal point between policy guidance and resources available at the Federal level and the implementation of comprehensive emergency management programs at the local level.

Federal government responsibilities

At the Federal level of government, the Federal Emergency Management Agency (FEMA) is involved in mitigation, preparedness, response, and recovery activities. FEMA helps the States in several ways. FEMA provides the following programs:

- ▶ Training programs and research information on the latest mitigation measures;
- ▶ Review and coordination of State emergency plans;
- ▶ Financial assistance;
- ▶ Flood insurance to individuals and businesses in communities that join the National Flood Insurance Program (NFIP);

- ▶ Subsidies to State and local offices of emergency management for maintaining emergency management programs;
- ▶ Guidance and coordination for plans to warn and protect the nation in national security emergencies; and
- ▶ Coordination of services for disaster response and recovery activities.

In addition, FEMA may provide supplemental resources when communities and States do not have sufficient resources to protect or assist their citizens, restore essential services that can get the local economy going again, and meet disaster-related needs of individuals.

FEMA is your principal source of Federal assistance for education in disaster management. It provides a variety of training opportunities, including this course. Many of FEMA's courses are taught through your State emergency management agency. FEMA also provides classroom instruction and operates the National Emergency Training Center which offers higher level courses in emergency management.

#### Voluntary agencies and organizations

One of the most important voluntary organizations in terms of disasters is the American Red Cross. The American Red Cross is a humanitarian organization, chartered by Congress and led by volunteers, that provides relief to victims of disasters. Each local chapter is responsible for providing disaster relief services in the community it serves. In large-scale disasters, volunteers from across the country may respond. The American Red Cross provides individuals and families with food, shelter, first aid, clothing, bedding, medicines and other services.

Voluntary organizations like the Salvation Army, Catholic Charities, Mennonite Disaster Services, and other local church and civic organizations often help disaster victims by distributing food, medicine, and supplies, and by providing temporary shelter. Many voluntary organizations also conduct fund-raising drives to provide financial assistance to disaster victims.

The following table summarizes the responsibilities for emergency management at various levels.

## Emergency Management

The goal of emergency management is to provide protection from all hazards for the citizens, properties, and governments within the United States. Effective emergency management includes a functional approach to all emergencies, cooperative planning, appropriate use of resources, and shared responsibilities among the three levels of government.

- ▶ Personal disaster preparedness is the first and most effective intervention to reduce the impact of disasters.
- ▶ The local government is responsible for emergency planning response and continued assessment of its ability to protect citizens and property within the community.
- ▶ In some States, there are several layers between the local and the State level. You must become familiar with your State's structure.
- ▶ The State government is responsible for assisting the communities within the State by reviewing plans and providing guidance. The State government also makes plans and assesses its capability to provide protection from large-scale, statewide disasters.
- ▶ A State will assist communities within the State that do not have adequate resources to protect themselves or to recover from disaster.
- ▶ The Federal government is responsible for assisting the States by reviewing plans, providing guidance, making plans and assessing their capability to provide protection from large-scale, nationwide disasters. It supplements State assistance when State and local resources are insufficient to complete recovery. In the event of a response to a Federally declared disaster, FEMA acts primarily in a coordinating role.

### Scenario

To understand how emergency management is applied at the local level and how it relates to you as an individual, let's look at an imaginary community and some of its emergency management activities. We'll call the community Centerville. It is a medium-sized town of 20,000 people, located alongside a river.

## Centerville: The four phases in action

One of the major hazards that threatens Centerville is flooding. Centerville joined the National Flood Insurance Program (NFIP) by adopting a local ordinance to regulate building activities in the flood-prone areas. Because of this, any resident or property owner is eligible to purchase Federal flood insurance. The Centerville Town Council appointed an emergency manager to prepare plans that included a warning system, evacuation plans, and emergency response teams to help move people and their animals to safety from the low-lying areas of the community.

There are several farms with livestock in floodplains. The emergency manager distributed flood preparedness information, presented public and school programs on flood hazards and preparedness, and encouraged citizens and businesses in the community to buy flood insurance provided by the NFIP through property insurance companies and agents. The local government and the Red Cross pre-identified shelter sites and offered first aid and shelter operations courses to the public. Representatives from the local animal-care community also identified fencing, cage and feed suppliers in the area that were willing to help farmers and pet owners in the event of major flood. In cooperation with the National Weather Service and the State, Centerville installed a series of river gauges at certain points along the river to monitor water levels and provide an advance warning system.

One spring, a major flood struck Centerville. Warnings were issued, and response teams quickly followed emergency plans and procedures. Early in the incident, most owners moved with their pets to stay temporarily with friends and family in nearby towns. Farmers and horse owners also moved their animals to higher ground. One swine producer decided to send his finishing hogs to slaughter early. For those farmers that could not move their cattle to higher ground, the State Department of Transportation was called to help coordinate the evacuation of several hundred cattle from farms in areas that would be most severely flooded. At the same time, citizens in threatened areas were evacuated to Red Cross emergency shelters. The local humane shelter set up an emergency shelter for pets with cages supplied from a local pet supermarket and another shelter for horses at the county fairgrounds. Veterinarians and animal control personnel supervised the admission and health status of all animals. No lives were lost and only minor injuries occurred. However, damage to homes, businesses, and farmlands were extensive.



The amount of damage and economic loss was quickly estimated by local disaster assessment teams. These teams worked closely with the county extension educators, local veterinarians and the humane association, to assess damages to farms and other properties caring for animals. The Mayor contacted the State's office of emergency management and gave the damage report. The State contacted FEMA with the damage report, and requested a joint Federal, State, and local assessment. Based on the results of the joint assessment, the Governor requested a Presidential declaration of major disaster through FEMA. The President declared Centerville a major disaster area and authorized release of Federal disaster assistance funds.

FEMA, in coordination with the State and local governments, established a disaster assistance hotline and disaster recovery center in Centerville where its citizens and business owners applied for disaster relief funds. After applications were reviewed, disaster relief funds from the Federal government were distributed to disaster victims and local jurisdictions based on the funding available and the documentation provided.

In addition, those citizens of Centerville who had purchased a flood insurance policy contacted their insurance agents and had the damage assessed immediately. Flood insurance claims were paid quickly, and flood victims began to rebuild in ways that made their property less prone to damage in the next flood. In a few months, Centerville homes and businesses were safer than ever.

How were the citizens of Centerville protected?

Before a flood emergency . . .

- ▶ The local government knew that flooding was a hazard.
- ▶ Plans had been developed with representatives from the animal-care community to protect people, animals and property in the event of flood.
- ▶ A floodplain management ordinance was adopted and enforced.
- ▶ A warning system was established.
- ▶ Citizens were informed of the risk of floods and encouraged to buy flood insurance.

During a flood emergency . . .

- ▶ Warnings were issued, and livestock was moved early to prevent greater problems later.
- ▶ Everyone knew what to do, and understood the importance of early evacuation of pets and farm animals.
- ▶ The plans made earlier were put into action.
- ▶ People evacuated quickly.
- ▶ Shelters were prepared.
- ▶ Medical and health services were available.

After a flood emergency . . .

- ▶ Damage to property was quickly assessed by persons knowledgeable of the animal industry. After proper documentation, insurance claims were promptly paid.
- ▶ Governments (local, State, and Federal), disaster relief organizations (such as the Red Cross), humane shelters, local veterinarians and individual citizens, worked together to help Centerville recover.

## Some personal examples

So far we have discussed how emergency management applies to a community. The same principles also apply on a personal level. Each of us can prepare for, respond to, recover from and mitigate disasters that threaten our personal lives. Animal owners are actually required to think in those terms, because they are responsible for the safety and well-being of their animals. Let's illustrate the four phases of emergency management with two personal examples.

### The horse show that didn't happen

You are traveling with your horse to a show where it will likely be a winner and a tire on the trailer explodes. Your truck and trailer swerve into a ditch. Fortunately nobody in the truck is hurt and you are able to get the trailer out of the ditch, but your horse appears to have cut his poll (top of the neck) and is in considerable pain. Anticipating emergencies and break downs you recently installed a cellular phone in your truck. You call the highway patrol to help secure the area and request a local equine veterinarian to examine your horse.

The highway patrol arrives at the same time as the veterinarian. The area is secured and you and the veterinarian carefully back your horse

out of the trailer. The veterinarian determines that follow-up radiographs will show if the horse has any internal damage. For the moment the horse appears well enough to continue the journey having received anti-inflammatory analgesic therapy by the veterinarian.

You decide it is best to take your horse home, where it can recover from its shock in a familiar environment. Before you carry on you replace the flat tire with a spare and have the burst tire replaced in the next town. Once home, you call your regular veterinarian who takes radiographs of the injured area of your horse.

Fortunately, your horse did not sustain serious injuries. From then on, before each show and throughout the years you regularly check the wear and condition of all the tires on your truck and trailer. Your diligence pays off and your horse wins its next show.

When you respond to emergency situations or dangers in this manner, you are practicing emergency management.

Mitigation	You learned from your experience and applied your knowledge to improve on transport safety by regularly checking the condition of your equipment.
Preparedness	You prepared yourself by equipping your truck with a cellular phone that you used to contact highway patrol to help you secure the area, and ensure the safety of your horse and passing motorists.
Response	When the emergency occurred you reacted responsibly by calling a veterinarian to examine your horse and give a professional opinion on its health status. You also rested the horse by returning home and not entering the show.
Recovery	Once the immediate emergency was over you repaired the damage by replacing the tire and lost no time in ensuring that you had another spare in case of another incident. You also contacted your regular veterinarian to be sure that your horse had not sustained internal injuries and did not require treatment.

## The puppy that conquered firecrackers

You recently bought a dog, which is a great family pet, plays nicely with children and is friendly to visitors. It is late June and Fourth of July celebrations have begun. Random firecrackers are being set off. Your dog is crying, digging at the floor and tearing at the door as a result of the loud noises. His barking is disturbing the neighbors and you are concerned about his frantic behavior and the damage he is doing to your home. You realize that the problem is likely to intensify with the upcoming holiday.

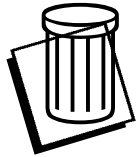
You phone your veterinarian who recommends that you bring your dog in for an examination. Upon examination you and your veterinarian agree that sedation may be the best temporary solution. Twenty minutes later the sedative is working and your dog is sleeping quietly at home. Your veterinarian also sends you home with medication to administer until the Fourth of July has passed, and suggests you keep your dog comfortably confined in a room with a radio playing.

You administer the medication as directed, and the remainder of the holiday passes uneventfully. Your pet again becomes a relaxed and playful member of the family. To give everyone a brighter outlook, the entire family goes for a walk to a neighborhood park.

Your veterinarian also identified steps you can take to desensitize your dog to loud noises in the future. You practice these steps and by the end of the summer your dog is no longer afraid of loud noises.

How do the phases of emergency management apply to this situation?

Mitigation	You learned how to desensitize your dog to prevent future problems.
Preparedness	Although you might not have been prepared the first time, you acted quickly to control your pet's behavior for the remainder of the holiday period, and for future events, by obtaining prescription sedatives.
Response	You immediately sought help from your veterinarian.
Recovery	You relieved stress in your pet and reinforced the bond with the family by going on a walk together.



## LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT THE FOUR PHASES OF EMERGENCY MANAGEMENT?

This activity is designed to assess your understanding of the information presented in this unit.

**Directions:** Answer the questions – use the Answer Key in Unit 10 to check your answers.

---

### True or False

1. Preparedness and response activities always occur at the same time.
2. Government officials are ultimately responsible for animals in disasters.
3. Response activities are actions taken to save lives and prevent future property damage in a disaster or emergency situation.
4. The State is the point between policy guidance and resources available at the Federal level and the implementation of comprehensive emergency management programs at the local level.
5. The Federal level is the most important at which to develop emergency management plans.
6. Response activities take place before an emergency occurs.

### Multiple Choice

7. These include actions taken to return to normal once an emergency occurs.
  - a. Mitigation
  - b. Response
  - c. Preparedness
  - d. Recovery
8. Following safety standards in selecting building materials is an example of this type of activity.
  - a. Mitigation
  - b. Response
  - c. Preparedness
  - d. Recovery
9. At the local level, the authority granted to the emergency manager is defined by:
  - a. Local laws or ordinances
  - b. The Governor
  - c. The director of the State emergency management office
  - d. The authority of the emergency manager is not defined

### Fill in the Blank

10. List various levels at which emergency management can take place.
-

## Summary

In this unit, you learned the definition of emergency management; the four phases of emergency management; the responsibilities of individuals and local, State, and Federal governments in regard to emergency management; and looked at some examples of emergency management in action.

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# Animals in Disasters

## MODULE A UNIT 4

## Meteorological Hazards: Applying the Four Phases

### Overview

This unit covers meteorological hazards including tornadoes, floods, thunderstorms and winter storms. It defines each of these hazards and provides practical information for applying the four phases of emergency management in relation to these hazards. It focuses on protecting animals during such emergencies.

### Objectives

Upon completion of this unit you should be able to:

- ▶ Define meteorological hazards that threaten the United States
- ▶ Protect yourself against meteorological hazards
- ▶ Protect animals against meteorological hazards
- ▶ Apply the four phases of emergency management to meteorological hazards

### Types of disasters

The most common disasters result from meteorological (weather-related) and geological events and can affect any area of the United States. Their impact can be localized or widespread, predictable or unpredictable. Damage can range from minimal to major. Depending on the severity of the incident, they can have a long-term impact on the infrastructure (roads, bridges, and utilities) of any location. Threats involving natural forces include thunderstorm, flood, tornado, hurricane, winter storm, drought, wildfire, landslide, earthquake, tsunami, volcano and dam failure. Technological (man-made) hazards include hazardous materials releases and spills, nuclear accidents and many consequences of natural disasters.

Natural hazards are usually more predictable than any other type of hazard. Although we cannot know exactly when or where they will



strike, or how severe they will be, we recognize from past experience which geographical areas are most vulnerable to certain types of natural hazards. This knowledge helps us better prepare for and respond to natural hazards.

As you read through the following information on natural hazards, remember that each type of hazard has unique characteristics, yet common elements. These characteristics allow you to prepare and protect yourself and your animals. In particular, you should learn about the disasters most likely to occur in your geographical area.

## Thunderstorms

Thunderstorms are a violent form of air convection. As warm air rises, storm clouds develop that can dump large amounts of rain or hail on localized areas. Violent lightning can strike the ground several miles away from its parent cloud. Thunderstorms can cause tornadoes and flash floods.

At least 100,000 thunderstorms occur annually across the United States. Their frequency and potential for violence makes them one of nature's greatest killers and destroyers. In an average year, lightning kills between 200 and 300 people. Lightning also kills grazing livestock and horses. Annual property loss resulting from thunderstorms, including damage to farms and barns, is estimated in the hundreds of millions of dollars. Lightning is also a major cause of wildfires.

The National Severe Storms Forecast Center in Kansas City, Missouri, issues severe thunderstorm watches. Local National Weather Service offices issue warnings and statements about severe weather and localized storms.

Severe thunderstorm watch	Conditions are right for: <ul style="list-style-type: none"><li>▶ Lightning or damaging winds greater than 58 mph,</li><li>▶ Hail that could reach a diameter of 0.75 inches, and</li><li>▶ Heavy rain.</li></ul> A thunderstorm watch indicates that you should take action to protect yourself and your animals.
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Severe thunderstorm warning	Severe thunderstorms have been sighted in your area.
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Animals, especially dogs, can often hear thunderstorms before humans and may show this by becoming anxious, hiding, and vocalizing. Horses will sometimes run frantically around their pasture.

## Mitigation

There are a number of specific measures you can adopt to mitigate the impact of thunderstorms. Here are a few examples:

- ▶ Install lightning suppression systems on all high-risk buildings, including those where animals are kept.
- ▶ Insure crops against storm damage loss through the Federal Crop Insurance Corporation of the U.S. Department of Agriculture.
- ▶ Because lightning strikes can cause fire; install appropriate sprinkler systems and smoke detectors.
- ▶ Support the adoption and enforcement of a floodplain management ordinance.
- ▶ Buy flood insurance through your local property insurance agent (thunderstorms often cause flooding).
- ▶ If you live in a manufactured (mobile) home, securely tie it to a solid foundation or anchors to keep the wind from shifting it or turning it over.
- ▶ Build fences around single trees in pastures where horses and livestock graze so they will not congregate under these trees in storms.

## Preparedness

There are several steps that you can take to keep yourself and your animals safe during thunderstorms. Some preparedness actions are listed below.

- ▶ If you plan to be outdoors or your animals are kept outside, check the latest weather forecast and keep an eye on the sky. When you observe signs of an impending storm, such as towering thunderheads, darkening skies, lightning, and increasing winds, listen to the National Oceanic and Atmospheric Administration (NOAA) weather forecast, or a local radio or television station for the latest information.

- ▶ Designate a safe area in or near your home to shelter your family and animals in a severe thunderstorm. Teach family members what to do in a storm if they are at home, outside, or in a car, including how to relocate animals to safe locations.
- ▶ Prepare a disaster supply kit that includes:
  - flashlights and extra batteries
  - a battery-powered radio
  - a carrier to confine smaller animals
  - enough drinking water for you and your animals
  - contact your local Red Cross for information on other essential supplies

If you have animals that get nervous and pose a safety risk in thunderstorms, contact your veterinarian for advice on how to mitigate this situation.

## Response

Here are some recommendations that you should consider when responding to a thunderstorm hazard:

- ▶ Evacuate from a manufactured (mobile) home with your animals during a severe thunderstorm.
- ▶ Get inside a storm shelter, home or large building. Avoid using the telephone except for emergencies, and stay away from windows.

If you are outside and do not have time to reach a safe building or an automobile, follow these rules:

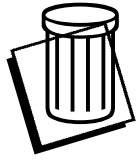
- ▶ Avoid standing under a natural lightning rod such as tall, isolated trees in an open area.
- ▶ Keep yourself and any animals away from open water, such as a lake, pond, or river.
- ▶ Keep yourself and any animals away from tractors and other metal farm equipment.
- ▶ Get off of and stay away from motorcycles, scooters, golf carts, and bicycles. Put down golf clubs.

- ▶ Keep yourself and any animals away from wire fences, clotheslines, metal pipes, rails, umbrellas and other metallic paths that could carry lightning to you from some distance away.
- ▶ Move yourself and any animals to a low place such as a ravine or valley but remain alert for flash floods.
- ▶ If you feel your hair stand on end (which shows that lightning is about to strike), stand on the tip of your toes and curl your body into a tight ball. Ideally you want to be as low as possible with as little contact with the ground as is possible. Do not lie flat.
- ▶ A person or animal struck by lightning will receive a severe electrical shock and may be burned. They will carry no electrical charge and can be handled safely. Give first aid and get emergency medical assistance immediately.
- ▶ Victims who appear only stunned or otherwise unhurt may also need appropriate medical attention. Check for burns in people especially fingers and toes next to buckles and jewelry. In animals check areas around collars and leashes.
- ▶ More than one storm may strike an area within a few hours. Once one storm subsides, be certain there are no more storms approaching before resuming normal activity.
- ▶ Provide fresh feed for animals, many will refuse to eat waterlogged feed and minerals.

## Recovery

Severe thunderstorms cause extensive power outages, agricultural damage, and may lead to flooding.

- ▶ Make sure that any animal enclosures are secure before placing animals in them.
- ▶ In pasture areas, remove any debris that might injure animals or that animals may accidentally eat.
- ▶ If your house or farm have sustained damage, have the damage assessed as required by your property insurance company.
- ▶ Clean up and repair damage as soon as authorized by your insurer.



## LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT THUNDERSTORMS?

This activity is designed to assess your understanding of the information presented in this unit.

**Directions:** Answer the questions – use the Answer Key in Unit 10 to check your answers.

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### True or False

1. In an average year lightning kills between 200 and 300 people in the United States.
2. Lightning is a significant cause of wildfires.
3. A severe thunderstorm watch indicates that thunderstorms have been sighted in your area.
4. Animals in pastures should be provided with sources of shade and shelter that are not prone to a lightning strike during thunderstorms.
5. It is not safe to stay in a manufactured (mobile) home during a severe thunderstorm.
6. People and animals are protected from lightning during thunderstorms by taking cover under a tall isolated tree in an open area.
7. A person or animal struck by lightning will receive a severe electrical shock; however, they will carry no electrical charge and can be safely handled.

### Multiple Choice

8. Thunderstorms are **NOT** associated with which one of the following events?
  - a. Tornadoes
  - b. Flash floods
  - c. Wildfires
  - d. Drought
9. A measure to mitigate the impact of thunderstorms includes which one of the following?
  - a. Check weather forecasts
  - b. Evacuate with your animals
  - c. Clean up and repair damage
  - d. Obtain appropriate insurance
10. When preparing for thunderstorms, which one of these items should be available for the care of animals?
  - a. Carriers for small animals
  - b. Important documents
  - c. Enough food for one week
  - d. Electric powered radio

## Floods

The transformation of a calm, slow-flowing river into a violent and destructive flood occurs hundreds of times each year. Floods are one of the most common natural disasters in the United States and no area is completely free from the threat of floods. In the average year:

- ▶ More than 300,000 people are driven from their homes by floods,
- ▶ 200 flood-related fatalities occur,
- ▶ \$2 billion in total flood damages are sustained, and
- ▶ Animals that are affected by floods risk death from hypothermia and drowning.

Floods are classified according to whether they are slow or fast rising. Slow-rising floods are typical as flood waters move down a river or stream and can often be predicted to reach a certain height. Flash floods are usually the result of extremely heavy rain or melting snow and occur suddenly. They can also result from a dam or levee failure.

If you live near a dam you should understand your community's dam failure warning signals. Warnings may be issued by sirens, horns, radio, television, or door-to-door canvassing by local emergency personnel. Federal agencies also conduct stream-flow monitoring to provide advanced warning of a flash flood.

The National Weather Service, local police, the sheriff, the highway patrol, the county flood control district office, or other local agencies issue flood watches and warnings.

Flash flood watch	Issued when flash flooding is possible within the designated watch area: be alert. Listen to your radio for flood forecasts and prepare for evacuation with your animals.
Flash flood warning	Issued when a flash flood has been reported or is imminent: take necessary precautions.
Flood warning	Issued as an advance notice that a flood is imminent or is in progress at a certain location or in a certain river basin. Take precautions as directed. Start to relocate large animals that are in danger.

## Mitigation

Proper land-use management and strict enforcement of building codes, with special attention to floodplains, has helped reduce some of the high cost of losses due to flooding. There are other actions that may mitigate the impact of floods.

- ▶ Determine if you are in the floodplain. You can obtain this information from your county government. The National Flood Insurance Program (NFIP) is a Federal program enabling property owners to purchase flood insurance. Ask your local property insurance agent about flood insurance.
- ▶ Before you build or buy a home below a dam, learn as much as you can about its safety record.
- ▶ Check local building codes and ordinances. Install check valves in building sewer traps to prevent floodwater from backing up in sewer drains. The cost of protecting your home or farm may be expensive, but the investment may save the lives of people and valued animals.
- ▶ Avoid building in a floodplain. If you graze livestock or horses in floodplains, be prepared to move them to higher ground before low-lying evacuation routes become flooded. Consult with your State natural resources department if you plan to alter landscape on your property in such a way that it may affect the flow of water in a flood.
- ▶ Many farms operate manure pits and lagoons that are susceptible to flooding. Consult with your State departments of environmental management or natural resources on how to prevent overflow of these waste treatment facilities into local streams, rivers, or even the drinking water supply.
- ▶ Construct buildings for the storage of farm chemicals such as fertilizer, herbicides, pesticides and fuels so that these have minimal chance of contaminating the environment. Spilled chemicals are a potential cause for liability suits after disasters.

## Preparedness

Preparing for floods includes actions such as stockpiling and replenishing emergency supplies, planning evacuation routes, and ensuring that equipment and vehicles are in proper working condition. Listed below are some guidelines to follow when preparing for a flood emergency.

- ▶ Stockpile and replenish emergency building materials such as sandbags, plastic sheeting, and lumber.

- ▶ Keep your car, truck, or other vehicles fueled. If electric power is disrupted, gas station pumps may be out of operation for several days.
- ▶ Check your horse or livestock trailers to make sure they are in useable condition.
- ▶ Make family and animal evacuation plans. If you are in a flash flood area, have several alternate routes to ensure rapid evacuation. If you have a large number of cattle or horses, anticipate the course flood waters might take. Start moving animals in advance of any danger. Even if the evacuation turns out to have been unnecessary, at least you have practiced for the time when it might be.
- ▶ Maintain a disaster supply kit that includes items such as a first aid kit, water, foods that require little or no cooking or refrigeration, a portable radio, emergency cooking equipment, flashlights, and batteries. Be sure to also maintain a supply of food for your animals.
- ▶ You should have a way to keep animals safely confined while they are evacuated and living in a temporary setting.
- ▶ Ensure that animals are properly identified – keep a collar and identification tag on pets at all times so that if they get lost during a flood, you have a better chance of getting them back. Ideally tags should also list an out-of-state contact.
- ▶ Store drinking water in jugs, bottles, and pans. Be sure to include enough water for the animals in your household.
- ▶ Maintain your animal's vaccinations against rabies and tetanus.

## Response

The immediate danger from flash floods is from the strength of the water current as it surges through an area, carrying debris and causing injuries and drowning. This is a particular concern for farms and livestock.

- ▶ Floods can interrupt power, disable fuel sources, and make roads impassable.
- ▶ People may be stranded in their homes and farms or be unable to reach their homes.
- ▶ Landslides may follow flooding.



Seconds may make the difference between life and death. If you hear a flash flood warning on the radio or television, or hear the roar of approaching waters, act immediately.

- ▶ Head for the nearest high ground without hesitation, bringing with you animals in danger.
- ▶ Even if you are not sure where to take your animals, do not leave them behind (unless it would compromise your safety).
- ▶ If you must leave an animal behind, ensure that it always has an easy escape route. Never tie an animal up if floods are pending. Many animals have died during floods when owners left them confined.

As flood waters rise, take these key precautions:

- ▶ Secure all outdoor items or store them inside on upper levels.
- ▶ Move all valuable household possessions to upper levels above rising water.
- ▶ Move cars, machinery, and all livestock to higher ground.
- ▶ Check emergency food and water supplies and move them to a high-and-dry place.
- ▶ Listen to radio announcements from emergency officials. If you are told to evacuate, do so immediately. Use only those routes recommended by local authorities. Any other route could be blocked or otherwise made impassable by flooding. At the earliest sign of danger, start moving your animals to a safe location.
- ▶ If there is time before evacuation, turn off all utilities at the main switch. Do not touch any electrical equipment unless it is in a dry area. Always wear well insulated rubber footwear and gloves.
- ▶ Do not attempt to drive over a flooded road; you can become stranded or trapped. If your car stalls while in flowing water, abandon it immediately, taking with you any animals (unless it would compromise your safety). Cars may only serve as traps in the face of a raging flood. If you are evacuating horses, do not ride them through swift moving, deep water.
- ▶ Do not attempt to cross flowing water that is above your knees.

## Recovery

Large-scale flooding can disrupt a community for a long time while utilities are restored, debris is cleared, and property is repaired.

Dangers include:

- ▶ Outbreak of disease,
- ▶ Widespread animal death,
- ▶ Broken sewage lines and widespread water supply pollution,
- ▶ Broken gas lines, downed power lines, and fires.

Keep animals away from any of these dangers. Agricultural and grazing lands can be ruined and crops destroyed by flooding, decreasing the food supply for people and livestock. Fungal contamination of animal feed can be toxic to animals and humans who consume the meat or milk of cattle that ingest these fungal toxins.

During the recovery process, safety precautions may prevent further damage. Listed below are some precautions that will help you as you recover from a flood.

- ▶ Do not use food that has come in contact with flood waters. This includes any feed for animals. If there is a boil water order in effect, continue to take this precaution until officials tell you the tap water is safe to drink. Do not give animals tap water until it has been boiled or determined safe. Wells should be flushed out and the water tested before drinking.
- ▶ Before entering a building or barn, check for structural damage. Also, look for any poisonous snakes or wildlife that may have gotten trapped inside buildings or barns.
- ▶ When entering a building, open the building and let it air out for several minutes to remove foul odors or escaped gas before entering. Do not use a match or lantern as a source of light because of the possibility of gas buildup. A battery-powered flashlight is recommended.
- ▶ Once inside a building, check for electrical shorts and live wires. Make sure the power is turned off and do not use any electricity until an electrician has checked your system. Report broken utility lines to appropriate authorities.
- ▶ Open all doors and windows to help dry the building. Shovel out mud while it is still moist to give walls and floors an opportunity to dry. If horses or livestock have to stand in mud for extended periods, they can develop foot problems.

- ▶ In a barn, empty any water containers that contain flood water, and be sure to clean them with dilute chlorine bleach or some other type of disinfectant before they are used again. Any feed or bedding that has gotten wet or damp must be disposed of so that animals cannot eat it. Moldy food can lead to serious disease in horses and livestock.
- ▶ Before horses or livestock are returned to property that has flooded, be sure that all perimeter fences are intact and any debris has been removed.

The release of hazardous materials during floods may also become a problem. This can lead to poisonings in animals that ingest or come into contact with the hazardous materials and exposure to humans that handle contaminated animals. Ingestion of and skin contact with hazardous materials by farm animals could also cause the hazardous materials to enter the human food chain. Consult with your veterinarian, department of agriculture, county extension educator or State chemist to determine the safety of the feed for animals and products for human consumption.



## LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT FLOODS?

This activity is designed to assess your understanding of the information presented in this unit.

**Directions:** Answer the questions – use the Answer Key in Unit 10 to check your answers.

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### True or False

1. Fungal contamination of animal feed will not harm animals or humans.
2. Floods can be classified according to whether they are slow or fast rising.
3. After a flood, empty all containers that contain contaminated water and clean them with dilute chlorine bleach.
4. Hazardous material releases can occur during flooding.
5. Keeping animals confined during a flood is essential.
6. Following a flood, check the perimeter fences of pastures to ensure they are intact and that all debris is removed before allowing animals to graze.
7. If your car stalls while in flowing water, wait a few minutes and attempt to restart the ignition.

### Multiple Choice

8. Which notification is issued when flash flooding is possible within a designated watch area.
 

a. Flood watch	c. Flash flood watch
b. Flood warning	d. Flash flood warning
9. Good flood preparedness includes which one of the following?
  - a. Before entering a building or barn, check for structural damage
  - b. Replenish emergency building materials such as sandbags, plywood and lumber in the spring
  - c. Wear insulated rubber gloves and footwear
  - d. Install check valves in building sewer traps
10. When returning to a building that has been flooded, take which one of the following actions?
  - a. Allow animals to eat food that has gotten wet
  - b. Use a match or lantern as a source of light
  - c. Allow animals such as horses to return immediately
  - d. Allow the building to air out before entering

## Tornadoes

Tornadoes are violently rotating columns of air that descend in a funnel shape from thunderstorm cloud systems. Tornadoes can occur anywhere at any time.

The National Severe Storms Forecast Center in Kansas City, Missouri, issues tornado watches. Local National Weather Service offices issue tornado warnings.

Tornado watch	Conditions are right for a tornado to develop and that the sky should be watched.
Tornado warning	A tornado has been sighted or is spotted on radar. Warnings will give the location of the tornado and the area immediately affected by the warning.

## Mitigation

Tornado warning networks save many lives each year. Each community in high and moderate risk tornado areas should have a group of volunteer spotters who watch the sky during threatening weather and report signs of a tornado to local emergency management officials, the regional office of the National Weather Service, and local farmers.

The following is a list of other mitigation activities.

- ▶ Follow relevant building code practices such as the use of wind-resistant design.
- ▶ Build tornado shelters for manufactured (mobile) home parks and implement policies that provide sheltering for pets when there is a pending tornado or other disaster.
- ▶ Replace windows in barns with materials that will not shatter and cut animals or people when broken. Store or secure any loose materials including strapping and label hazardous material tanks such as heating, oil, or propane.

## Preparedness

Tornadoes develop during severe thunderstorms and hurricanes. While not all thunderstorms and hurricanes create tornadoes, the potential is there. During violent weather, stay tuned to a local television or radio station for tornado reports.

The best preparation for a tornado is to designate a tornado shelter for yourself and your animals. Tornado shelters are safest if they are underground – a storm cellar or basement away from windows offers the best protection.

If a storm shelter or basement is not available, follow these guidelines when preparing for a tornado hazard.

- ▶ Plan to find shelter under heavy furniture or mattresses near an inside wall of your house on the ground floor. Provide animals in your household with a safe area and keep them confined.
- ▶ Keep collars and identification tags on all your pets, at all times. When you evacuate take current pictures of the animals in your household, their most recent vaccination and health records, and any bills of sale for them with you.
- ▶ Conduct tornado drills with your family.
- ▶ Know the location of the designated shelter where you work or go to school. If you frequently travel with your dog in the car, keep a leash in the vehicle at all times in case you have to vacate the car during a tornado.
- ▶ If you are boarding an animal or using a pet-sitting service ask about their disaster plans and make sure they are familiar with your disaster plan while the animals are in their care.
- ▶ Plan to evacuate your manufactured (mobile) home taking your pets with you. Even if you are not sure where to take them, do not leave them behind.
- ▶ If a watch is issued, turn horses and other livestock out to an open pasture to avoid injuries from building collapse. Try to turn animals out into areas where they will not be harmed by flying debris. Ideally this will be a low-lying area where animals can choose to lie down and protect themselves.

## Response

The destructive path of a tornado averages about 250 yards in width and 15 miles in length. However, in extreme conditions, a tornado may travel more than 300 miles and leave a path of total destruction more than a mile wide. Tornadoes will travel up to 60 mph with wind speeds approaching 400 mph within the tornado's center. When nearby, a tornado has a sound comparable to the combined roars of several jet engines. The immediate threat from tornadoes is danger to life and damage to property from violently whirling winds and debris hurled through the air.

Take the following actions when responding to tornadoes.

- ▶ If you have a storm cellar or shelter, go to it immediately with your family and animals. If no shelter is available, go to your basement and get under a heavy workbench or stairs.
- ▶ If your home has no basement, stay in the center of the house away from the windows or in a small room on the ground floor that is away from outside walls. Take cover under solid furniture or mattresses. Protect your head.
- ▶ In manufactured (mobile) homes or vehicles, leave and take shelter in a substantial structure, taking your animals with you. If there is no nearby shelter, lie flat in the nearest ditch or ravine with your hands shielding your head.
- ▶ Do not drive. If you are driving and spot a tornado, get out of your car and go into a nearby building or ditch taking your animals with you. Protect your head and stay low to the ground.
- ▶ After a tornado passes, stay tuned to the local radio or television station to get an all-clear signal before leaving your shelter. Sometimes more than one tornado will develop during a violent storm.

## Recovery

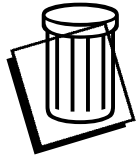
Tornadoes are part of a severe thunderstorm and may bring with them the dangers of lightning, high winds, floods, and flash floods from extremely heavy rainfall. Other risks include:

- ▶ The possibility of building collapse,
- ▶ Fallen trees and downed power lines,
- ▶ Broken gas lines,
- ▶ Broken sewer or water mains,
- ▶ Hazardous materials releases, and
- ▶ Fires.

Be alert to additional hazards and take the following precautions.

- ▶ Consult with your veterinarian if you are concerned about the health of your animal, or with the agriculture department, county extension educator or State chemist if you are concerned about contamination of your livestock or your animals' feed.
- ▶ Re-enter buildings with extreme caution.
- ▶ Be alert to fire hazards such as broken electrical wires or damaged electrical equipment, gas or oil leaks, other hazardous materials or smoldering piles of wet hay or feed. Report downed utility lines or other hazards to appropriate authorities.
- ▶ Do not use food that may have been contaminated. This includes any food for animals. If there is a boil water order in effect, continue to take this precaution until officials tell you the tap water is safe to drink. Do not give tap water to pets until it has been boiled or otherwise determined safe.
- ▶ Keep animals safely confined until the area has been cleared of debris.





## LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT TORNADOES?

This activity is designed to assess your understanding of the information presented in this unit.

**Directions:** Answer the questions – use the Answer Key in Unit 10 to check your answers.

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### True or False

1. Thunderstorms and tornadoes have the potential to create hurricanes.
2. Tornado shelters are safest if they are underground.
3. It is usually safe to leave your pet in a mobile home during a tornado.
4. During a tornado, turning horses and livestock out will help prevent them from being injured by a building collapse, but may put them at risk from flying debris.
5. If there is no indoor shelter during a tornado, lie flat in a ditch or depression shielding your head.
6. Tornadoes usually travel at up to 60 mph with winds approaching 400 mph.
7. Tornadoes are part of a severe thunderstorm and may occur along with lightning, high winds, floods and extremely heavy rainfall.
8. Furniture and mattresses may offer some protection against injury caused by a tornado.

### Multiple Choice

9. A mitigation activity that will reduce the effects of tornadoes includes which one of the following?
  - a. Evacuate with your pets
  - b. Do not drive if a tornado warning has been issued
  - c. Wait for an all-clear signal before leaving your shelter
  - d. Create a volunteer tornado spotting network
10. Which of the following is **NOT** a risk following a tornado?
  - a. Hazardous materials
  - b. Flying debris
  - c. Fires
  - d. Broken gas lines

# Hurricanes

Hurricanes usually strike coastal areas, but may also affect inland regions. They begin as tropical depressions (low-pressure center), progress to become tropical storms and finally hurricanes.

Hurricanes	Storms that develop in the northern hemisphere and have winds with constant speeds of at least 74 mph. These winds blow in a counterclockwise spiral around a relatively calm center known as the eye of the hurricane. Around the rim of the eye, winds may gust to more than 200 mph. The entire storm dominates the ocean surface and the lower atmosphere over tens of thousands of square miles. In the western Pacific, hurricanes are called typhoons. South of the equator and in the Indian Ocean, they are called cyclones.
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Hurricanes are very destructive. The worst recorded event in the United States happened in Galveston, Texas, in 1900, when approximately 6,000 lives were lost. The greatest economic damage resulted from Hurricane Andrew in 1992, with an estimated loss in excess of \$20 billion.

Hurricanes can move inland and cause extensive flooding. For example, in 1955 Hurricane Diana brought floods to Pennsylvania, New York, and New England that killed 200 people and caused an estimated \$700 million in damage. In 1972, Hurricane Agnes and another storm system caused more than a foot of rain in less than 12 hours, resulting in severe flooding from Virginia to New England. That hurricane killed 117 people and caused \$4.7 billion in damage.

One of the greatest dangers associated with hurricanes is a storm surge.

Storm surge	A dome of water that may cause flooding up to 20 feet above normal sea level along major stretches of coastline where the eye of the hurricane makes landfall. This surge of water is topped by battering waves and incredibly strong winds. Nine out of 10 hurricane-related fatalities are caused by the storm surge.
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On the average, six Atlantic hurricanes occur each year. Most occur in August, September, and October, but the six-month period from June 1 to November 30 is considered the Atlantic hurricane season. Not all of these violent storms strike land. The National Hurricane Center in Miami monitors weather data and issues forecasts for hurricanes in the Atlantic Ocean, Caribbean Sea, Gulf of Mexico, and the eastern Pacific Ocean. Your local National Weather Service office and local and State officials may disseminate hurricane information.

Hurricane advisory	Tells where the storm is located, the intensity of wind speeds, and the direction of movement.
Hurricane watch	Issued for a coastal area when there is a threat of hurricane conditions within 24 to 36 hours. In vulnerable areas, actions for protection of life and property should begin at this point. This includes starting to evacuate large animals, such as horses and cattle, or large populations of dogs and cats, i.e., an animal shelter, boarding, or breeding kennel. Zoos should also start to move or secure their animal population. If you have cats put them in transport cages. Cats often sense an approaching storm and search for a hiding spot. However, do not depend on behavior changes to indicate the severity of storms.
Hurricane warning	Issued when hurricane conditions are expected in a specified coastal area in 24 hours or less. Hurricane conditions include winds of 74 mph (64 knots) and dangerously high tides and waves. Final actions for protection of life and property should be completed as quickly as possible before high winds and heavy rains arrive.

## Mitigation

Communities in areas that may be threatened by hurricanes should develop action plans that specify what areas would need to be evacuated and by what routes, what shelters would be used, and how local emergency services units would respond. Special attention should be given to evacuation routes for trucks and trailers that would carry livestock or horses.

The following are some actions that you can take to help mitigate hurricane hazards.

- ▶ Retrofit your home to withstand wind and flooding. Coastal homes in flood hazard areas should be elevated. All windows should be shuttered and structural connectors reinforced. Check for hurricane strapping. Strengthen masonry that is not reinforced. Consult *FEMA's Coastal Construction Manual* (FEMA-55) for guidance.
- ▶ Support the adoption and enforcement of floodplain management requirements.
- ▶ In some cases the best mitigation may be not to build at all. Protecting wildlife in areas such as dunes, wetlands, reefs and barrier islands should also be a consideration.
- ▶ In addition to your property insurance, buy a flood insurance policy. Renters also can buy a flood policy for personal property.
- ▶ Determine sheltering options for you and your animals – consider the following in your area and within a 100 mile radius:
  - motels/hotels that allow pets,
  - boarding kennels,
  - veterinary offices with boarding facilities,
  - grooming shops,
  - dog or horse race tracks, and
  - approved areas at fairgrounds or parks.

In addition, individuals should be encouraged to set up buddy systems with friends or relatives that live outside their area, where an animal can be safely evacuated.

- ▶ Learn about warnings, dangers, and how to protect property, family, animals, and yourself in hurricanes. Before hurricane season, recheck your window shutters and supply of boards, tools, batteries, nonperishable foods, bottled water, and other equipment.
- ▶ If you have a horse that is not accustomed to being transported in a trailer, practice leading and loading under a variety of circumstances, such as rain, extreme heat, at night, and when you are tired. Plan a flood-free evacuation route if your area is vulnerable to flooding or if you live in a manufactured (mobile) home.

- ▶ Make a household inventory with pictures or a video, and keep it with your insurance policies in a safe place such as a safety deposit box. Don't forget to inventory items in your barn used to maintain and care for animals.

## Preparedness

Plans should include animal evacuation locations. Once the plan is in place, the community should conduct exercises (simulations of emergency situations). Include animal concerns in emergency preparedness drills.

Special thought should be given to senior citizens and others that have close bonds with their animals. People who cannot evacuate with their animals may refuse to evacuate. This puts their lives at risk and jeopardizes rescue workers.

Use the following list to check your animal disaster supplies.

- ▶ If your pet is on prescription medication keep an extra copy of this prescription in your pet's disaster kit. Remember that prescriptions have expiration dates – keep the prescription updated.
- ▶ Make sure that your animal's vaccination records are current.
- ▶ Keep a collar and an identification tag that includes your out-of-state contact phone number on your dogs and cats at all times.
- ▶ Take updated pictures of all your animals and put them with your important insurance papers, in case an animal should get separated from you during a disaster. Send a copy of important papers, including current photos, to your out-of-state contact. Also include any bill of sales or registrations for animals you own.
- ▶ If you do not have a horse trailer or the proper vehicle to transport other large animals, try to locate someone who would be willing to loan you what you need to evacuate your animals. You should also consider who would evacuate your animals if you were not in a position to do so.

When your area receives a hurricane watch notification, keep calm; plan your time before the storm arrives and avoid a last-minute rush that might leave you marooned or unprepared. Take the following precautions:

- ▶ Listen for weather updates.
- ▶ Board up your windows or protect them with shutters or tape.
- ▶ Secure outdoor objects such as tools, porch furniture, garbage cans, and bicycles that could become deadly projectiles in hurricane winds. Store them inside if possible.
- ▶ Store drinking water in clean bathtubs, bottles, pans and containers suitable for livestock. Remember to include enough for your animals.
- ▶ Ensure batteries are fresh and in sufficient quantity.
- ▶ Keep your car's gas tank filled. Service stations may be closed for several days after a hurricane due to power outages and flooding.

Manufactured (mobile) homes are extremely susceptible to high winds and most should be evacuated for more substantial shelter. Do not leave any animals in these types of homes.

Follow these basic guidelines at all times:

- ▶ Evacuate low-lying areas when ordered to do so by officials.
- ▶ Turn off utilities at the main switch, if time permits.
- ▶ Do not leave animals behind, even if you are not sure where to take them.

## Response

The storm surge can destroy property along a coastline and is a major threat to life. Dangers associated with a hurricane emergency also include high winds that can demolish houses, uproot trees, and fill the air with debris. Tornadoes may develop as a hurricane passes.

- ▶ Stay at home only if it is safe. If you are advised to evacuate before the hurricane, follow directions. Do not attempt to evacuate during a hurricane – stay indoors in windowless rooms or hallways. Keep your small animals in carriers or confined areas.
- ▶ If the storm center passes directly overhead, the wind will calm. Don't think the hurricane has passed while the eye is

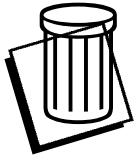
over your area. When winds begin again, they quickly grow to hurricane force and come from the opposite direction.

- ▶ Severe flooding may follow hurricanes as they move inland. Stay away from river banks and streams. Monitor National Weather Service advisories on flood stages.

## Recovery

Long-term hazards include interrupted gas, water, and electric power, fires and explosions from gas leaks, fallen power lines, electrical short circuits, and contaminated food and water. The following actions should be taken when recovering from a hurricane.

- ▶ Dispose of perishable, contaminated, or water-soaked foods, including any water or food for animals. This will also ensure that stray or wild animals cannot eat it.
- ▶ If there is a boil water order in effect, do not drink or give animals tap water unless you know it is safe. Official notices will be given about the safety of the water supply.
- ▶ Avoid loose or dangling wires, and report them to the power company. Inspect areas where animals are kept for loose wires.
- ▶ Report broken sewer or water mains to the water department.
- ▶ Check for gas leaks. Do not strike a match or relight appliances until they have been inspected.
- ▶ Open windows and doors to let the air circulate. This will help remove foul odors and protect you from collected gas. It also will help dry out the house.
- ▶ Pump out the basement if it is flooded, but do it gradually. Drain one third of the flood waters each day to minimize further structural damage. Shovel out the mud while it is still moist, and dry rugs and carpets thoroughly. It is especially important to remove mud from barns as horses and livestock will develop foot problems if they stand in mud for too long.
- ▶ Make any temporary repairs necessary to prevent further losses, including repair to fencing needed to keep animals confined. Ensure that substantially damaged structures are elevated above the base flood elevation or relocated when reconstructed.



## LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT HURRICANES?

This activity is designed to assess your understanding of the information presented in this unit.

**Directions:** Answer the questions – use the Answer Key in Unit 10 to check your answers.

---

### True or False

1. Severe flooding may accompany a hurricane.
2. Your animal's vaccinations should be current before the hurricane season starts.
3. You should attempt to evacuate when a hurricane makes landfall.
4. Hurricane winds are the most violent in the center (eye) of the storm.
5. Your out-of-state contact should have a copy of important papers, including current photos.
6. Hurricanes are confined to inland areas where they cause extensive damage.

### Multiple Choice

7. Which of the following regions is most likely to be hit by a hurricane?
  - a. Southwestern States such as Arizona and New Mexico
  - b. Great Plains States such as Oklahoma and Kansas
  - c. The Great Lake region including Michigan and Ohio
  - d. Coastal areas from Texas to Maine
8. This information is issued for an area when there is a threat of hurricane conditions within 24 to 36 hours.
 

a. Storm surge	c. Hurricane watch
b. Hurricane advisory	d. Hurricane warning
9. This information is issued when hurricane conditions are expected in 24 hours or less.
 

a. Storm surge	c. Hurricane watch
b. Hurricane advisory	d. Hurricane warning
10. This information tells where the storm is located, the intensity of wind speeds, and the direction of movement.
 

a. Storm surge	c. Hurricane watch
b. Hurricane advisory	d. Hurricane warning



## Winter Storms

Winter storms vary in size and strength. A storm may be large enough to affect many States or only a portion of a single State. There are three categories of winter storms. These are defined in the following table.

Blizzard	The most dangerous of all winter storms. It combines low temperatures, heavy snowfall, and high winds that blow the snow into drifts and reduce visibility to only a few yards.
Heavy snowstorm	Drops four or more inches of snow in a 12-hour period or six or more inches in a 24-hour period. High winds may blow snow into drifts and cause poor visibility.
Ice storm	Occurs when moisture falls from clouds and freezes immediately upon impact. Ice storms make driving and even walking extremely hazardous.

In addition, the National Weather Service issues watches and warnings for hazardous winter weather. The terms used are defined to follow.

Winter storm watch	Severe winter weather may affect your area.
Winter storm warning	Severe winter weather conditions are expected.
Ice storm warning	Significant, possibly damaging, ice accumulation is expected.
Heavy snow warning	A snowfall of at least four inches in 12 hours or six inches in 24 hours is expected
Blizzard warning	Large amounts of falling or blowing snow and winds of at least 35 mph are expected for several hours.
Severe blizzard warning	Considerable falling or blowing snow, winds at least 45 mph, and temperatures of 10 F or lower are expected for several hours.
High wind warning	Winds of at least 40 mph are expected to last at least one hour.
Traveler's advisory	Ice and snow are expected to hinder travel but the anticipated weather conditions are not serious enough to require warnings.

Heavy snowfall and blizzards can trap people and animals in their cars or inside buildings. These conditions can cause the loss of livestock.

Ice storms can break power lines causing widespread blackouts. This can be a serious problem for dairy farmers, making it difficult for them to milk their cows. Intensive farm industries, such as swine and poultry farms, may suffer during these storms if their heating systems fail or fuel cannot be delivered for power generators. Frozen water troughs and snow-covered feed bunkers and pasture predispose animals to malnutrition and dehydration.

Fires during winter storms present a great danger because water supplies may freeze and fire-fighting equipment may not be able to get to the fire. Large amounts of snow can also lead to localized flooding when warmer temperatures melt the snow in a short period of time.

## Mitigation

The following is a list of actions that can be taken to mitigate the possible effects of winter storms.

- ▶ Purchase a flood insurance policy to cover possible flood damage that may occur during the spring thaw.
- ▶ Store adequate amounts of fuel and extra feed before the severe winter weather starts.
- ▶ Construct barns to withstand typical snow accumulations in your area.

## Preparedness

Preparedness actions before winter storms include following weather conditions, insulating the areas where your pets are kept, and ensuring that family members know how to use emergency lighting and heating equipment. Use the following guidelines for further preparation.

- ▶ Use your radio, television, and newspapers to keep informed of current weather conditions in your area.
- ▶ Be prepared for isolation at home, particularly if you live in a rural area. It is highly possible that a severe winter storm could isolate you for one or two weeks.
- ▶ If possible, insulate any buildings used to house animals. Dog houses should be built to withstand extreme cold – putting straw inside will provide added protection. Under extreme conditions, animals should be housed inside. Avoid leaving animals to rest on hard surfaces (e.g., in garages).

- ▶ Have fuel and a safe type of emergency heating equipment available in case of power failures that would shut down standard furnaces – a camp stove with fuel or a supply of wood or coal for your fireplace could be used. Be prepared to keep at least one room of your house warm enough to live in for at least a week or two.
- ▶ Be sure that all family members know how to use your emergency heating and lighting equipment. Proper ventilation in homes and barns is essential. Never use fuel in equipment that was not designed for that fuel. Burning charcoal indoors will give off deadly carbon monoxide. If you are trying to heat a barn, use something with a safely contained heating element. Do not place it near hay or any other combustible materials or leave a heater unattended in the presence of animals. Keep fire extinguishers nearby.
- ▶ Stock an emergency supply of food and water for yourself and your animals. Keep foods that do not require cooking or other preparation. If you or your animals are on continual medications, be sure to always have at least a two-week supply on hand.
- ▶ Should a power failure occur, have a battery-powered radio and extra batteries on hand. Have flashlights ready for use. A generator may be necessary to prevent the loss of life in livestock production facilities.
- ▶ Keep simple tools and other equipment to fight a small fire easily accessible. The chance of fire may increase when wiring and ventilation is inadequate. Winter storms may interrupt fire department services.
- ▶ Only keep animals outdoors that have had sufficient time to acclimatize to the cold weather. Provide extra feed and wind breaks for any animals kept outdoors. See the tables at the end of this section.
- ▶ Keep your car winterized with antifreeze, but use it in a safe manner. Carry a winter care kit that includes food and water, a windshield scraper, a flashlight with extra batteries, a tow chain or rope, a shovel, tire chains, a blanket, a bag of sand, a fluorescent distress flag, and an emergency flare. If you have to travel, keep a supply of high-energy foods, candles and matches with you. Keep extra mittens, hats, boots, socks and outerwear in the car. If you routinely take your dog in the car, be sure to

keep a leash in the car. Put extra blankets in the car to keep the dog warm.

## Response

Do not be fooled if a winter storm seems mild as it begins. Some storms may take several hours to move into an area and may last for several days. When responding to a winter storm, keep the following guidelines in mind.

- ▶ Cold weather itself, without any physical exertion, puts an extra strain on your heart. If strenuous physical activity such as shoveling snow, pushing a car, or even walking fast or far through deep snow is added to your body's overworked system, you risk serious or fatal results.
- ▶ Avoid all unnecessary trips. If you are at home when a winter storm strikes, plan to stay there. Keep all domestic animals inside if possible. If they must be outdoors, be sure to provide them with proper sheltering to keep them warm and dry.
- ▶ If you must be outdoors, wear several layers of loose-fitting, lightweight, protective clothing rather than a single layer of thick clothing. Mittens are warmer than gloves. Hoods should be worn to protect your head and face. Cover your mouth to protect your lungs from the extremely cold air.
- ▶ If you are traveling and your car breaks down or if you become lost, decide what is the safest and best thing to do and do it slowly and carefully. If you are stuck on a well-traveled road, display a trouble signal. Turn on your flashing hazard lights, raise the hood of your car, or hang a bright cloth from the antenna or car window. Stay in your car and wait for help. Do not leave your car to search for assistance unless you are absolutely certain you can find help within 100 yards of your car. It is very easy to become disoriented and lost during a severe storm. If you have animals in the car, leave them in the car while you go to get help.
- ▶ While in your car awaiting assistance, take the following precautions:
  - If you run your engine to keep warm, remember to keep snow away from the exhaust pipe. Keep a window open slightly to provide proper ventilation and protection from carbon monoxide poisoning.

- Do not let everyone in the car sleep at the same time.
- At night, turn on the inside dome light so work and rescue crews can spot you.

## Recovery

If the storm lasts more than one or two days, there is an increased possibility of utility failures and interruption of services. This can lead to extreme hardship and even death from extended exposure to cold temperatures. Animals that live outside require additional feed and owners must make sure that the animals have water available. Although some livestock and horses will eat snow and ice in the winter as a source of water, this varies among animals and cannot be relied upon for all animals.

Use the following list of suggestions as you recover from a winter storm.

- ▶ After the storm, check on your neighbors and their animals. Be sure they have proper heating and sufficient supplies to get them through the emergency.
- ▶ Check roofs of your house and barns for damage from heavy snow. Remove the snow to prevent the roof from collapsing.
- ▶ Avoid overexertion while clearing snow by working slowly and taking frequent breaks, particularly if you become dizzy or tired.
- ▶ Check and replenish emergency provisions.

Hair coat	Feed level	Lower critical temperature (° F)
summer coat or wet	maintenance	60
fall coat	maintenance	45
winter coat	maintenance	32
heavy winter coat	maintenance	19

Adapted from Brownson R, Ames D. Winter Stress in Beef Cattle. Alberta Beef Herd Management. Alberta Agriculture, Calgary, Canada.

Feed requirements for livestock kept under various temperature ranges

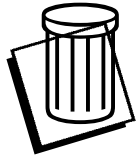
Deviation in °F below critical temperature	Energy increase to be metabolized		
	1,000 lb. pregnant cow	770 lb. yearling	550 lb. cows gaining 1.5 lb. per day
0	0.0	0.0	0.0
5	0.9	1.0	0.9
10	2.0	1.9	1.7
15	3.2	2.8	2.5
20	3.6	3.7	3.3
25	4.5	4.6	4.2
30	5.4	5.5	5.0
35	6.4	Above intake capacity	Above intake capacity
40	7.3	Above intake capacity	Above intake capacity

Adapted from Brownson R, Ames D. Winter Stress in Beef Cattle. Alberta Beef Herd Management. Alberta Agriculture, Calgary, Canada.

Recommendations for wind break requirements for livestock under winter conditions

- ▲ Wind has the most serious effects on livestock performance. Cold by itself has little influence on feed performance, particularly for animals on full feed.
- ▲ Wind and snow must always be considered as a joint problem.
- ▲ Simple shelters, sheds and wind break fences are essential.
- ▲ Porous fences of 80 percent density offer the best wind protection for about 75 to 100 ft downwind.
- ▲ Solid fences provide the best snow barrier, because 90 percent of drifting snow moves within one foot of the ground.
- ▲ Buildings should be separated by at least 30 to 50 feet to prevent snowdrifts developing between them.

Adapted from Publication 1461. Snow and wind control for farmstead and feedlot. Agriculture Canada. Calgary, Canada, 1978.



## LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT WINTER STORMS?

This activity is designed to assess your understanding of the information presented in this unit.

**Directions:** Answer the questions – use the Answer Key in Unit 10 to check your answers.

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### True or False

1. A single layer of thick clothing offers the greatest protection if you must be outdoors during a winter storm.
2. Winter storms may start deceptively mild, and escalate into severe weather within a few hours.
3. Snow may be used as a supplement to fresh water for some animals.
4. Burning charcoal in a fireplace is a good method for keeping warm during winter storms.
5. Access to farms may be compromised for many weeks in winter storms.
6. Cold weather itself does not put extra strain on a person's heart; therefore adding strenuous physical activity during these times is not a problem.
7. Nutritional requirements for livestock remain the same during cold weather.

### Multiple Choice

8. Which of the following describes moisture falling from clouds and immediately freezing upon impact?
  - a. Blizzard
  - b. Heavy snowstorm
  - c. Ice storm
  - d. Winter storm
9. Which type of information is issued when severe winter weather conditions are expected.
  - a. Winter storm watch
  - b. Winter storm warning
  - c. Heavy snow warning
  - d. Blizzard warning
10. Which type of information is issued when large amounts of falling or blowing snow and winds of 35 mph are expected for several hours?
  - a. Winter storm watch
  - b. Winter storm warning
  - c. Heavy snow warning
  - d. Blizzard warning

## Drought and Extreme Heat

A drought occurs when there is no substantial rainfall for a long period of time. Since different areas of the country receive widely differing amounts of rainfall, the amount of time it takes for drought conditions to develop varies.

Extreme heat is defined as temperatures 10 degrees or more above the average high temperature, lasting for several weeks. Throughout the country, extreme heat conditions vary. When drought and extreme heat occur at the same time, the conditions can be very dangerous.

Local community officials will alert you through your local newspaper, radio station, or television station when drought and extreme heat conditions exist in your area. Although extreme heat conditions are easily recognized, drought conditions often develop slowly and can only be tracked through local weather advisories.

## Mitigation

The following guidelines will help you mitigate the effects of a drought or extreme heat hazard.

- ▶ Practice personal water conservation measures to avoid depletion of water supplies both before and during periods of extended drought. If you are a farmer, consider establishing alternative sources and supplies of water for your crops and your animals.
- ▶ Conserve electricity. During periods of heat and drought, people use a lot of power for air conditioning. Excessive drain on the community's energy supply could lead to another emergency, such as a power shortage or outage. Insulating your home will reduce the demand for air conditioning. Keeping the thermostat set to 78 F will also reduce energy use.
- ▶ For large animals, consider creating artificial shade and installing humidifiers to keep animals cool.



## Preparedness

All family members should learn to recognize heat impairment symptoms and administer appropriate first aid for animals. Causes of heat stroke or hyperthermia in pets are:

- ▶ Being left in parked cars (the most common reason),
- ▶ Lack of appropriate shelter for an animal outdoors,
- ▶ Animals not acclimated to the heat, and
- ▶ Excessive exercise in hot and humid weather.

Never leave your pet in a parked car in the heat of the summer. Even with the window open, pets can quickly suffer heat stroke and die.

## Response

The signs of heat stress in animals are identified below.

- ▶ Excessive panting or difficulty breathing,
- ▶ Body temperature 104 F or above,
- ▶ Collapse,
- ▶ Increased heart and respiratory rate,
- ▶ Salivation, and
- ▶ Depression, stupor.

In addition to recognizing the signs of heat stress in animals, follow these guidelines when responding during periods of drought and extreme heat.

- ▶ Keep animals in areas where they have access to shade.
- ▶ Provide animals with plenty of water. Hosing off an animal periodically will also help to cool it.
- ▶ Do not exercise animals when it is especially hot outside, e.g. playing Frisbee, jogging or riding. If you have to work with animals, provide regular rest periods. This allows the body's natural cooling system to work. A few minutes of sweat-free rest every hour will help restore physical and mental energy. Animals often are willing to please their owners to the point of endangering themselves.
- ▶ Since dogs don't sweat, dogs must be allowed to pant to dissipate heat. Do not encourage them to carry objects in their mouths if they are hot.

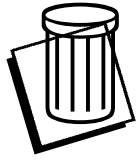
- ▶ Do not dress animals with vests, blankets and other clothing-type materials that would prevent them from sweating.
- ▶ Animals in cages require special attention because the ventilation may not be very good. Provide caged animals with extra ventilation.
- ▶ Provide plenty of fresh cool water for all animals to drink. Offer it in a shady place as some species may not venture into the sun if it is very hot.
- ▶ Be sure to provide salt licks for animals that require them regularly.

## Recovery

A prolonged drought can have a serious economic impact on a community. Agricultural production can be severely reduced by loss of crops or livestock, resulting in food shortages. Increased demand for water and electricity can result in shortages of these resources. When combined with extreme heat, droughts can make life very difficult, especially if the situation lasts for a long time. Droughts are probably the largest cause of death in livestock throughout the world.

Follow these guidelines when recovering from extreme heat or drought conditions.

- ▶ Continue to conserve water even after the drought appears to have ended.
- ▶ If you own a farm and your crop is lost, contact the county Farmer's Home Administration Office for disaster assistance information.
- ▶ Avoid any activities that could precipitate fires. As the forest dries up, debris falls on the forest floor. Trees become prone to fire, even from the slightest spark.



## LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT HEAT AND DROUGHT?

This activity is designed to assess your understanding of the information presented in this unit.

**Directions:** Answer the questions – use the Answer Key in Unit 10 to check your answers.

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### True or False

1. If they are provided with plenty of water to drink, it is safe to exercise animals when it is extremely hot outside.
2. Animals should be offered a shady place to drink water in hot weather.
3. Dogs sweat to dissipate heat.
4. If you have to work with animals in extreme heat, you should provide regular rest periods for the animals.
5. Animals that regularly require salt licks should not be provided with them during periods of extreme heat or drought.
6. Hosing off animals periodically is a good method to help cool them off in hot weather.
7. As long as a window is partly rolled down, it is safe to leave pets in parked cars in the summer.
8. A prolonged drought can result in food shortages for people and animals.

### Multiple Choice

9. Which of the following is a sign of heat stress in animals?
  - a. Excessive agitation
  - b. Slowed heart and respiratory rate
  - c. Body temperature greater than 104 F
  - d. Lack of panting and little salivation
10. Extreme heat is defined as \_\_\_\_\_ degrees above the average high temperature.
  - a. 5
  - b. 10
  - c. 15
  - d. 20

## Wildfires

A wildfire is any instance of uncontrolled burning in grasslands, brush, or woodlands. Wildfires destroy property and valuable natural resources, and may threaten the lives of people and animals.

Wildfires pose an increasing threat to the residential United States. In 1987, 53,000 fires consumed more than two million acres. By October 1988, almost 70,000 fires had claimed more than four million acres. The increase in fires is the result of population growth in rural communities and in the wild land/urban interface.

Wildfires can occur at any time of the year, but usually occur during hot, dry weather. Wildfires are usually signaled by dense smoke which may fill the air for miles around. The National Weather Service, U.S. Forest Service, and State forestry agencies combine to give wildfire probability forecasts. Local radio and television stations broadcast information and warnings on local fire conditions.

## Mitigation

There are many actions you can take to mitigate the effects of wildfires. Many of these are listed to follow.

- ▶ Use only fire-resistant materials on the exterior of your home or barn, including the roof, siding, decking, and trim.
- ▶ Consider installing sprinkler systems for buildings on your property, and lawn sprinkler systems outdoors.
- ▶ When constructing pools and ponds, make them accessible to fire equipment – they may serve as a source of water for fighting wildfires.
- ▶ Have hoses that are long enough to reach all parts of your building.
- ▶ Use fire carefully and wisely so that you do not cause a wildfire. Teach family members and employees safe practices.
- ▶ Keep your chimney clean and install a spark arrestor.
- ▶ Avoid open burning during dry weather. Store firewood away from your home and barns.
- ▶ Store hay, sawdust, or straw in a building separate from where animals are housed. This is especially important during the summer when freshly cured hay can suddenly ignite from spontaneous combustion.

- ▶ Be extremely careful with open flame when shoeing horses or welding.
- ▶ Gas and other hazardous materials should be stored in separate buildings from animals.
- ▶ To reduce the risk of structural fires, make sure that the wiring in your barn is in good condition. Rodents can chew through the wiring, putting the barn at risk for fire. Keep all areas around your barn free of cobwebs.
- ▶ Clear leaves and other vegetation off roof surfaces and out of gutters regularly. Meet local fire code requirements by clearing brush away from all structures.
- ▶ Implement and enforce no smoking policies on your property.
- ▶ Teach all personnel working with animals where the fire extinguishers are and how to use them. Practice a fire drill every month throughout the fire season.

## Preparedness

The following list outlines steps that you can take to prepare for wildfires.

- ▶ Learn to recognize dangerous fire conditions and consult with your local fire department on how to improve the safety of your house and barns.
- ▶ Provide wide spacing between trees. Cut back vegetation overhanging any building.
- ▶ Clear vegetation, including dead brush, from around your house or barn to serve as a fire break. Fire breaks should be at least 30 feet wide for all structures and 75 feet wide for homes built in pine forests.
- ▶ Use fire-resistant plants on your property. Check with local fire officials or a nursery about the best species for your area.
- ▶ Plan several evacuation routes with your animals in case fires block your escape. If you have horses or livestock, make arrangements ahead of time for a place to temporarily relocate them. Fairgrounds, parks, racetracks, large animal shelters, or with family or friends may be options available to you.
- ▶ Make sure your trailer is in good condition and keep the gas tank of your car and truck filled. If you do not have enough trailers, identify who else could help you evacuate. Practice

your buddy system, teach your horse how to load into a trailer, and practice your evacuation routes.

- ▶ Purchase rope or leather halters for horses and livestock because nylon halters can melt when they heat up in a fire. This may lead to deep burn wounds on the animal.
- ▶ Have fire tools handy at your home and in your barn: a ladder, garden hoses, fire extinguishers, gas-operated water pumps, shovels, rakes, and buckets.
- ▶ Keep your horses' tetanus vaccinations current.

## Response

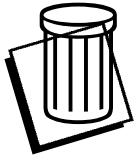
Use the following list to guide your actions when responding to a wildfire.

- ▶ Place a sprinkler on the roofs and anything else that might be damaged by fire to wet down the surfaces. Be sure that your efforts do not jeopardize the water supply and pressure needed by firefighters.
- ▶ If officials evacuate your area, leave immediately. Fires can spread rapidly and unpredictably. If you have large numbers of animals, horses, or livestock, it will take a much longer time to evacuate these animals. If you are evacuating horses when the fire is close, it may help to temporarily place a blindfold over their eyes. Place pieces of cloth around the horses' nostrils to reduce the inhalation of smoke. Wet the horses' tails and manes and remove blankets on the horses' backs.
- ▶ If you are unable to take animals with you, do not leave them confined. If you have horses and livestock, let them out of the barn and close all the doors. A horse may run back into a burning barn if it gets frightened. Turn off the power and gas and disconnect any electrical fences so that animals will not injure themselves trying to escape. (These recommendations are for livestock, poultry and other types of animals; house pets should be leashed/crated and taken with you.)
- ▶ If you are on an outing in the woods when a fire breaks out, note the weather conditions and wind direction. Determine the direction of the fire and plan your escape routes in other directions. If you had a campfire burning, be sure to extinguish it before leaving. As you leave the area, be cautious of wild animals crossing the road.

## Recovery

The following list provides suggested actions during the recovery phase of a wildfire emergency.

- ▶ Consult with your insurance agent and have damages assessed as soon as possible. Take pictures or a video of damages.
- ▶ Wildfires can leave scorched and barren land, reducing grazing land for livestock. This land may take many years or decades to return to its previous condition. Major fires can destroy ground cover, which leads to erosion.
- ▶ The most common cause of death in fires and in the days afterward are complications from smoke inhalation. All animals exposed to fire should be monitored for smoke inhalation pneumonia. A veterinarian should be consulted immediately for any burn injuries. Burn injuries can be difficult and expensive to treat. They often require intensive care.
- ▶ Care must be taken in re-entering burned areas. There may be hot spots that could flare up without warning. Partially burned structures and trees can be very unstable, and may suddenly fall over. Do not tie animals to burned trees. Don't allow animals into areas where there may be ash pits (root systems that have burned underground).
- ▶ Check any areas where animals and people will be for dangerous debris – use a metal detector. Consult medical personnel about tetanus vaccinations for your family and animals.
- ▶ Debris from burned buildings should be removed before animals re-enter the area. Metal pipes heated during a fire may be coated with toxic residues from the heat damaged galvanized components. If this occurs to your pasture fences, they need to be cleaned before any animals come in contact with them.
- ▶ Replant burned forests quickly and efficiently to reduce the soil erosion. Ask your State forestry commission for guidelines. Landslides, mud flows, and floods can follow wildfires due to vegetation damage.



## LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT WILDFIRES

This activity is designed to assess your understanding of the information presented in this unit.

**Directions:** Answer the questions – use the Answer Key in Unit 10 to check your answers.

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### True or False

1. Wildfires are primarily caused by population growth among animals.
2. One way to decrease the chance of barn fires is the implementation and enforcement of no smoking policies.
3. Sources of water to fight wildfires could include pools and farm ponds.
4. Animals recover quickly from burn injuries and usually do not require veterinary care.
5. If you have installed sprinkler systems, it is not necessary to evacuate from a wildfire when officials ask that you do so.
6. Areas around burned buildings may contain debris that is hazardous to animals.
7. Vegetation damage caused by wildfires creates a flood risk.
8. It is the natural instinct of horses to flee from fire; therefore, you do not need to worry about them returning to a burning barn.

### Multiple Choice

9. Which of the following is the most common cause of animal death in fires?
  - a. Complications from smoke inhalation
  - b. Tetanus from stepping on debris
  - c. Burn injuries
  - d. Viral infection
10. Wildfires can occur at any time during the year, but most often occur when conditions are:
 

a. Hot and humid	c. Cool and humid
b. Hot and dry	d. Cool and dry



## Summary

In this unit you learned how the four phases of emergency management – mitigation, preparedness, response and recovery – can be applied to the emergency management and response to natural meteorological hazards. At each level you were given practical advice to protect yourself and your animals from the dangers that these hazards cause.

# Animals in Disasters

## MODULE A UNIT 5

## Geological Hazards: Applying the Four Phases

### Overview

This unit deals with geological hazards including landslides and mudflows, earthquakes, tsunamis and volcanoes. It defines each of these hazards and provides practical information for applying the four phases of emergency management in relation to these hazards. It focuses on protecting animals during such emergencies.

### Objectives

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

- ▶ Define geological hazards that threaten the United States
- ▶ Protect yourself against geological hazards
- ▶ Protect animals against geological hazards
- ▶ Apply the four phases of emergency management to geological hazards

### Landslides and mudflows

Landslides occur in many parts of the country. They are characterized by the down slope movement of rock, soil, or other debris. They can be triggered during earthquakes, volcanic eruptions, storm-generated ocean waves, or other landslides. Landslides also can result from freeze-thaw cycles, shrink-swell cycles, root wedging, animal burrows, natural erosion or deposition, or the thaw of ice-bearing soils such as permafrost. While most landslides are single events, more than one third of the cases are associated with heavy rains or the melting of winter snows. Increased housing development in landslide-prone areas increases the potential damage if a landslide occurs.

Mudflows are defined as flows or rivers of liquid mud down a hillside. They occur when water accumulates under the ground, usually following long and heavy rainfalls. If there is no brush, trees, or ground cover to hold the soil, mud will form and flow down the slope. For this reason, mudflows can follow wildfires.

## Mitigation

Before buying land or building on any property, check with the county land commissioner or the local office of the U.S. Geological Survey for ground composition, drainage, and stability. Surveys of land that may be susceptible to landslides should include grazing land.

Practical things you can do on your property are:

- ▶ Plant ground cover on slopes, or build retaining walls.
- ▶ Reinforce the foundation and walls of your home and barn.
- ▶ Install flexible rather than stiff pipe fittings to avoid gas or water leaks in the event of a landslide or mudflow.
- ▶ Construct channels or reinforced masonry walls to direct the mudflows around your home, buildings, or barns. Clear obstructions from waterways.

Mudflow is covered by flood insurance policies from the National Flood Insurance Program (NFIP). Buy flood insurance through your local property insurance agent.

## Preparedness

Landslide warning signs include:

- ▶ Opening of cracks on hill slopes;
- ▶ Tilting of trees, poles, or walls; and
- ▶ Perceptible changes such as the formation of sags and bumps in the slope.

Mudflows are most commonly triggered by high-intensity rainstorms but can also occur following forest fires when soil is newly bare. They tend to flow in channels but will often spread out over the floodplain. They frequently recur in the same area.

If you suspect a slope is unstable have it examined by a specialist.  
Possible signs of slope failure include:

- ▶ Doors or windows sticking or jamming for the first time;
- ▶ New cracks appearing in plaster, tile, brick, or foundations;
- ▶ Outside walls, walks, or stairs beginning to pull away from the building;
- ▶ Slowly developing, widening cracks appearing on the ground or on paved areas such as streets or driveways;
- ▶ Underground utility lines breaking;
- ▶ Fences, retaining walls, utility poles, or trees tilting or moving; and
- ▶ Water or bulging ground appearing at the base of a slope.

If you live in an area where landslide or mudflows can occur, and you notice any of the above signs, be prepared to evacuate your home, barn and stables.

## Response

Several actions can be taken to ensure a safer and more effective response to a landslide or mudflow. Listed to follow are some of these actions.

- ▶ If you are warned of an impending landslide or mudflow, evacuate at once with your animals to stable ground. Do not leave your animals behind. However, do not let the movement of animals delay your own evacuation and endanger your safety.
- ▶ If you are inside a building during a landslide, stay inside and get under a desk, table, or other piece of sturdy furniture.
- ▶ If you are outside and cannot get into a sturdy building while scattered rocks and debris tumble toward you, curl into a tight ball and protect your head.
- ▶ If you are in a valley, once you hear rumbling from upstream or feel the ground tremble – leave. These may be signs that indicate that a mudflow is coming your way. Do not try to outrun a landslide – instead move at right angles to the direction of flow.

## Recovery

Annual economic losses from landslides are estimated at \$1 to \$2 billion. These losses include the replacement and repair of damaged facilities and associated costs such as:

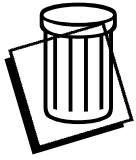
- ▶ Lost productivity,
- ▶ Disruptions to utility and transportation systems,
- ▶ Loss of revenue for affected communities,
- ▶ Loss of livestock and horses, and
- ▶ Damage to or loss of buildings that house equipment and animals.

Associated dangers include broken electrical, water, gas, and sewage lines. Damaged electrical wires and gas lines may also start fires.

Other long-term dangers from this hazard include the continued threat of landslides due to unstable land. Erosion from the loss of adequate ground cover could be very damaging and lead to flash flooding during periods of heavy rain or following heavy snows.

If a landslide or mudflow has occurred near your home or barn, take the following steps to assure a safe recovery.

- ▶ Thoroughly check the foundation, chimney, and surrounding land to be sure no damage has occurred.
- ▶ Check for damaged gas, electrical, or water lines. Do not strike a match or attempt to turn on electricity until you are sure it is safe. Report damages to the appropriate utility companies.
- ▶ Stabilize new land as quickly as possible to reinforce against secondary slippage. Replanting damaged land will help tremendously in both short- and long-term recovery.



## LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT LANDSLIDES?

This activity is designed to assess your understanding of the information presented in this unit.

**Directions:** Answer the questions – use the Answer Key in Unit 10 to check your answers.

---

### True or False

1. Instead of trying to outrun a mudflow, you should move at right angles to the direction of the flow.
2. Planting ground cover on slopes will help prevent damage from landslides on your property.
3. It is safe to leave animals behind when evacuating due to a landslide or mudflow, because they will be able to outrun danger.
4. Tilting of trees, poles or walls may give warning of impending landslides.
5. More than one third of all landslides are associated with heavy rains or melting snow.
6. The down slope movement of rock, soil, or other debris characterizes landslides.
7. If you are in a building during a landslide, leave immediately.
8. Erosion following a landslide can lead to flash flooding during heavy rain.

### Multiple Choice

9. Which of the following is defined as a flow or river of liquid mud running down a hillside?
 

a. Avalanche	c. Mudflow
b. Landslide	d. Flood
10. Which of the following may trigger landslides?
 

a. Earthquakes	c. Tornadoes
b. Drought	d. Hurricane winds

## Earthquakes

An earthquake is a wave-like movement of the earth's surface. The earth's crust and upper part of the mantle push and move against one another along what are known as fault lines. When rock masses slip along a fault, the energy of an earthquake is released in seismic waves. An earthquake can also be produced by volcanic eruptions.

The damage caused by an earthquake depends on its magnitude and intensity. The most widely known indicator of magnitude, the Richter scale, measures the energy released when large rock masses in the upper earth suddenly shift. A change of one full point in the Richter scale represents a difference by a factor of 30 in energy released. Thus, an earthquake of magnitude 7 is roughly 30 times as powerful, in terms of energy released, as one of magnitude 6. The Modified Mercalli scale, found in Appendix D, indicates intensity.

Earthquake monitoring is conducted by the U.S. Geological Survey, the National Oceanic and Atmospheric Administration (NOAA), and universities throughout the United States. The exact time and place an earthquake will occur still cannot be predicted.

## Mitigation

Listed below are several actions that can be taken to mitigate the harmful effects of earthquakes.

- ▶ Check your local emergency manager for potential earthquake and fire risks.
- ▶ Bolt down or reinforce water heaters and other gas appliances. Use flexible gas line and appliance connections wherever possible. Know where to turn off the gas supplies to your house or barn.
- ▶ Place large and heavy objects on lower shelves and securely fasten shelves to walls taller than 5 feet. Brace anchor all tall or top-heavy objects.
- ▶ Do not place dog runs or other animal enclosures underneath things that might fall on them during an earthquake, such as a chimney or a heavy retaining wall. Include a pair of bolt cutters in your disaster kit. Gates can sometimes become damaged and unable to be opened.
- ▶ Affix tabletop equipment (such as computers or typewriters) with industrial strength Velcro. Overhead lighting fixtures should be anchored solidly in place.

- ▶ Deep plaster cracks in ceilings and foundations should be investigated and repaired by experts, especially if there are signs of structural defects. Be sure the house is firmly anchored to its foundation.
- ▶ Purchase earthquake insurance for your home and its contents. Renters can also purchase earthquake insurance for their belongings.
- ▶ Support local safe land use and building codes that regulate land use along fault lines. Modern engineering can produce structures that resist earthquake damage; existing buildings can be retrofitted to better withstand tremors. Often there are tax advantages for these types of improvements.

## Preparedness

Prepare yourself, your family and your animals for earthquakes by following the guidelines listed below.

- ▶ Prepare a family earthquake plan and conduct family earthquake drills. Include animals in these exercises.
- ▶ Discuss earthquakes and other possible disasters so that younger members of your family understand how to take action without fear. Instructional videos are available for this.
- ▶ Designate an out-of-state contact and be sure that all members of your family know how to reach this person. If possible, include the out-of-state contact number on your animal's identification.
- ▶ Know where the safest places are at home, work, or school.
- ▶ Teach responsible members of your family how to turn off gas, electricity, and water at main switches and valves. Check with your local utility offices for instructions.
- ▶ Learn how to extinguish small fires and to provide emergency first aid.
- ▶ Be prepared to survive for 72 hours without any assistance. Remember to include supplies for your animals.
- ▶ Test your radio, flashlights and batteries when daylight savings time arrives to ensure your ready response. Keep spare bulbs for flashlights.
- ▶ All the members in your household and your horses should have a current tetanus vaccination.



- ▶ If you take your dog or cat to a boarding kennel or have a pet sitter come to your home in your absence, make sure they are familiar with your earthquake preparedness plans.
- ▶ Keep a collar and an identification tag on your pets at all times.
- ▶ You may also learn a lot by helping organize and support earthquake preparedness programs in your community. Your community could hold earthquake drills and public education programs to prepare for earthquakes.
- ▶ Earthquakes have the potential to trigger other emergency conditions such as tsunamis, fires, major landslides, dam failures, power plant ruptures, and hazardous materials spills. Be prepared for all of these disasters if you live in an earthquake-prone area.

## Response

Earthquakes usually occur without warning. If an earthquake is occurring in your area:

- ▶ You will feel a trembling in the ground or floor,
- ▶ You may notice hanging lights or planters starting to sway,
- ▶ You may even feel slightly dizzy, and
- ▶ Many animals will become very nervous and apprehensive – they can bite, kick, or scratch.

The actual movement of the ground is seldom the direct cause of death or injury to humans and animals. The following commonly cause earthquake-related casualties:

- ▶ Partial or total building collapse, including toppling chimneys or walls, falling ceiling plaster, light fixtures, and pictures;
- ▶ Flying glass from broken windows and skylights (this danger may be greater from windows in high-rise structures);
- ▶ Overturned bookcases, fixtures, and other large furniture and appliances falling on people and animals;
- ▶ Fires resulting from broken chimneys and broken gas lines;
- ▶ Electrocution from fallen power lines; and
- ▶ Exertion and fear leading to heart failure.

To reduce injury and death to people and animals special precautions should be taken and include the following:

- ▶ Broken gas lines often are a major cause of earthquake-related fires. Following an earthquake, turn off any supplies of gas to your home or farm buildings.
- ▶ Above all, remain calm. Try to reassure others. Think through the consequences of any action you take.
- ▶ If you are indoors stay indoors and remember the safety routine to *drop, cover* and *hold*. Take cover under a sturdy piece of furniture (such as a heavy desk, table, or bed) and hold onto one of the legs. In barns, tools, equipment and other objects on the walls and in the rafters are likely to fall, and can cause serious injury to people and animals. Stay away from objects that can shatter (such as windows, mirrors, or skylights) and chimneys.
- ▶ If you are in a high-rise building, a crowded store or mall, do not run for exits. Stairways may be broken or jammed with people. Power for elevators may fail so do not use them. Stay away from store display windows that may break. If you must leave the building, choose your exit as carefully as possible.
- ▶ If you are outside, get away from buildings, walls, utility poles, downed wires, and all other objects that could fall.
- ▶ If you are in a car, stop as quickly as safety permits but stay in the vehicle until the shaking stops. Avoid bridges, underpasses, and tall buildings.
- ▶ Check for injuries and attend to them. Seek medical help if necessary for humans and animals. Check for fires or other hazards.
- ▶ Remember that animals can be frightened by an earthquake too. Be alert to any aggressive behavior displayed by an animal. An animal may bite out of fear and stress.

## Recovery

Earthquakes can cause damage to buildings, utility lines, bridges, or dams. Water supplies can become contaminated by seepage around broken water mains. Damage to roadways and to other means of transportation may create food and other resource shortages for people and animals if transportation is interrupted. Use the following guidelines to aid in safe recovery from earthquakes.

- ▶ If you are unsure of a building's safety, do not enter until it has been inspected by a qualified person. Aftershocks may cause additional damage to buildings.
- ▶ Check to make sure that fences used to confine animals are intact. If animals have escaped, they will often return to their regular feeding site at mealtime and may be recaptured.
- ▶ Keep animals safely confined until debris is removed.
- ▶ Check utilities. If you smell gas, open windows and shut off the main gas valve. Shut off electrical power if there is damage to your house wiring. Leave the building and report damage to the appropriate utility companies. Do not use matches, lighters, or open-flame appliances until you are sure there are no gas leaks. Do not operate electrical switches on appliances if gas leaks are suspected, i.e., if lights are on, leave them on. If they are off leave them off.
- ▶ Do not eat or drink from open containers near shattered glass and do not offer these to animals either. Remove any contaminated sources of food or water so that animals can not get to them. If there is a boil water order in effect, do not drink or give animals tap water until the officials announce that it is safe to do so. Let water from pipes run several minutes once the boil water order is lifted.
- ▶ Open closet and cupboard doors carefully, watching for falling objects. Immediately clean spilled medicines and potentially harmful materials. Wear gloves when you do this.
- ▶ Check to be sure that sewage lines are intact before flushing toilets. On farms, check to see that the waste-handling facilities have not been disrupted and manure is not leaking into the environment or groundwater.
- ▶ Be prepared for additional aftershocks. While the aftershocks are usually smaller than the main shock, some may be large enough to cause additional damage.
- ▶ Do not use your telephone except for emergency calls. Listen to your radio for damage reports and information.
- ▶ Do not go sightseeing. Stay away from beach and waterfront areas where seismic sea waves (tsunamis) may strike.
- ▶ When it comes time to repair your house and farm buildings, ensure that the repairs will increase the structure's ability to withstand future quakes.



## LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT EARTHQUAKES?

This activity is designed to assess your understanding of the information presented in this unit.

**Directions:** Answer the questions – use the Answer Key in Unit 10 to check your answers.

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### True or False

1. Geologists can predict exactly when and where earthquakes will occur.
2. If you are in your car during an earthquake, stop immediately and get out.
3. Fires can be a major problem following earthquakes.
4. The best thing to do if you are in a building during an earthquake is to get out of the building.
5. Animals always sense earthquakes before they occur and will usually bite, kick, or scratch you.
6. If animals escape during an earthquake, they may return at mealtime.
7. The beach is a safe place to stay until earthquake aftershocks have passed.
8. It is safe to give animals tap water to drink following an earthquake.

### Multiple Choice

9. Which one of the following is a danger commonly associated with earthquakes?
 

a. Avalanches	c. Hazardous materials spills
b. Flash flooding	d. Wildfires
  
10. Which one of the following can help cause an earthquake?
 

a. Landslides	c. Volcanic eruption
b. Floods	d. Drought

## Tsunamis

A tsunami (pronounced “soo na’mee”) is a series of giant ocean waves produced by a major underwater or coastline disturbance such as an earthquake or volcanic eruption. A series of waves sometimes lasts several hours, with 20 or 30 minutes between waves. Tsunamis can occur in all oceans, but they are most common in the Pacific. In this century, more than 200 tsunamis have been recorded in the Pacific.

Areas thousands of miles from an earthquake can be struck by a resulting tsunami. The waves appear to be normal ocean waves until they approach the coastline, where a gigantic wall of water can build on the ocean surface. Tsunamis reaching heights of more than 100 feet have been recorded.

## Mitigation

The most effective mitigation measure to avoid property damage is not to build or live in buildings within several hundred feet of the coastline. Even the strongest buildings can be damaged or undermined by a powerful tsunami.

## Preparedness

Tsunamis can be detected before they strike land and local warning systems are in place. Approaching tsunamis usually are preceded by a pronounced rise or fall of coastal water. This action is nature’s tsunami warning and should be heeded. Many people have been trapped while exploring the newly uncovered sea bottom for marine life as the sea retreats before the giant wave strikes. Follow these general guidelines to prepare for tsunamis.

- ▶ If you live near a coastal area and have experienced or heard of a recent earthquake or volcano, listen to your radio for a tsunami warning.
- ▶ If you hear of a tsunami warning, do not go down to the beach to look for the tsunami. If you can see it, you will be too close to escape it.
- ▶ Adequately identify all animals so that if they are separated from you, they can be traced and returned.

## Response

There are several ways that you may be warned of an approaching tsunami:

- ▶ Your community may be warned by radio or television announcements.

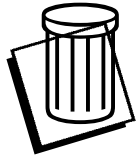
- ▶ Local police, fire, or emergency officials may go door-to-door in threatened areas.
- ▶ Outdoor sirens may sound to warn of the dangers.

To respond safely to the threat of a tsunami, use the following guidelines.

- ▶ Learn the warning signs and signals and heed them. This includes staying off the beach during unusual tidal action.
- ▶ Plan several escape routes to high ground. Your primary escape route might be damaged or destroyed if a local earthquake strikes.
- ▶ Be prepared to evacuate low-lying coastal areas immediately. Evacuate all animals that you can.
- ▶ If you must leave animals behind, do not confine them.
- ▶ Keep a collar and an identification tag on dogs and cats at all times in case they get lost.
- ▶ Since a tsunami is not a single wave but a series of waves, stay out of dangerous areas until an all clear is issued.
- ▶ After the tsunami, check for injuries and seek medical help if necessary for humans and animals.

## Recovery

Risks associated with tsunamis include broken sewage lines, polluted water supplies, damaged gas lines, and downed power lines and fences. If your home, apartment, business or farm has been damaged, document the damage with photos and videos and call your insurance agent, who will advise you what to do next. Follow the same instructions regarding water, food, and building safety as in other sections of this course, such as for floods and earthquakes.



## LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT TSUNAMIS?

This activity is designed to assess your understanding of the information presented in this unit.

**Directions:** Answer the questions – use the Answer Key in Unit 10 to check your answers.

---

### True or False

1. A tsunami is a series of giant ocean waves produced by a major underwater or coastline disturbance.
2. Tsunami waves are usually visible before they approach the coastline.
3. Two events that may trigger tsunamis are earthquakes and hurricanes.
4. Tsunami waves usually arrive within a few moments of each other and the entire event lasts about an hour in length.
5. A pronounced rise or fall of coastal water usually precedes approaching tsunamis.
6. Tsunamis cannot be detected before they strike land.
7. It is important to plan several escape routes in the event a tsunami should occur.

### Multiple Choice

8. Not building a home within several hundred feet of the coastline to avoid damage from tsunamis is an effective example of which of the four phases of emergency management?
  - a. Mitigation
  - b. Preparedness
  - c. Response
  - d. Recovery
9. Tsunamis most commonly occur in which of the following oceans?
  - a. Atlantic
  - b. Arctic
  - c. Indian
  - d. Pacific
10. Which of the following is one of the first steps you should take when recovering from tsunamis?
  - a. Check for injuries and seek medical advice
  - b. Document damage with photos and videos and call your insurance agent
  - c. Call the Federal Emergency Management Agency for assistance
  - d. Call the Small Business Administration to seek a loan

## Volcanoes

Volcanoes form where weak spots or breaks in the earth's crust allow the magma to push toward the surface. When the pressure of gas and magma becomes too great, the volcano erupts. Magma may pour through the vent opening in lava flows or shoot into the air as dense clouds of gas and dust (ash) fall. Volcanic eruptions can generate mild to moderate earthquakes, mudflows, flash floods, tsunamis and huge ash clouds that can create intense lightning storms.

In the United States, the chance of eruptions that could damage populated areas is greatest in the active volcano range of the Pacific Rim. The danger area around a volcano can extend hundreds of miles.

In 1980, the violent eruption of Mount St. Helen's resulted in 60 deaths and caused approximately \$1.5 billion in damages. The eruption spread thick layers of ash over thousands of square miles and caused massive flooding and mudflows in the immediate area. The Mount St. Helens eruption renewed interest in the possibility of future eruptions in the Cascade Range.

## Mitigation

Because areas far from the volcano may be affected, you should listen for advisories as to whether your area will be impacted. Warnings include information about the approximate time, place, and extent of the effects as well as the uncertainties involved in making the prediction. Evacuation routes for yourself and your animals should be determined in advance for use if needed.



## Preparedness

Contact your local emergency management office to learn about methods of protecting your family, animals, and home from ash fall. The U.S. Geological Survey assesses all information related to the development of impending geological disasters and informs the public. To prepare for an eventual volcanic eruption, take the following preparedness steps.

- ▶ Keep a collar and an identification tag on your dogs and cats at all times, so that if they should get lost you have a greater chance of finding them.
- ▶ Have emergency, battery-operated lighting and heating supplies available in case of a power failure. Test the power of the batteries monthly.

## Response

The degree of hazard to human and animal life and property resulting from a volcano depends on the type and distance from the eruption. Hazards include lava flows, rock falls, ash falls, earthquakes, mudflows, and flash floods. Take the following actions when responding to a volcanic eruption.

- ▶ Heed official warnings of imminent volcanic eruption.
- ▶ If told to evacuate, do so immediately.
- ▶ Following an eruption, flash floods resulting from glacier outbursts can cause overflow from dams and reservoirs. Avoid stream beds and valleys in the vicinity of a volcano. If caught in a low area, run uphill to avoid injury from flash floods or mudflows.
- ▶ During ash fall, close all windows, doors, and dampers in your home and where your animals are housed. Put all machinery inside a garage or barn. Bring animals into closed shelters. Stay indoors until the ash has settled.
- ▶ Do not attempt to drive in heavy ash fall, it will stir up more ash and clog and stall your vehicle.
- ▶ If caught in a small rock fall (not a landslide), roll into a ball and protect your head. If caught outside during ash fall, keep your mouth and nose covered to avoid inhalation of ash. Cover your eyes and keep your skin covered to avoid irritation or burns. Do the same for animals where possible and practical. Respiratory diseases can develop in any persons or animals that are exposed to the fumes and fine ash suspended in the air.

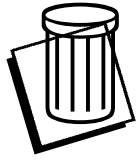
## Recovery

Hazards within the immediate vicinity of the volcano come from heavy ash fall, which can darken the sky as if it were nightfall. The increased demand for lighting could result in power failures. Ash may be carried by winds for thousands of miles and affect distant areas long after the eruption. Secondary eruptions and lava flows can occur in the days, weeks, or months after a volcanic eruption.

The ash is actually pulverized rock. A one-inch layer weighs ten pounds per square foot. Ash can clog waterways, reservoirs, and machinery and its weight can cause roofs to collapse.

If you have to work in an environment where there is volcanic ash be sure to take the following actions.

- ▶ Wear an approved respirator.
- ▶ Clear roofs of ash fall as soon as possible to avoid collapse.
- ▶ Remove ash from any areas where animals will be confined. With ash covering the ground livestock cannot graze.
- ▶ Throw away any food or water, for both humans or animals, that have been contaminated by the ash. Ash is commonly contaminated with heavy metals that are toxic to humans and animals. In addition, pyroclastic material contains glass-like particles that can cut or irritate lungs and intestines.



## LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT VOLCANOES?

This activity is designed to assess your understanding of the information presented in this unit.

**Directions:** Answer the questions – use the Answer Key in Unit 10 to check your answers.

---

### True or False

1. Volcanic ash is often contaminated with heavy metals that can be toxic to humans and animals.
2. If you are indoors during actual ash fall, open all doors and windows to increase ventilation.
3. Volcanic ash and lava is usually slow moving, so there is ample time to evacuate.
4. The danger area around volcanoes can extend several hundred miles.
5. The eruption of Mount St. Helens spread thick layers of ash over thousands of square miles.
6. Volcano warning information includes the exact time, place and extent of effects.
7. Power failures are common following a volcanic eruption.

### Multiple Choice

8. Which of the following is **NOT** a hazard following a volcanic eruption?
  - a. Mudflow
  - b. Flash flood
  - c. Tsunami
  - d. Tornado
9. Which of the following agencies assesses information related to the development of impending geological disasters?
  - a. Department of Energy
  - b. Environmental Protection Agency
  - c. State highway patrol
  - d. U.S. Geological Survey
10. People and animals that are exposed to ashfall are most susceptible to which of the following?
  - a. Bacterial infection
  - b. Respiratory disease
  - c. Dehydration
  - d. Viral infection

## Summary

In this unit you learned how the four phases of emergency management – mitigation, preparedness, response and recovery – can be applied to the emergency management and response to natural geological hazards. At each level you were given practical advice to protect yourself and your animals from the dangers that these hazards cause.

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# Animals in Disasters

## MODULE A UNIT 6

## Technological Hazards: Applying the Four Phases

### Overview

This unit deals with technological hazards including hazardous materials spills and radiation hazards. It defines each of these hazards and provides practical information for applying the four phases of emergency management in relation to these hazards. It focuses on protecting animals during such emergencies.

### Objectives

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

- ▶ Define technological hazards that threaten the United States
- ▶ Protect yourself against technological hazards
- ▶ Protect animals against technological hazards
- ▶ Apply the four phases of emergency management to technological hazards

### Hazardous materials

Hazardous materials can be released by accident or in disasters. They are dangerous to persons and animals that are exposed and may contaminate the environment and the human food supply. Animals exposed to hazardous materials are a potential threat to humans.

Many farmers are familiar with the appropriate methods for handling commonly used hazardous materials, such as herbicides, pesticides, and fertilizers. The general public needs a better understanding of what hazardous materials are and how to deal with them.

Hazardous chemicals should be dealt with by qualified persons. Depending on the scale of the chemical release, local, State, or Federal offices may become involved in the security and clean-up operations. Often these groups are assisted by industry.

## Mitigation

Hazardous materials are common in many households and animal-care facilities. Compounds such as detergents, cleaning materials, herbicides, and pesticides are potentially dangerous if persons or animals are exposed through incorrect handling or spillage. The following steps will help mitigate a hazardous materials incident.

- ▶ Hazardous chemicals should be stored in safe places where children and animals cannot be exposed.
- ▶ Storage areas must guard against freezing and overheating of hazardous materials. They should also have separate locks.
- ▶ Chemicals should be stored on the floor or lower shelves to prevent falling and spilling. Lips are recommended for all shelving upon which hazardous materials are stored.

## Preparedness

You should identify potential hazards in your immediate environment and learn about proper storage. You should also know what clinical signs these toxins may cause if a person or an animal has been exposed. If you suspect your animal has been exposed, always consult a veterinarian.

You can find out about hazards through legislation called the “Right to Know Act.” Your local fire department or emergency management agency can provide you with information on hazardous chemicals in your community. Individuals and animal facilities should have a plan for dealing with hazardous materials on their property.

FEMA may provide resource information and technical and financial assistance to States for developing emergency plans for hazardous materials accidents and other types of emergencies and assist State and local governments in hazardous materials training.

The Environmental Protection Agency (EPA) also conducts technical and environmental training programs related to hazardous materials, and chairs the 14-agency National Response Team (NRT). At the request of community officials, the EPA can provide technical expertise on the full range of environmental contamination issues.

## Response

Unlike many other emergencies in which volunteer help is welcome, in a hazardous materials emergency there is little that untrained members of the public can do. Any information you wish to offer should be given by telephone from a safe distance. Observe all posted exclusion

zones and listen for public announcements on the radio or other local information system.

If a hazardous materials accident occurs during the daytime, animal owners may be at work. The area will be secured and owners should realize that they may not be allowed into the secured areas to retrieve or care for their animals. Emergency services personnel will notify you as to what steps to take. If you are at home during a hazardous materials emergency, it is especially important to bring your animal(s) with you if asked to evacuate, since you may be away for a lengthy period. Alternately, you may be asked to shelter in place. Sheltering in place is required when it would be more harmful for you to evacuate your location than it would be for you to stay.

Owners should not treat animals themselves. The National Animal Poison Control Center in Urbana, Illinois, any college or school of veterinary medicine, State animal disease diagnostic laboratory, and some human poison control centers can provide needed information on how to deal with animal poisonings. There may be a charge for these services.

For animals that graze or live outside, hazardous materials can present additional problems. Animals exposed to low levels of hazardous materials may not appear clinically affected, but their meat, milk and eggs may contain residues that present health risks for humans. Contact a specialist for advice if you think your animal has been exposed. Representatives from the U.S. Department of Agriculture Food Safety and Inspection Service are trained and qualified to deal with these issues. Other sources of information regarding hazardous materials and animals include:

- ▶ Federal and State Food and Drug Administration;
- ▶ State chemists, whose role includes the safety of animal feeds;
- ▶ The National Animal Poison Control Center;
- ▶ Colleges and schools of veterinary medicine;
- ▶ State disease diagnostic laboratories; and
- ▶ Hazardous materials teams in some areas.



Recovery A major hazardous materials incident may require response of various levels of government (Federal, State, and local).

The following table identifies local government responsibilities.

Agency/Center	Responsibility
Local public health department	Safeguards the public when food or water supplies may be affected or when dwellings may become contaminated.
A chemist and toxicologist from the local health department	May provide advice on toxicity and personnel protection as well as recommendations to the scene manager regarding actions to reduce public health hazards.
Public works department	May assist in containment and cleanup.

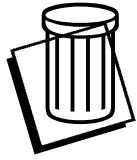
In a major incident, a local government may call on State agencies for resources and knowledge. Such an action could involve a number of State agencies, which include those listed in the following table.

Agency/Center	Responsibility
State Office of Emergency Services	Arranges State and regional mutual aid support and provides liaison with State agencies.
State Department of Transportation	Assists and/or provides identification and containment of all materials on State highways and freeways or unincorporated county roadways.
State Police or Highway Patrol	Provides general control of the perimeter of the incident (e.g., regulating traffic) and other roles depending on State law and incident requirements.
State Department of Fish and Game and regional water quality control boards	Provide recommendations and guidelines when hazardous materials spills are likely to contaminate streams and/or waterways or would otherwise affect wildlife resources.
State Occupational Safety and Health Administration (OSHA) personnel	Often possess technical knowledge useful to an incident commander in the areas of exposure, protection and control of hazardous materials. In an incident in which employees have been injured due to exposure, or in a prolonged incident, State OSHA personnel may respond. The State department of health employs health scientists who can help assess the potential human impact of a toxic release.
State department of environmental protection	Can predict the environmental impact of actions the incident commander is considering. (For more information about the Incident Command System, see Module B of this course, Unit 5.)

State and local fire marshal	Have specific expertise relating to chemical behavior and fire codes.
The U.S. Department of Agriculture Food Safety Inspection Service	The agency that oversees food inspection for human safety, including carcasses that may have been exposed to hazardous materials.

In the event of an incident, the Federal government can also provide assistance to the local incident commander. The following table identifies Federal government responsibilities.

Agency/Center	Responsibility
National Response Center (NRC)	Staffed by the U.S. Coast Guard, this center operates a 24-hour hotline to communicate notices of major hazardous materials discharges to the appropriate authorities. The NRC can also provide the local government with the expertise and resources of other Federal agencies.
Environmental Protection Agency (EPA)	Primarily responsible for hazardous waste site operations, cleanup activities, and environmental impact.
Department of Transportation (DOT)	Establishes the nation’s overall transportation policy. It bears the primary responsibility for issuing standards and regulations relating to the transportation of hazardous materials from State to State.
Department of Energy (DOE)	Primary responsibility in the hazardous materials arena involving radioactive waste generated by the nuclear weapons program or by nuclear reactors that supply energy.
Department of Defense (DOD)	Responsible for maintaining personnel, equipment, and other resources for potential use in military conflict. DOD manufactures, stores, and discards the full range of hazardous materials and is also one of the nation’s largest shippers of such materials. The DOD can also provide response teams and equipment.
OSHA	Responsible for establishing rules and standards to ensure that occupational environments are safe for workers. As part of this function, OSHA regulates employee safety and health at hazardous waste operations, in work environments where hazardous materials are present, or during emergency response to incidents involving hazardous materials.
National Agricultural Chemicals Association	Has identified a group of specialists designated as the Pesticides Safety Team. The team provides advice for incidents involving pesticides and will dispatch a response team to the site if one is needed.
FEMA	Available to provide additional financial relief in the event of an incident so serious that local and State funds prove inadequate.



## LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT HAZARDOUS MATERIALS?

This activity is designed to assess your understanding of the information presented in this unit.

**Directions:** Answer the questions – use the Answer Key in Unit 10 to check your answers.

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### True or False

1. Animals that have been exposed to hazardous materials present no danger to people.
2. Household compounds like cleaning materials are not considered hazardous materials.
3. There is little that untrained members of the public can do to intervene in a hazardous materials event.
4. If you suspect that your animal has been poisoned, the best resource to contact is a human poison consulting service, they always have information pertaining to humans and animals.
5. Animals that ingest low levels of hazardous materials may not appear clinically affected.
6. Exposure of livestock to hazardous materials may potentially contaminate human food.
7. When hazardous materials releases occur during the day when people are at work, officials are prepared to let owners into secured areas to retrieve their pets.

### Multiple Choice

8. In your home, chemicals should be stored in which of the following places?
  - a. Upper shelves
  - b. In the attic
  - c. The floor and lower shelves with cabinet locks
  - d. In the garage
9. Which of the following agencies safeguards the public when food or water supplies may be affected and when dwellings may be contaminated?
  - a. Local public health department
  - b. Environmental Protection Agency
  - c. Office of Emergency Preparedness
  - d. Food and Drug Administration
10. Which of the following agencies has the primary responsibility when hazardous materials accidents involve radioactive waste?
  - a. Sheriff's department
  - b. Department of Energy
  - c. Department of Transportation
  - d. Environmental Protection Agency

## Radiation hazards

Contemporary radiation hazards include problems associated with nuclear power plants, nuclear weapons accidents, and the manufacture, transport, and storage of nuclear and other hazardous materials. There is a glossary of radiation terms at the end of this section.

Utility companies in the United States generate about 20 percent of our electricity by nuclear power. Fixed nuclear facilities (power plants, storage facilities, research reactors) are generally safe and constructed to contain any radiological release. However, there is a possibility that an incident could cause a release of radioactive materials. To prepare for this eventuality the Nuclear Regulatory Commission requires that all power plants and State emergency response agencies plan for such problems. The agency must also periodically conduct practice exercises to determine the effectiveness of the plan.

Radiation is any kinetic energy emitted in rays or particles from sources of heat, light, sound, and radioactivity. Mostly, radiation is described as charged particles (ions) in material that it strikes. There are two types of ionizing radiation: those produced from natural origin (including those naturally found in the body) and those produced from natural origin but affected by human activities.

As the radioactive isotope decays it emits a electromagnetic wave or energized particles. The types of radiation are either alpha or beta particles of gamma emissions. The following table identifies each type of emission.

Alpha particles	The largest particles with very shallow penetration into a surface. A piece of paper will absorb the radiation.
Beta particles	Smaller particles that will penetrate tissue about 2 cm.
Gamma rays	Not particles and have no mass. Can penetrate through the body. Similar to X-rays.

Alpha and beta particles can cause surface skin wounds and internal damage if radioactive compounds that emit these are inhaled or swallowed. Gamma and X-rays can cause whole body damage because of the extent of penetration.

Each isotope has its own specific half-life and most have an affinity for specific tissues. The half-life, or decay of an isotope is the speed at which that isotope reaches one half of its original radioactive strength. For example: the half-life of iodine-131 is eight days. After eight days, it reaches one half of its original radioactivity. In another eight days, the radioactivity is again reduced by one half. The longer the half-life the more persistent the isotope is in the environment.

The following table identifies sources of radioisotopes and their contribution to the human body.

Source of Radiation	Percentage
Radon	54
Internal	11
Medical X-rays	11
Terrestrial	8
Cosmic	8
Nuclear Medicine	4
Consumer Products	3
Other	1

Incidents at nuclear power plants are classified into four escalating categories or levels. They are: Unusual Event, Alert, Site Area Emergency, General Emergency.

Unusual Event	Any mishap that occurs at the plant. This could be a worker falling off a ladder and breaking a leg. This must be reported to the State emergency response agency because an ambulance sighted at the door of the facility could cause the circulation of false rumors. Unusual events are usually minor mishaps of any kind, not necessarily involving the reactor, with no radiological release requiring offsite response or monitoring.
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Alert	There is a reactor accident that involves an actual or potential substantial degradation of the plant safety level. Any releases are expected to be small fractions of the Federal (EPA) protective action guideline exposure levels. Alerts do not represent a threat to the public.
Site Area Emergency	A reactor accident that involves actual or likely major failures of plant functions needed for protection of the public. Any releases are not expected to exceed Federal (EPA) protective action guideline exposure levels except near the site boundary. The public will normally be notified and given instructions.
General Emergency	A reactor accident that involves actual or imminent substantial core degradation or melting with potential for loss of containment integrity. Releases can be reasonably expected to exceed Federal (EPA) protective action guideline exposure levels offsite for more than the immediate site area. These are incidents that call for immediate protective action. Follow all official instructions.

Nuclear facilities provide people living nearby (within 10 miles) with written instructions of what to do in all eventualities (what the sirens mean if they go off and where to listen on their radio and television for instructions). If incidents do occur, the following actions are taken.

- ▶ The plant notifies the appropriate authorities of the event classification. The lowest classification that applies is designated. As the event continues classifications may change depending on the problem and the actions taken to correct it.
- ▶ Depending on the progression of the event emergency management officials will recommend necessary protective action to the public. Public notification is made through sirens and the emergency alert system (EAS) on radio and television.

If radioactive material is released into the environment it forms a plume. The plume cannot be detected by sight or smell and may contain various radioactive isotopes. The direction and speed of the plume depends on weather conditions, especially the wind.

Generally there are two zones of concern: one up to 10 miles from the plant called the plume zone and the other up to 50 miles from the plant called the ingestion pathway zone. (The ingestion pathway zone is named such because radioactive material may be deposited on crops and grasses and contaminate animal or human food.) Action for each zone depends on the direction and speed of the wind. For example, if the wind is going in a westerly direction the recommendations for the west would be different from those made for the east.

Two actions can help protect against radiation exposure:

- ▶ Create a distance from the source of radioactivity, and
- ▶ Create a barrier to the radioactivity.

The preferred protective action for people is evacuation, but in some limited circumstances sheltering in place may be recommended. Recommendations should be made well in advance of the plume reaching the affected areas. Precautionary actions for livestock typically involve putting animals in corral or under shelter and using protected food and water. Recommendations for livestock are usually made *before a recommendation is made for people*. This protects the people that need to carry out the actions to protect the animals.

The State agriculture department and U.S. Department of Agriculture provide information on the radiation risks to livestock. The emergency management agency should rate the effectiveness of animal shelters in protecting against radioactive penetration in advance of any incident. When animals are sheltered they should be fed only stored covered feed and water that is protected from radioactive fallout.

If animals need to be evacuated along with humans, procedures discussed elsewhere for evacuation should be followed. Routes that are not primary routes for human evacuation efforts should be used to avoid traffic being slowed due to a disabled livestock vehicle.

If animals are left outside and become exposed to radioactive material, a veterinary should evaluate the animals as soon as safety permits. Some forms of external contamination on animals can be washed off. If none of the material has been absorbed, the animal may no longer be contaminated. It is important that a veterinarian check animals for exposure, especially farm animals. No products should be used until appropriate laboratory tests for radioactivity are performed.

The rapid evacuation of people may require that animals are left in barns. Regulatory officials may prohibit entry into the area if it is radioactive. However, short trips may be allowed to care for and milk farm animals. Officials will determine the frequency, duration, and equipment required for these trips. The amount of radiation personnel performing these chores receive will be checked with dosimeters.

## Mitigation

Personal preparation and mitigation for radiological incidents can be improved by ensuring that you have the following:

- ▶ Awareness of and familiarity with siren alerts and the emergency alert network;
- ▶ Adequate shelter on the premises for animals;
- ▶ Protective covers for feed and water resources;
- ▶ Knowledge of evacuation sites and routes;
- ▶ Knowledge of nearby nuclear facilities, what they do, worst-case scenarios, what a radiation release would contain, and protective measures against these elements.

Many nuclear facility plans do not account for pets and livestock evacuation or on-premise care in the event of radiation release. By working with the facility planners, much can be accomplished in correcting these shortfalls.

## Preparedness

The following actions can be taken to prepare for radiation hazards.

- ▶ Those living near a fixed nuclear site should know where the sirens are located and under what circumstances they are activated. The emergency alert system gives specific directions for actions, announcements describing the incident at the nuclear facility, evacuation routes, emergency shelter locations, and other actions to be taken.
- ▶ Know where the emergency shelters for your area are located to prevent searching at the time of the incident. (Shelters are also called congregate care centers or mass care centers.) Shelters may not take pets so having a pre-arranged place to take them is important and will reduce concern for animals left in jeopardy.



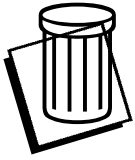
- ▶ Prior arrangements for protection or evacuation of horses and other livestock is also important. A barn, thick grove of trees, or trench silo might shelter them against radioactive fallout. Practice will help accustom animals to temporary shelters (many animals resist moving to unfamiliar environments).
- ▶ Arrangements with family or friends outside the evacuation area for temporary housing of large animals should be made in advance. Feed and water resources may become critical at the host site without planning.
- ▶ Controlling fallout onto water and feed supplies may be difficult. Since most radioactive fallout particles are heavier than water, in bodies of water with little or no turbulence the surface water consumed by animals will be safe to drink within 10 to 14 days. Other water sources such as water troughs can be covered temporarily to protect the water from immediate fallout. Rolls of garden mulch or plastic sheeting can be stored for this purpose.

#### Response

If the sirens in the area are activated, listen on radio or television to the designated emergency alert station. Follow the directions closely. If evacuation notices are given it is very important that they are obeyed as soon as possible. The closer the farm is to the incident, the less time is available to shelter without endangering the life of the owner. Follow local instructions as to whether to take your pets with you when you evacuate. Close up the house and leave quickly.

#### Recovery

If there is a release of radioactive material, the emergency managers will secure the entire area of possible radiation exposure. Before anyone is permitted to re-enter the area, careful monitoring will assure the safety of residents wanting to return. Re-entry might be permitted under supervision. Animals and feed and water supplies should be checked for radioactivity. Decontamination of any object is difficult and can be hazardous; only people specifically trained in that field should do this.



## LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT RADIATION HAZARDS?

This activity is designed to assess your understanding of the information presented in this unit.

**Directions:** Answer the questions – use the Answer Key in Unit 10 to check your answers.

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### True or False

1. The persistence of a radioactive isotope in the environment is measured by its half-life.
2. Two things that can be done to protect people and animals from radiation are creating a distance from the source and creating a barrier to the radioactivity.
3. When evacuation and sheltering are necessary during a radioactive release incident, recommendations are made for people before a similar recommendation for animals.
4. Some forms of external radioactive contamination can be washed off of animals.
5. Having a pre-arranged place to take pets, horses, and livestock will help when an evacuation of a farm or home occurs.
6. If there is a release of radiation and there has been radioactive contamination, the area of contamination will be sealed off by the authorities.
7. Any animal owner can easily decontaminate animals exposed to radioactive materials.

### Multiple Choice

8. Which of the following is **NOT** a type of radiation?
 

a. Alpha particles	c. Gamma rays
b. Beta particles	d. Delta particles
9. Which of the following refers to a reactor accident that involves actual or likely major failures of plant functions needed to protect the public?
 

a. Unusual event	c. Site area emergency
b. Alert	d. General emergency
10. Which of the following refers to a reactor accident that involves actual or imminent substantial core degradation or melting with potential for loss of containment integrity?
 

a. Unusual event	c. Site emergency
b. Alert	d. General emergency

## GLOSSARY OF RADIATION TERMS

**Alpha Particle** – Two neutrons and two protons typically arising from the decay of heavy metals such as uranium, plutonium and radium. The large mass and two positive charges result in large direct ionization potential but little ability to penetrate. Alpha particles cannot penetrate through a piece of paper or skin.

**Beta Particle** – Negatively or positively charged particle emitted from the nucleus as an unstable atom. They can penetrate the skin.

**Biological Half-life** – The times it takes for the body to reduce the amount by one-half its original amount through elimination.

**Electromagnetic Wave** – Energy resulting from changing electric and magnetic fields. Long wave lengths are x and gamma rays where the shorter wave lengths are ultraviolet and visible lights and the shortest wave lengths are radar, radio and television.

**Fallout** – The descent of airborne particulate matter. Although this could refer to soot, dust, etc., it is now generally used in reference to radioactive materials incorporated in particulate matter such as dust and sand as the result of a nuclear detonation or release of radioactive materials from a nuclear power plant.

**Gamma rays** – A nuclear electromagnetic ray with no mass or charge. Gamma rays can penetrate many centimeters into the tissue.

**Ionizing Radiation** – Radiation as a result of radioactivity.

**Irradiation** – The submission of an object to radiation whether it is solar, radioactive or heat.

**Neutrons** – A man-made nuclear source of nuclear radiation resulting from a fission process. There is no electrical charge and neutrons can travel considerable distance in the air and penetrate the body tissues.

**Radioactive Decay (half-life)** – The amount of time it takes for an element to reach half of its initial value. The decay rate is the rate of disintegration of a radioactive material.

**Radioactivity** – The spontaneous disintegration of atoms from an unstable form to a more stable form; the transformation rate of an atom resulting in the emission of radiation in the form of alpha, beta or gamma rays.

**Radiation** – Kinetic energy being emitted in rays such as heat, light, sound and radioactivity.

Radionuclide – Any radioactive material. Radioisotope should be used in referring to a specific element.

Radiotoxicity – The relative hazards of the various radionuclides and electromagnetic rays and their effect within the body.

X-rays – An artificial source of ionizing radiation. It has the same physical properties of gamma rays but this form of radiation is used in diagnostic and therapeutic applications.

## Summary

In this unit you learned how the four phases of emergency management – mitigation, preparedness, response and recovery – can be applied to the emergency management and response to technological hazards. At each level you were given practical advice to protect yourself and your animals from the dangers that these hazards cause.

# Animals in Disasters

## MODULE A UNIT 7

### The Care of Pets in Disasters

#### Overview

This unit gives practical advice for pet owners and caregivers. It is the most comprehensive of the units in terms of protecting your pets in a disaster. It reviews the four phases of emergency management and gives specific recommendations for mitigating, preparing for, responding to and recovering from all types of disasters. Special emphasis is given to your emergency plan and disaster kit.

#### Objectives

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

- ▶ Prevent losing your pet in a disaster
- ▶ Develop an emergency management plan
- ▶ Act in a safe and responsible way during a disaster
- ▶ Aid your pet in the disaster recovery process
- ▶ Apply the four phases of emergency management to the care of pets in disasters

#### The care of pets in disasters

Although we all like to think, “It will never happen to me,” disasters can strike anyone at any time. We typically think of disasters as cataclysmic events such as floods, hurricanes, or earthquakes. However, individual family disasters are much more common. It is estimated that the United States suffers more than 150,000 household fires; 10,000 violent thunderstorms; 5,000 floods; 800 tornadoes; many forest fires and several hurricanes and earthquakes every year. Each year, two to three million people are affected by disasters. Many of these people own animals and must provide care for these animals and themselves.

Disasters can strike quickly and unannounced

Often you cannot prevent a disaster from occurring but you can reduce the impact of a disaster. A little planning goes a long way toward reducing injuries, death and suffering. This applies to your pets and yourself. You and your pets will need shelter, water and food. You should also consider the stresses that will be imposed on owners and their pets. Mental health providers are a good resource when the disruption of the daily routine results in pain, fear and confusion.

You are ultimately responsible for the survival and well-being of your pet. You should have an emergency response plan and readily accessible kits with provisions for family members and pets.

## Mitigation

The best way to mitigate disasters for your pets is to avoid the disaster in the first place. Throughout this course you have learned about mitigation for specific hazards. All of these mitigation measures will help reduce the impact of or avoid disasters for your pets too.

To prevent losing your pet in a disaster

With unfamiliar sounds, smells and sights that follow a disaster, pets can easily become confused and get lost.

- ▶ Dogs and cats should wear appropriate identification at all times. Examples of appropriate identification include: tags with your name, address and phone number. You should also include the phone number of a friend or relative from out-of-state. More permanent methods include microchips, freeze marking and tattoos. Examples of appropriate identification for birds include: leg bands, microchips or tattoos. These are most useful if the information on them is included in a national registry.
- ▶ Current photographs of your pet will help with identification after a disaster. You should also send photos of your pet to your out-of-state friend or relative.
- ▶ Know your cat and dog's common and favorite hiding places. Once the chaos starts, this is where you will find them.
- ▶ Make a list of the places where you can get veterinary care, food, shelter and housing for your pets in an emergency. Find out what they provide and what they would need from you. Make a commitment to gather this information now. Special facilities may be required for birds or exotic animals.

## Preparedness

Develop an emergency plan and practice it

How can you get started with emergency preparedness? The following recommendations will help reduce the impact of a disaster.

- ▶ Start by imagining the types of disasters that you might encounter. This is the first step toward developing an effective disaster plan.
- ▶ Develop a general family disaster plan. The American Red Cross provides excellent courses for this and has brochures that will help you and your children in developing and exercising your plan. Add specific plans for your pet.
  - ▶ Practice evacuation of your family and pets until you can evacuate within a few minutes. Everybody in the family should participate, including your pets.
  - ▶ Decide on a place where your family will meet if you get separated.
  - ▶ Decide who will take care of your pet and where he or she will stay during a crisis.
  - ▶ Determine the best room in the house to leave your pet if you must evacuate without your pet. This will vary with the type of pet you own and the type of disaster.
  - ▶ Make arrangements for pet care with neighbors, family and friends. Make sure they have keys to your house and leave information on where you will be, how you can be reached, which room the animals are in, and how to care for your pets.
  - ▶ Think of who you would phone outside of your area. Often people cannot phone into a disaster zone, but it is possible to phone out. An out-of-state contact can help relay information and keep your family connected.
- ▶ Keep a supply of quarters to use for pay phones as they will most likely be the first public communication to resume.



- ▶ The best emergency plans involve many people and systems that can back each other up. Here are some people and groups you need to get involved:
  - family,
  - friends,
  - neighbors,
  - your veterinarian,
  - your local animal control or humane shelter,
  - local boarding and grooming kennels, and
  - local hotels and motels in your area that accept pets.
- ▶ An effective and proven method of ensuring help in a disaster is to establish a telephone tree. Telephone trees work when one person phones two friends to see if they need help or to request help. These two people each phone another two people and so on.

Accustom your pets to sudden actions as would be needed in a disaster

Actions taken in preparation for a disaster include the following.

- ▶ Train your dog. Obedience may save its life during an emergency and help to make it a welcome guest.
- ▶ Familiarize your pet with its transport crate before a crisis.
- ▶ Familiarize your pet with being transported. You can practice drills with your pet by getting it used to riding with you in your car. That way it will not be unduly alarmed if it has to evacuate in a disaster.
- ▶ Cats can be very difficult to catch when they are stressed or afraid. Practice catching and transporting your cat in a crate and carrying it around the house. This will allow your pet to become familiar with the transport box.

## Prepare a disaster kit for each pet

You should have a disaster kit for each pet. Do not store kits in the kitchen or the garage. These are frequently the areas where fires start. Kits and their contents should be easily retrieved and kept in rodent- and ant-proof containers. Check the contents of the disaster kits twice a year when the clocks change for daylight savings. Rotate all foods into use and replace with fresh food every two months. Here are some items that are recommended for your disaster kit:

- ▲ Extra collars and tags, harnesses and leashes for all pets (including cats).
  - ▲ Muzzles may be needed to control agitated and aggressive animals – for dogs, these can be made from gauze rolls or panty hose. A muzzle or towel can be used for cats. A towel can be used to restrain your bird if it becomes agitated and aggressive during the confusion.
  - ▲ Extra pet food to avoid diet changes in stressful situations.
  - ▲ Toys or blankets your pet will find familiar.
  - ▲ A manual can opener.
  - ▲ A supply of stored drinking water.
  - ▲ Food, water, and bowls for each pet.
  - ▲ Paper towel, plastic bags, and spray disinfectant for animal waste clean up.
  - ▲ Copies of your pet's medical and vaccination records. Boarding facilities may not accept your pets without proof of health.
- ▲ If your pet is on medication, ask your veterinarian about keeping extra supplies of medication or a copy of the prescription for these medications in your kit. Mark your calendar to replace medications before they expire.
- ▲ Include a recent photo of your pet.
- ▲ Your crate should be easily accessible and large enough for your pet to stand up and turn around. Since animals may be sheltered in open facilities, make sure there is enough bedding to keep them warm. You should also label the crate with your pet's name, your name and where you can be reached.

- ▶ A first aid kit should include only materials that you know how to use. Remember that if your pet has a problem and you do not know exactly what it is, you should consult a veterinarian. Useful items for a first aid kit for pets include:
  - bandaging materials to cover wounds,
  - animal antiseptic ointment,
  - clippers,
  - latex gloves, and
  - tweezers.

### Your pet's health

To minimize ill health effects of a disaster, make sure that:

- ▶ Your pet's vaccinations are current. Most vaccinations are repeated yearly. Rabies is repeated every three years in most species, but may be required yearly (depending on the type of vaccine and State requirements).
- ▶ Keep copies of your pet's current vaccinations, health and ownership records in your disaster kit.
- ▶ If your pet requires regular medications, keep a current copy of your pet's prescription or extra supplies in your disaster preparedness kit.

### Special recommendations for birds

The care of birds in disasters requires special consideration. Following are some recommendations.

- ▶ Determine if your birds need a continuous supply of power. Purchase a generator to meet your facilities' needs. Make sure your generator is in good running condition by starting it monthly.
- ▶ Make sure you have a sufficient water supply. Large water containers with chlorinated water (10 drops of chlorine bleach to each gallon of water) can be used to store water that prohibits bacterial growth. Store water away from sunlight.
- ▶ Aviaries should be equipped with an overhead sprinkler system. This will be very important to minimize smoke inhalation, cool the air and reduce the chance of burn injuries.

- ▶ Aviculturists should have enough carriers on hand to evacuate all birds. Many birds will run into their nest boxes during a crisis. Nest boxes should be equipped with quick-release latches and a hinge-type cover over the entrance to enable you to remove the nest box and use it as a pet carrier. Flights should be constructed with easy access into and out of them.
- ▶ Birds often require specialty foods. Make sure you know what these are and where you can get them. Although surplus food can often be refrigerated, this may not be possible in a disaster, when the power supply is out.
- ▶ If vaccinations are appropriate for your bird, be sure they are up-to-date. Consult your veterinarian to learn which vaccinations are appropriate.
- ▶ Birds should be tested and free of psittacosis and tuberculosis. These are serious diseases and are transmissible to many other animals and people.
- ▶ Do not leave your birds where they can be exposed to fumes from fires or chemicals. Birds are sensitive to smoke and fumes and succumb quicker to smoke than most other animals.

## Response

Several actions will help ensure a safe response to a disaster. Several of these are listed below.

- ▶ Stay calm and assess the situation.
- ▶ Never put yourself or others at risk. Do not attempt to rescue your pet if your life or health or that of others may be placed in danger.
- ▶ Crate your cat or dog immediately. If you do not, your pet may sense danger. This will make them want to hide and they become more difficult to catch and crate.
- ▶ Listen to the emergency alert system on your radio or television for instructions on what you should do and whether special arrangements have been made for people with pets. Follow these guidelines and incorporate them into your actions.
- ▶ If your pet has been exposed to chemicals, get information on how to handle it without harming yourself. You should have identified sources of veterinary care and other information in your emergency plan.

In some situations, circumstances may force you to leave your pet behind. **Leaving your pet behind is only a last resort.** If you must leave without your pet, you should leave them in your home. Under these conditions, the following advice should be helpful:

- ▶ Under *no* circumstances should you *ever* leave your pet tied up outside or let them loose to fend for themselves. Roaming dogs are a public health hazard and owners remain responsible for any injuries or damage caused by your dog. In large disasters where loose animals become a problem, animal control shelters often have no other option than to treat these animals as abandoned. Many pets have to be adopted, fostered, or euthanized.
- ▶ Do not leave unfamiliar foods and treats for your pet. They may overeat which leads to intestinal problems. Provide water in a heavy bowl that cannot be tipped over.
  - ▶ Always keep exotic pets in separate rooms. Many exotic pets can be very dangerous to disaster personnel and other animals not familiar with them or who encounter them unexpectedly. Leave warnings and handling instructions for all exotics, especially poisonous ones.
  - ▶ Paste labels clearly for rescue workers to see what animals they will encounter, how many and where they can contact somebody familiar with how to take care of them.
- ▶ Make sure somebody knows where you can be contacted and what the needs and location of your pets are.
- ▶ **Leaving your pet behind in a disaster may decrease its chances of survival.**

Special  
recommendations for  
birds

The following actions are specially recommended for birds.

- ▶ Check your bird for injury and exposure to chemicals. If you have any concerns about the health of your birds, contact a veterinarian. If you think or know that your bird has been exposed to chemicals, contact your veterinarian before treating it yourself.

- ▶ Many avian and exotics will show signs of disease (respiratory, gastrointestinal, etc.) several days after a stressful episode. This is very common in birds. Any bird showing signs of lethargy, loss of appetite, depression or injury should be evaluated by a veterinarian. If the animal is bleeding, apply direct pressure with a small piece of cotton cloth until you can get help. Do not remove the cloth as this may start the bleeding again.
- ▶ If you have to move to new surroundings, do not remove your bird from its cage. When birds are frightened, they may become aggressive or fly away.
- ▶ If electricity is available, many birds benefit from having a heating pad under their cage in times of stress. Blankets placed over the cage can also minimize stress.

## Recovery

When the disaster has passed, it is not uncommon to find that once familiar surroundings have been rearranged. Pets that rely on visual and olfactory (scent) cues may become disoriented.

Here are some guidelines that may help you through the recovery period.

- ▶ Check your pet for injury and exposure to chemicals. If you have any concerns about the health of your pet or their exposure to hazardous materials, contact a veterinarian before you attempt to treat them.
- ▶ If you have to move to new surroundings, do not remove your pet from its crate until it is calm. Do so only in a closed room.
  - ▶ Be careful in allowing your cat or dog out after a major disaster. Follow the recommendations of the emergency management personnel as to whether the environment is safe for you and your pet.
  - ▶ Give your pet small amounts of food and water several times throughout the day. The volumes of food may be increased to normal over three to four days.

- ▶ Let your pet have plenty of uninterrupted sleep. If you still have your pet's favorite toys, encourage them to play. This will allow them to recover from the stress and trauma.
- ▶ Avoid unfamiliar activities with your pet, such as bathing, excessive exercise, or diet supplements. Try to avoid diet changes.
- ▶ If you and your pet are separated, pay daily visits to local shelters, animal control facilities, veterinary offices

and kennels until you have found it. A phone call is often not as effective as a visit. You can also post photos of your lost pet. If your pet has tattoos, a microchip or other permanent identification, this will increase the chances of finding it. Be aware that collars and tags are sometimes lost.

- ▶ If you find a stray animal, take it to a shelter or other facility set up for lost and found animals. Place an advertisement in the local newspaper to inform the owner where the pet was taken. Often newspapers run found ads for free.
- ▶ Share your experiences with friends and family. Talking about your experiences will help you deal with them and offers great stress relief.
- ▶ Consider seeking professional counseling, as recovery is aided when guided by professionals experienced in dealing with disasters.

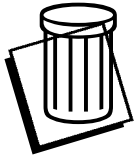


## CHECKLIST FOR DISASTER PREPAREDNESS FOR PETS

Do you have the following items ready?

- Your written family disaster plan
- Disaster preparedness kit
- Crate and bedding
- Food, water, manual can opener, and dishes
- Plastic bags, paper towels, newspaper (when shredded, can be used as cat litter), disinfectant
- Collar, leash, harnesses
- Muzzles, gauze rolls
- Identification tags
- Current medical and vaccination records
- Extra bottles of daily medications or copies of prescriptions with current expiration date
- Current photos
- Pet comfort items: towels, blankets, toys
- A list of hotels, motels and boarding kennels that accept pets
- Detailed instructions for animal care and rescue workers
- First aid kit
- Flashlights, batteries
- Copies of health certificates
- Out-of-state telephone contact
- Flat tire repair kit





## LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT THE CARE OF PETS IN DISASTERS?

This activity is designed to assess your understanding of the information presented in this unit.

**Directions:** Answer the questions – use the Answer Key in Unit 10 to check your answers.

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### True or False

1. Law enforcement and firefighters are ultimately responsible for the survival and well-being of pets.
2. Permanent identification or identification tags and collars should be on animals at all times.
3. Current photos of your pets should be kept in your disaster kit and sent to your out-of-state contact.
4. Personal safety must be considered before the safety of animals.
5. Turning your pets loose in a disaster always increases their chance of survival.
6. Pets lost after a disaster can always find their way home using olfactory or visual cues.
7. Disasters are usually predictable and preventable.
8. It is best to keep your disaster kit in the kitchen.

### Multiple Choice

9. How often should rabies vaccinations be repeated? (For most species of animals)
  - a. Twice per year
  - b. Every five years
  - c. Every ten years
  - d. Every one or three years
10. If you are asked to evacuate, which one of the following actions is the safest for your pets?
  - a. Tie pets up outside
  - b. Let pets loose
  - c. Leave pets in your home
  - d. Take pets with you

## Summary

In this unit you learned how the four phases of emergency management – mitigation, preparedness, response and recovery – can be applied to the care of your pet in a disaster. At each level you were given practical advice to protect yourself and your animals from the dangers that all types of hazards cause.

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# Animals in Disasters

## MODULE A UNIT 8

## The Care of Livestock and Horses in Disasters

### Overview

This unit gives practical advice for the farmer or large animal caregiver. It is the most comprehensive of the units in terms of protecting your livestock and horses in a disaster. It reviews the four phases of emergency management and gives specific recommendations for mitigating, preparing for, responding to and recovering from all types of disasters. Emphasis is given to issues such as evacuation of large animals and the restoration of farms as businesses.

### Objectives

Upon completion of this unit, you should be able to do the following:

- ▶ Prevent flooding, fire or power failures from harming your livestock and horses
- ▶ Safely transport, communicate and obtain medical assistance for your livestock and horses in disasters
- ▶ Evacuate, feed and identify your livestock and horses in a disaster
- ▶ Take steps to ensure that your animal-related business fully recovers from a disaster
- ▶ Apply the four phases of emergency management to the care of livestock and horses in disasters

### The care of livestock and horses in disasters

Many farms are vulnerable to natural disasters and require special consideration in the protection against disasters. Their owners depend on the farm's income for their livelihood. There are often many chemicals, such as fertilizer, herbicides and pesticides, that can be spilled in a disaster. In this section, you will learn about some of the basic principles of disaster mitigation for livestock and horse farms.

Farms in disasters are of concern for many reasons, some of which are listed below.

- ▶ The safety of the human food supply depends on the health of food-producing animals.
- ▶ Owners have personal and financial investments in their animals.
- ▶ Farm owners may be injured or killed attempting to rescue their animals in disasters.
- ▶ For many States and businesses, livestock, poultry and horses are a vital source of revenue.

Protecting and saving human life is the first priority of disaster relief. Protecting property is of secondary concern. Because of this, emergency management officials are not trained to deal with animals as property or the restoration of animal-related businesses. Therefore, farm owners should work with their emergency management agency and other groups before a disaster. Though, they should remember that the care of and responsibility for all animals lies with their owner or designated care provider.

## Mitigation

There are many things that can be done on farms to mitigate disasters. Some of these are listed to follow.

- ▶ Build and repair buildings to meet or exceed construction codes and consider ease of evacuation.
- ▶ Replace or cover glass windows with materials that will not shatter and injure animals or personnel.
- ▶ Make sure that drainage ditches have grass covering (maintain sod).
- ▶ Prevent ground-burrowing animals from damaging dams and levees.
- ▶ Avoid accumulating piles of trash that can spill onto other persons' property and injure animals and people.
- ▶ Store chemicals in storm-proof buildings and secured containers.
- ▶ Do not leave construction materials unsecured. In high winds, these may become projectiles.
- ▶ Drain or build levees around ponds that could flood.

- ▶ After evacuating the barn, always close the barn doors to prevent animals from running back inside the barn.

## Flooding

Many farms are in floodplains, but some farm owners and managers have a false sense of security. Many people do not realize that living in a 100-year floodplain means that the chance of flooding is calculated as 1 percent chance of flooding per year or 30 percent chance in the life-span of many mortgages. The following resources are available.

County area planning offices compile information on floodplains in their community. The natural resources department can provide maps and flood-risk assessment information on every property in their State. Farm owners should gather this information, review the location of their property, and engineer access to their property that will not leave them stranded during flooding. Civil engineers can help in the design and construction of flood-protected farm accesses and make recommendations on

suitable locations for barns, stables, paddocks and high-lying areas that may be used as pasture ground in the event of a flood.

A common aftermath of flooding is the overflow of manure pits and waste lagoons. This can contaminate the environment, rivers and the drinking water supply. If this occurs, the environmental department will be interested in the environmental impact and the natural resources department will be concerned with river contamination and potential fish kills. Farmers can be fined for violations against regulations of both departments. To prevent this from happening, farmers should take the following precautions.

- ▶ Have lagoons regularly inspected.
- ▶ Diligently keep records on the impact lagoons have on the environment and water shed.
- ▶ Discuss plans to divert manure from streams and rivers with the local county extension educator and representatives from the appropriate State departments. (Similar issues surround all waste disposal systems on farms.)

Another common problem on farms in disasters is hazardous materials spills. Storing hazardous materials in locked buildings with securely strapped containers should prevent these from leaking into the environment and water supply.

After floods there may be an increase in infectious disease.

- ▶ Animals that have stood in contaminated flood water will be at increased risk and may develop infections of the hooves and skin (dermatitis).
- ▶ Cuts acquired from disaster debris make animals more susceptible to tetanus and contaminated floodwater may contain toxins, including botulinum toxin from rotting carcasses. Contact with wildlife may also increase the potential for rabies.

## Fire safety

Barn fires tend to break out in the winter and summer months when barn doors are closed and the demand for heating, cooling (fans) and lighting is at its highest. Many livestock facilities are built of flammable materials and some contain gas heaters. Safety measures to prevent the damage caused by fires include the following.

- ▶ Fire extinguishers, sprinkler systems, smoke detectors and enforced no smoking policies can greatly reduce the risk of fires.
- ▶ Electrical wiring of barns and stables should meet appropriate safety standards and be installed by qualified electricians. Professional advice is available to help with these.
- ▶ The State department of building and fire safety and most local fire departments provide low-cost inspections and recommendations on fire safety for properties. The recommendations are detailed and will provide the highest standards by which to prevent fires.
- ▶ Farm owners should consult with their local fire department on how to fireproof their stables. This also familiarizes farm owners and local firefighters with one another. This familiarity is helpful in the event of an emergency. Knowing where a farm is located, how to access facilities, how many animals are there, and where large volumes of water are available can make the difference when firefighters are responding.

Power supply and miscellaneous repairs

Priority for restoration of power following an emergency is usually based on human population density. Because many farms are in rural areas, it could be some time before power is re-established. Many livestock operations depend heavily on electrical power to milk cows, provide heat and cool air (fans), and operate feed elevators and machinery. Owners can find out about the relative priority of their farm from their local utility company. This important information can help farmers prepare for times without power.

Farm owners should consider securing a generator for emergencies. A representative from the electricity company or Cooperative Extension Services can advise on the energy requirements to run a farm, the size of generator and provide information on sources, maintenance and costs of generators.

Preparedness

The priorities for disaster planning for farms varies to some extent with the type of animals and facility. In general terms, the greatest priorities, i.e., the most likely disasters to occur, are trailer accidents, floods, fires, power outages and contagious disease outbreaks. Some locations will have additional hazards to consider, such as high winds, landslides, and hazardous materials. Owners should consult their local emergency management office on what type of help is available and where to get it.

Safety in animal transport

Transportation accidents are one of the most common disasters that horse and livestock owners will encounter. Preventive measures include regular inspection of trailers and tow vehicles for safe operation (including checking tire pressure). Reading materials and videos are available. Refer to the appendix for some recommendations.

Communications

Dependable communication is fundamental to identify immediate sources of help and where it will be needed most. A few methods of emergency communication are described to follow.

Buddy System	Neighbors and friends determine ahead-of-time who will be responsible for checking on and helping whom, which resources will be shared, and generally improve their knowledge and sensitivity of animal welfare.
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Telephone tree	Every person in an affected area phones two to three other people to see if they need help. These people in turn phone two to three others, and so on. Telephone trees should be tested periodically and revised if necessary.
"Help" or "OK" signs	Visible from the road, these are a simple, effective method of advising others as to your status.

Veterinary preparations for a disaster

The priorities in veterinary care vary with each disaster.

- ▶ In high winds, tornadoes and hurricanes, traumatic injuries will predominate.
- ▶ In droughts and in severe winter weather, starvation and dehydration may be problems.
- ▶ Following fires, smoke inhalation and burn wounds will be issues that require veterinary attention.

Many disasters also have distant effects on animals, e.g., debris on pastures many miles from a tornado touchdown and moldy corn following a flood can be a problem after a disaster. If you are concerned about diseases that may result from a disaster you should consult your veterinarian. If animals die or have to be euthanized, it is recommended that a post-mortem examination be performed at the State diagnostic laboratory so that insurance and legal claims can be settled should they arise. Photographs and videos can aid in documentation.

In disasters, farm animals may be forced to congregate. Horses from several farms may mix resulting in contagious diseases. Be aware that changing social structure may result in aggressive behavior leading to injury. Some measures can safeguard the health of horses and livestock in disasters – vaccinations, deworming, and Coggins tests for horses.

Veterinarians can also instruct their clients on first aid for horses and livestock and advise on the contents and appropriate use of first aid kits.

## Response

### Evacuation

Farm evacuations present unique problems. Appropriate planning is essential. Evacuations are best coordinated with neighbors, friends, livestock associations and horse clubs, and county extension educators. Both the destination and the method of transport need to be sorted out well in advance of any need.

### Feeding

When livestock and horses are evacuated and housed in large numbers, adequate amounts of feed may be difficult to procure.

- ▶ Develop lists of feed and hay suppliers in your area.
- ▶ Avoid dietary changes. When the diets of horses or livestock change, they become predisposed to colic, laminitis and metabolic diseases. Feeding diets that have moderate energy levels and meet the minimum nutritional requirements reduces the likelihood of illness.

Use the following table to judge how much water and feed your animals may need.

Short term dietary requirements for farm animals during disasters —  
For specific amount and type of feeds, consult your veterinarian

Animals		Amount of water per day (higher amounts apply to summer months)	Amount of feed per day
Dairy cows	In production	7-9 gal	20 lb hay
	Dry cows	7-9 gal	20 lb
	Heifers	3-6 gal	8-12 lb hay
	Cow with calf	8-9 gal	12-18 lb legume hay
	Calf (400 lb.)	4-6 gal	8-12 lb legume hay
Swine	Brood sow with litter	4 gal	8 lb grain
	Brood sow (pregnant)	3 gal	2 lb grain
	Gilt or boar	1 gal	3 lb grain
Sheep	Ewe with lamb	1 gal	5 lb hay
	Ewe (dry)	3 qt	3 lb hay
	Weanling lamb	2 qt	3 lb hay
Poultry	Layers	5 gal per 100 birds	17 lb per 100 birds
	Broilers	5 gal per 100 birds	10 lb per 100 birds
	Turkeys	12 gal per 100 birds	40 lb per 100 birds
Horses	All breeds	5-12 gal per 1000 lb	20 lb hay per 1000 lb
Cats and Dogs	All breeds	1 qt per animal	ad libitum dry food

In areas where legume hays such as alfalfa are routinely fed, this type of hay alone is likely to provide sufficient amounts of nutrition under emergency conditions. In other situations, 25 percent of the energy should be supplied from oats or sweet feed and 75 percent from hay. All horses should also be regularly fed bran as a laxative.

Identification of animals

In large-scale disasters when many animals are evacuated, identification of the animals and their owners is difficult. Ideally all animals should be uniquely and permanently identified. Consider that identification serves two purposes:

- ▶ The owner can positively identify their animal, and
- ▶ Others can trace the owner.

Horses can be permanently identified by microchips, freeze marking or tattoo. Owners should have current front and side view photographs. However, when this is not the case, e.g., when livestock and horses have to be evacuated suddenly, emergency identification methods can be used. These include:

- ▶ Painting or etching the hooves,
- ▶ Body marking with crayon,
- ▶ Clipping phone numbers or farm initials in the hair,
- ▶ Neck banding,
- ▶ Identification tags on halters, and
- ▶ Glue-on numbers.

**Hazardous materials** During floods, following tornadoes and earthquakes, hazardous materials can be knocked over and contaminate the environment and animals. While farmers are often qualified to handle hazardous materials commonly used on their farms, farm owners should be aware that proper training and hazardous materials certification are required to deal with releases and the potential contamination of the food supply. Untrained persons should not deal with hazardous materials at all. If you are concerned about a hazardous materials release, phone 911.

**Recovery** Farms are traditionally concerned with restoring the animal industries following a disaster.

- ▶ The long-term recovery phase of a disaster can be protracted, with substantial adjustments occurring in the disaster-stricken community.
- ▶ Restoration of businesses is facilitated through low-interest loans supplied by the Small Business Administration and local banks. Businesses with appropriate insurance coverage are most likely to have the best recoveries.
- ▶ Farms often have special claims programs for recovery from disasters – farmers should pay special attention to these and consult their State emergency management officials and county extension educators on what is available. In the past, farmers have been unaware of the sources of funding available to them to help recovery.

## Relocation

Every farm owner should have alternative accommodations planned for their animals in the event of a disaster. These contacts should be confirmed at least once per year. County extension educators often have good relationships with the owners and managers of fairgrounds, racetracks, etc. and may be consulted when identifying facilities that may be available. Be sure when selecting facilities to choose those that will not likely be affected by the same disasters you are planning for.

Consideration should be given to how large amounts of manure will be disposed – this will accumulate and pose a significant animal and human health problem. Plans should be made for disposal of carcasses.

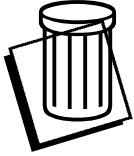
## Restoration of farms as businesses

Farms are often affected by local disasters, such as fires, floods, chemical spills, and tornadoes. It is estimated that only 5 percent of small businesses affected by a major disaster ever recover to a functional state. This is likely due to inadequate insurance coverage. Farms without sufficient records will have a difficult time making an adequate insurance claim. Major concerns for small businesses, including farms, in disasters include the following.

- ▶ Personnel,
- ▶ Cash flow,
- ▶ Continued income for employees,
- ▶ Continued provision of quality care for animals,
- ▶ Restoration of a functional business,
- ▶ Changes in community infrastructure, and
- ▶ Customer, buyer and supplier loyalty.

Many of these issues can be addressed before a disaster by obtaining adequate insurance coverage and entering into agreements with neighboring farms to share facilities and resources.

In addition, farms may obtain assistance from the Small Business Administration and if the President requests special funding from congress, the Federal government. Agricultural emergency assistance funding is administered through the Secretary of Agriculture. The chairperson of this board is usually executive director of the State's Agricultural Stabilization and Conservation Service.



## LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT THE CARE OF LARGE ANIMALS IN DISASTERS?

This activity is designed to assess your understanding of the information presented in this unit.

**Directions:** Answer the questions – use the Answer Key in Unit 10 to check your answers.

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### True or False

1. Barn fires usually occur in the spring.
2. The buddy system is an effective means of communication in disasters.
3. Video and photos can aid in identification and documentation of deceased animals.
4. Manure disposal is not a concern following disasters.
5. There is no permanent method of identifying livestock.
6. Farmers are often qualified to handle hazardous materials commonly used on their farms.
7. Because farms are businesses, they are usually high in priority for the restoration of power during outages.

### Multiple Choice

8. The chance of flooding in a 100-year floodplain is \_\_\_\_\_ per year.
 

a. 0.1 percent	c. 10 percent
b. 1 percent	d. 100 percent
9. Which of these is a **temporary** method of identifying livestock?
 

a. Microchip	c. Tattoo
b. Freeze marking	d. Etching hooves
10. Which type of veterinary concern will predominate following high winds, tornadoes, and hurricanes?
 

a. Starvation	c. Traumatic injuries
b. Dehydration	d. Bacterial infection

## Summary

In this unit you learned how the four phases of emergency management – mitigation, preparedness, response and recovery – can be applied to the care of your livestock or horses in a disaster. At each level you were given practical advice to protect yourself and your animals from the dangers that all types of hazards cause.

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## Review

### Instructions

Now you have completed the units of instruction for this Module. Before moving on to the final examination, let us revisit the scenarios presented in Unit 2. As you will recall, the scenarios included information and questions for animal owners and emergency managers. Having completed this Module, think about how your answers to these questions may have changed.

1. A train carrying propane derailed and prompts the immediate evacuation of 1000 households in a 2-mile radius. You estimate that approximately 50 percent of families in the evacuation area own animals.

Emergency Managers: Do you have an action plan to evacuate people with their animals, and know where to house the animals?

Animal owners: How would you evacuate with your animals? What supplies would you take for your pets? Where would you shelter your animals?

2. During Hurricane Jackie many persons become separated from their horses.

Emergency Managers: How would you reunite the horses and their owners?

Animal owners: There are 35 bay mares in a temporary enclosure for horses. If one of them were yours, how would you positively identify it to a security guard at the pasture?



3. In a tornado, a tank of herbicide is knocked over. It may have contaminated the grain bin on a dairy farm and been sprayed onto the skin of some pigs at a neighboring farm.

Emergency Managers: What are the potential public health risks associated with contaminated livestock feed and food-producing animals?

Animal owners: Who would you contact to determine the safety of your cows' feed and to determine the potential contamination of the milk?

The pigs do not appear to be affected.

Who can determine the withdrawal times for safe slaughter of the pigs for human consumption?

4. Many farms are in low-lying areas close to rivers. Flooding is a problem that can result in animals drowning, and difficulty in supplying feed to stranded animals.

Emergency Managers: How many farms in your community are potentially affected by floods and what types and numbers of animals do they have? How would you obtain this information?

Animal owners: How could the problem of recurrent flooding be prevented? What department in your State could help you in this regard?

5. During a heat wave there is a local power failure that results in the death of 500,000 chickens in two adjacent barns.

Emergency Managers: What emergency power supplies could have been mobilized and prevented this costly loss?

Animal owners: How would you dispose of this large mass of dead birds?

6. A brush fire precipitates the escape of a large private collection of exotic animals. The animals include lions, tigers and bears. There is great risk of people being injured. The animals are very valuable and belong to an influential local resident.

Emergency Managers: Should the escaped animals be killed or captured?

What factors would help you reach the most appropriate decision.

Animal owners: Whom would you call in your jurisdiction to help you with this situation?

# Animals in Disasters

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MODULE A  
UNIT 9

## Module A Final Examination

### How to take the Module A final examination

The following Module A final examination is a test to find out how much you have learned about emergency management from this course.

While taking the test, read each question carefully and select the answer that you think is correct after reading all the possible choices. Complete all of the questions. You may refer to the course materials to help you answer the questions.

When you have completed the examination, please log onto <http://training.fema.gov>, click on FEMA Independent Study and follow the links to the course. Your answers will be scored and the results returned to you as quickly as possible. If you score at least 75 percent, you will receive a certificate of completion from FEMA. If you score less than 75 percent, you will have another chance to take the test.

This examination consists of 44 questions. The test should take no more than 60 minutes. Find a quiet spot where you will not be interrupted during this time.

## Animals in Disasters: Module A Examination

**Directions:** Carefully read each question and all of the possible answers before you mark your answers. There is only one correct answer for each test item.

- 
1. True (A) or False (B). The care of animals in disasters does not affect the safety and care of humans.
  2. True (A) or False (B). The care of animals in disasters is equally important to the care of people.
  3. The best disaster preparedness starts at which level?
    - a. Personal
    - b. State
    - c. Federal
    - d. National
  4. Which level of emergency management is the best for providing policy guidance and additional resources?
    - a. Personal
    - b. Local
    - c. State
    - d. Organizational
  5. Which level of emergency management is the best for implementing comprehensive emergency management programs?
    - a. Personal
    - b. Local
    - c. State
    - d. Federal
  6. Of the various levels of emergency management, which is the most important at which to develop emergency management plans?
    - a. National
    - b. Local
    - c. State
    - d. Federal
  7. A measure you can adopt to **mitigate** the impact of thunderstorms includes which one of the following?
    - a. Monitor weather forecasts
    - b. Evacuate with your animals
    - c. Clean up and repair damage
    - d. Obtain appropriate insurance

8. If you encounter a person or an animal that has been struck by lightning, how should you respond?
  - a. Clear the area, you may be at risk for electrocution
  - b. Do not attempt to give medical assistance as the victim may carry an electrical charge
  - c. Seek emergency medical assistance and administer first aid immediately
  - d. Do nothing – the victim will recover without assistance
9. True (A) or False (B). During the flood recovery process, you should empty all containers that contain contaminated water and clean them with dilute chlorine bleach.
10. Good flood **preparedness** includes which one of the following?
  - a. Before entering a building or barn, check for structural damage
  - b. Replenish emergency building materials such as sandbags, plywood and lumber
  - c. Evacuate if told to do so
  - d. Install check valves in building sewer traps
11. Which of the following may potentially create a tornado?
  - a. Hurricane
  - b. Wildfire
  - c. Earthquake
  - d. Drought
12. If you are in your home, which of the following is the best **response** action to take if there is an impending tornado?
  - a. Crouch in a doorway
  - b. Seek shelter near exterior walls
  - c. Go outside and lie in a ditch or a ravine
  - d. Seek shelter in a storm cellar or basement
13. True (A) or False (B). If you have not already done so, you should attempt to evacuate when a hurricane makes landfall.
14. Which of the following is a good example of a hurricane **recovery** activity?
  - a. Keep a collar and a identification tag on your pets at all times
  - b. Inspect areas where animals are kept for loose or dangling wires
  - c. Confine small animals in carriers during hurricanes
  - d. Regularly practice leading and loading your horse into a trailer
15. Which of the following offers you the greatest personal protection when you must be outdoors during a winter storm?
  - a. Many layers of lightweight, protective clothing
  - b. Warm beverages such as coffee
  - c. Many layers of thick, loose-fitting clothing
  - d. A single layer of thick clothing

16. If your dog normally lives outside your home, which of the following **preparedness** activities offers the most practical protection when winter storms threaten?
  - a. Allow the dog to sleep inside whenever it snows
  - b. Heat dog houses with electric blankets and space-heaters
  - c. Insulate dog houses and put straw inside
  - d. Allow the dog to sleep on the floor in the garage
  
17. True (A) or False (B). Snow may be used as a supplement to fresh water for some, but not all, animals.
  
18. True (A) or False (B). If they are provided with plenty of fresh water to drink, it is safe to exercise animals in extreme heat.
  
19. Which of the following is a sign of heat stress in animals?
  - a. Excessive agitation
  - b. Slowed heart and respiratory rate
  - c. Body temperature greater than 104 F
  - d. Lack of panting and little salivation
  
20. A wildfire preparedness activity includes which one of the following actions?
  - a. Be careful of wild animals crossing the roads when you attempt to escape the fire
  - b. Clear vegetation and dead brush from around your house and barn
  - c. Place a sprinkler on the roofs and anything else that might be damaged by fire
  - d. Implement and enforce no smoking policies
  
21. True (A) or False (B). Debris that is hazardous to animals may be scattered around burned buildings.
  
22. Which of the following activities will help **mitigate** damage from landslides on your property?
  - a. Check for damaged gas, electrical, or water lines
  - b. Install rigid pipe-fittings
  - c. Plant ground cover on slopes, or build retaining walls
  - d. If you are warned of an impending landslide, evacuate at once with your animals to stable ground
  
23. If you are inside a building during a landslide, which of the following actions should you take?
  - a. Evacuate at once with your animals to stable ground
  - b. Stay inside and get under a desk, table, or other piece of sturdy furniture
  - c. Curl into a tight ball and protect your head
  - d. Try to outrun the landslide

24. Following a landslide, which of the following can lead to flash flooding during heavy rain?
- Replanting damaged land
  - Damage to or loss of buildings that house equipment and animals
  - Damaged electrical wires and gas lines
  - Erosion from the loss of adequate ground cover
25. If you are inside your home during an earthquake, what action should you take?
- Remember the safety routine to stop, drop and roll
  - Take cover under a sturdy piece of furniture to protect yourself from falling objects
  - Run outside
  - Take cover near exterior windows so that you will have an easy escape route if the building collapses
26. A good method for reuniting with your animals that have been lost in a disaster includes which one of the following?
- Drive around looking for them
  - Wait until someone finds them and calls you
  - Check local shelters on a daily basis
  - Rely on their visual and olfactory cues – they will make their way back home
27. Which of the following emergencies may trigger an earthquake?
- Flash flooding
  - Volcanic eruption
  - Drought
  - Tornado
28. During the disaster planning process, which of the following is **NOT** an important step?
- Keep vaccinations current
  - Take photos and videotapes of your pet
  - Confine animals to a small room in your home
  - Adequately identify all animals
29. An example of a tsunami **mitigation** activity would include which of the following?
- Not building within several hundred feet of the coastline
  - Listening to your radio for a tsunami warning
  - Escaping to high ground
  - Checking for injuries and seeking medical assistance when necessary
30. Which of the following is an appropriate action when recovering from a tsunami?
- Call FEMA for advice on rebuilding your property
  - Be prepared to evacuate low-lying coastal areas
  - Explore the beaches for new marine life
  - Document damage to your home and call your insurance agent

31. True (A) or False (B). Geologists can predict volcanic eruptions and warn you of the exact time, place, and extent of effects.
32. People and animals exposed to ashfall during a volcanic eruption are most susceptible to which of the following health problems?
- a. Respiratory disease
  - b. Bacterial infection
  - c. Viral infection
  - d. Traumatic injuries
33. True (A) or False (B). Animals that have been exposed to hazardous materials present no danger to people.
34. Which of the following is an effective method to protect your family and your animals from exposure to hazardous materials?
- a. Volunteer to help emergency personnel when an incident occurs
  - b. If an incident occurs and you are at work, return to your home to safely retrieve your pets
  - c. Store hazardous materials in an area where they will not freeze or overheat
  - d. Decontaminate livestock to protect the food supply
35. Which of the following government agencies is responsible for handling hazardous materials incidents that involve radioactive waste?
- a. Department of Energy
  - b. Department of Health and Human Services
  - c. Food and Drug Administration
  - d. Federal Emergency Management Agency
36. True (A) or False (B). Animal owners can easily decontaminate animals exposed to radioactive materials.
37. Which of the following is the most appropriate **response** action if your animal has been exposed to radiation?
- a. Wash the animals and the areas where they sleep
  - b. Create a distance between the animal and the source of radiation
  - c. Seek medical attention from a veterinarian before handling the animal
  - d. Take your animal with you when you evacuate
38. Following a disaster, which of the following activities is a good method for recovering a lost pet?
- a. Visit local shelters and veterinary offices weekly looking for them
  - b. Call kennels and animal control facilities several times per day to see if they have them
  - c. Check local newspapers for found ads
  - d. Look for them daily at shelters and other places where animals may be kept

39. It is best to keep your disaster kit in which of the following places?
- The kitchen where it is easily accessible
  - In a room where everyone in the family has access to it
  - In the garage where it is not likely to be damaged in a house fire
  - On a high shelf so that rodents don't eat the supplies
40. True (A) or False (B). Law enforcement and firefighters are trained to deal with pets in an emergency.
41. An effective means of communication in disasters includes which of the following?
- Local phone lines
  - Newspaper ads
  - The buddy system
  - Memorandum
42. True (A) or False (B). It is important to have an out-of-state contact because local phone lines are usually overwhelmed in an emergency.
43. Which type of veterinary concern will predominate following high winds, tornadoes, and hurricanes?
- Rabies
  - Traumatic injury
  - Hazardous materials exposure
  - Respiratory disease
44. Which type of veterinary concern will predominate following flooding?
- Infectious disease
  - Traumatic injury
  - Hazardous materials exposure
  - Respiratory disease



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# Animals in Disaster

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MODULE A  
UNIT 10

## Appendices

Appendix A	Training available through FEMA
Appendix B	Recommendations on how to deal with contaminated water
Appendix C	References
Appendix D	Modified Mercalli Scale of Earthquake Intensities
Appendix E	Wind Speed Measurement – Land and Water Comparison
Appendix F	Wind Chill Measurement Table
Appendix G	Wind Speed Matrix
Appendix H	Learning Checks Answer Key
Appendix I	FEMA-related acronyms

## Appendix A

### Training available through FEMA

#### Independent study courses available through FEMA

*Emergency Management, USA* gives an introduction to disaster hazards and preparedness to the public. This course provides a good overview of many topics with which both the public and the emergency program manager should be familiar. This course provides detailed information on the distribution of natural hazards in the United States, how to prepare family plans and how to safeguard against common household hazards. Module A of the *Animals in Disasters* course is based on *Emergency Management, USA*.

*The Emergency Program Manager: An Orientation to the Position* is designed to provide the basics of the job for the emergency program manager. Module B of the *Animals in Disasters* course is based on the Emergency Program Manager course.

*A Citizen's Guide to Disaster Assistance* provides a basic understanding of the roles and responsibilities of the local community, State, and the Federal government in providing disaster assistance. It is appropriate for both the general public and those involved in emergency management who need a general introduction to disaster assistance.

*Hazardous Materials: A Citizens Orientation* details how to identify and protect against hazardous materials. This course has a lot of useful information and is highly recommended for employees of all animal-related businesses.

Another independent study course that should be of interest for nuclear attack and fixed nuclear facility preparedness is called *Radiological Emergency Management*. Its subjects include fallout effects, exposure monitoring, and protective and decontamination measures. It also covers many other subjects that are relevant to workers in veterinary practices, where X-ray equipment and occasional radioisotopes are used for diagnostic tests.

*Basic Incident Command System* – The Incident Command System (ICS) is recognized as an effective system for managing emergencies. Several States have adopted ICS as their standard for emergency management, and others are considering adopting ICS. As ICS gains wider use, there is a need to provide training for those who are not first responders (i.e., law enforcement, fire, or emergency medical services personnel) who may be called upon to function in an ICS environment. This Basic Incident Command System (ICS) Course will begin to meet that need. The course has been developed as self-instruction but can also be delivered, with the use of an instructor, in a classroom. The course includes a large number of scenarios, examples, and opportunities for students to apply what they have learned.

## Courses available at the Emergency Management Institute

Title	Course number
Basic Public Information Course	G 290
<i>Basic Skills in Emergency Management</i>	
Decision Making and Problem Solving	G 241
Effective Communication	G 242
Leadership and Influence	G 240
Emergency Planning Course	G 235
Exercise Design Course	G 120
Exercise Evaluation Course	G 130
Incident Command System/Emergency Operations Center Interface	G 191
Introduction to Emergency Management	G 301

## Appendix B

### Recommendations on how to deal with contaminated water

If water contamination is suspected or known to have occurred, the water should be purified. There are three basic procedures for purifying water:

- ▶ Boiling,
- ▶ Purification tablets, and
- ▶ Bleach purification.

#### Boiling

Boiling is the safest method of purifying water. Bring water to a rolling boil for 10 minutes, keeping in mind that some water will evaporate. To improve taste, pour from one container to another several times.

#### Purification tablets

These tablets are available at most sporting goods and drug stores. Follow directions on the package. Usually one tablet is enough for one quart of water. For cloudy water double the dose.

#### Bleach purification

Liquid household bleach can also be used if the label lists sodium hypochlorite as the only active ingredient and there is no perfume (such as “lemon-scent”) in the bottle. Add bleach according to the table below, stir and let stand for 30 minutes. If the water does not taste and smell of chlorine after 30 minutes, add another dose and let stand for another 15 minutes. (Note: do not use this method to purify water to be used to fill a waterbed. Use a manufacturer provided purifier that will not harm the plastic).

Amount of water	Amount of bleach	
	Clear water	Cloudy water
1 qt	2 drops	4 drops
1 gal	8 drops	16 drops
5 gal	½ teaspoon	1 teaspoon

## Appendix C

### References

Topic	Source	Material	Comments
Transport safety	Blue Green Publishing Company, PO Box 1255, Southern Pines, NC 28388	Hawkins Guide on "Equine Emergencies" and "Horse Trailering on the Road"	
<ul style="list-style-type: none"> <li>• Transportation safety for horses</li> <li>• How to rescue horses from wrecked trailers</li> </ul>	Horse Park of New Jersey, PO Box 548, Allentown, NJ 08501	Videotape on "Equine Trailer Rescue"	For both horse owners and emergency management personnel
Handling manure on farms	Midwest Plan Service. Iowa State University Press. Ames, Iowa.	Livestock Waste Facilities Handbook MWPS 18. 1985	

### Others

Brownson R, Ames D. Winter Stress in Beef Cattle. Alberta Beef Herd Management. Alberta Agriculture, Calgary, Canada.

Publication 1461. Snow and wind control for farmstead and feedlot. Agriculture Canada. Calgary, Canada, 1978.

U.S. Pet Ownership and Demographics Sourcebook, Center for Information Management. American Veterinary Medical Association. Schaumburg, IL. 1997

## Appendix D

### Modified Mercalli Scale of Earthquake Intensities

	Intensity	Characteristic Effect	Richter Scale Magnitude
I	Instrumental	Detected only by seismography.	3.5 – 4.2
II	Feeble	Noticed only by sensitive people.	
III	Slight	Like the vibrations of a heavy truck passing, felt only by people at rest.	
IV	Moderate	Felt by people while walking. Objects rock, including standing vehicles.	
V	Rather Strong	Felt generally; most sleepers awakened.	4.3 – 4.8
VI	Strong	Trees sway, suspended objects swing, loose objects overturn or fall.	4.9 – 5.4
VII	Very Strong	General alarm. Walls crack, plaster falls.	5.5 – 6.1
VIII	Destructive	Masonry cracks, chimneys fall, poorly constructed buildings damaged, water levels may change.	6.2 – 6.9
IX	Ruinous	Some houses collapse where ground begins to crack; pipes break open.	
X	Disastrous	Disastrous ground cracks badly, many buildings destroyed and railway lines bent; landslides on steep slopes.	7.0 – 7.3
XI	Very Disastrous	Few buildings remain standing; bridges destroyed, all services (rail, pipelines and cables) out of action. Great landslides and floods.	7.4 – 8.1
XII	Catastrophic	Total destruction; objects thrown into the air; ground rises and falls in waves.	8.1+

## Appendix E

### Wind Speed Measurement — Land and Water Comparison

Wind Speed (mph)	Effects Over Water	Effects Over Land
1 – 3	Ripples with appearance of fish scales.	Calm; smoke rises vertically.
4 – 7	Small wavelets; crests of glassy appearance.	Smoke drift indicates wind direction; vanes don't move.
8 – 12	Large wavelets; crests begin to break.	Wind felt on face; vanes begin to move.
13 – 18	Small waves; becoming longer; numerous whitecaps.	Leaves and small twigs in constant motion.
19 – 24	Moderate waves; becoming longer; numerous whitecaps.	Dust, leaves and loose paper rise up.
25 – 31	Larger waves forming; whitecaps everywhere.	Small trees begin to sway.
32 – 38	Water heaps up; white foam begins blowing in streaks.	Large branches move, whistling from wires.
39 – 46	Moderately high waves of greater length.	Twigs and small branches broken off trees.
47 – 54	High waves begin to roll; spray may reduce visibility.	Slight structural damage occurs; slate blown from roofs.
55 – 63	Very high waves with overhanging crests.	Seldom experienced on land; trees broken, structural damage.
64 – 72	Exceptionally high waves; water covered with white foam.	Very rarely experienced on land; structural damage.
73 or higher	Air filled with foam, water white, little visibility.	Violent action, massive destruction.



## Appendix F

Wind Chill Measurement Table

Wind Data		Equivalent Temperature (Fahrenheit)														
		Locate temperature on top row, find wind data on left. Cross reference matrix to see wind chill factor.														
Wind Speed mph	0-5	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35
	5	32	27	22	16	11	6	0	-5	-10	-15	-21	-26	-31	-36	-42
	10	22	16	10	3	-3	-9	-15	-22	-27	-34	-40	-46	-52	-58	-64
	15	16	9	2	-5	-11	-18	-25	-31	-38	-45	-51	-58	-65	-72	-78
	20	12	4	-3	-10	-17	-24	-31	-39	-46	-53	-60	-67	-74	-81	-88
	25	8	1	-7	-15	-22	-29	-36	-44	-51	-59	-66	-74	-81	-88	-96
	30	6	-2	-10	-18	-25	-33	-41	-49	-58	-64	-71	-79	-86	-93	-101
	35	4	-4	-12	-20	-27	-35	-43	-52	-56	-67	-74	-82	-89	-97	-105
	40	3	-5	-13	-21	-29	-37	-45	-53	-60	-69	-76	-84	-92	-100	-107
	45	2	-6	-14	-22	-30	-38	-46	-54	-62	-70	-78	-85	-93	-102	-109

## Appendix G

### Wind Speed Matrix

Formula

$$T = (D \times 5280) / (S \times 5280 / 60)$$

T = Time to reach observer

D = Distance (miles)

S = Wind Speed/Velocity (mph)

Wind Speed (mph)	Distance from location of observer						
	60 miles	50 miles	40 miles	30 miles	20 miles	10 miles	5 miles
70	51.42 min	42.86 min	34.28 min	25.71 min	17.14 min	8.57 min	4.3 min
60	60 min	50 min	40 min	30 min	20 min	10 min	5 min
50	72 min	60 min	48 min	36 min	24 min	12 min	6 min
40	90 min	75 min	60 min	45 min	30 min	15 min	7.5 min
30	120 min	100 min	80 min	60 min	40 min	20 min	10 min
20	3 hr	2.5 hr	120 min	90 min	60 min	30 min	15 min
10	6 hr	5 hr	4 hr	3 hr	120 min	60 min	30 min
5	12 hr	10 hr	8 hr	6 hr	4 hr	126 min	60 min
4	15 hr	12.5 hr	10 hr	7.5 hr	5 hr	2.5 hr	75 min
3	20 hr	16.6 hr	13.3 hr	10 hr	6.7 hr	3.3 hr	100 min
2	30 hr	25 hr	20 hr	15 hr	10 hr	5 hr	2.5 hr
1	60 hr	50 hr	40 hr	30 hr	20 hr	10 hr	5 hr

## Appendix H

### Learning Checks Answer Key

<p>Unit 2 Answer/Page</p> <ol style="list-style-type: none"> <li>1. True/A-2-1</li> <li>2. False/A-2-2</li> <li>3. True/A-2-2</li> <li>4. True/A-2-4</li> <li>5. False/A-2-4, A-2-7</li> <li>6. False/A-2-7</li> <li>7. False/A-2-7</li> <li>8. True/A-2-7</li> <li>9. B/A-2-2</li> <li>10. C/A-2-6</li> </ol>	<p>Unit 3 Answer/Page</p> <ol style="list-style-type: none"> <li>1. False/A-3-4</li> <li>2. False/A-3-6</li> <li>3. True/A-3-4</li> <li>4. True/A-3-8</li> <li>5. False/A-3-6</li> <li>6. False/A-3-4</li> <li>7. D/A-3-4</li> <li>8. A/A-3-5</li> <li>9. A/A-3-6</li> <li>10. Personal, Local, State, Federal/A-3-10</li> </ol>	<p>Unit 4 Thunderstorms Answer/Page</p> <ol style="list-style-type: none"> <li>1. True/A-4-2</li> <li>2. True/A-4-2</li> <li>3. False/A-4-3</li> <li>4. True/A-4-3</li> <li>5. True/A-4-4</li> <li>6. False/A-4-4</li> <li>7. True/A-4-5</li> <li>8. D/A-4-2</li> <li>9. D/A-4-3</li> <li>10. A/A-4-4</li> </ol>
<p>Unit 4 Floods Answer/Page</p> <ol style="list-style-type: none"> <li>1. False/A-4-11</li> <li>2. True/A-4-7</li> <li>3. True/A-4-12</li> <li>4. True/A-4-12</li> <li>5. False/A-4-10</li> <li>6. True/A-4-12</li> <li>7. False/A-4-10</li> <li>8. C/A-4-7</li> <li>9. B/A-4-8</li> <li>10. D/A-4-11</li> </ol>	<p>Unit 4 Tornadoes Answer/Page</p> <ol style="list-style-type: none"> <li>1. False/A-4-18</li> <li>2. True/A-4-15</li> <li>3. False/A-4-16</li> <li>4. True/A-4-15</li> <li>5. True/A-4-16</li> <li>6. True/A-4-16</li> <li>7. True/A-4-17</li> <li>8. True/A-4-16</li> <li>9. D/A-4-14</li> <li>10. B/A-4-17</li> </ol>	<p>Unit 4 Hurricanes Answer/Page</p> <ol style="list-style-type: none"> <li>1. True/A-4-19</li> <li>2. True/A-4-22</li> <li>3. False/A-4-23</li> <li>4. False/A-4-19</li> <li>5. True/A-4-22</li> <li>6. False/A-4-19</li> <li>7. D/A-4-19</li> <li>8. C/A-4-20</li> <li>9. D/A-4-20</li> <li>10. B/A-4-20</li> </ol>
<p>Unit 4 Winter Storms Answer/Page</p> <ol style="list-style-type: none"> <li>1. False/A-4-29</li> <li>2. True/A-4-29</li> <li>3. True/A-4-30</li> <li>4. False/A-4-28</li> <li>5. True/A-4-27</li> <li>6. False/A-4-29</li> <li>7. False/A-4-30</li> <li>8. C/A-4-26</li> <li>9. B/A-4-26</li> <li>10. D/A-4-26</li> </ol>	<p>Unit 4 Heat and Droughts Answer/Page</p> <ol style="list-style-type: none"> <li>1. False/A-4-34</li> <li>2. True/A-4-34</li> <li>3. False/A-4-34</li> <li>4. True/A-4-34</li> <li>5. False/A-4-35</li> <li>6. True/A-4-34</li> <li>7. False/A-4-34</li> <li>8. True/A-4-35</li> <li>9. C/A-4-34</li> <li>11. B/A-4-33</li> </ol>	<p>Unit 4 Wildfires Answer/Page</p> <ol style="list-style-type: none"> <li>1. False/A-4-37</li> <li>2. True/A-4-38</li> <li>3. True/A-4-37</li> <li>4. False/A-4-40</li> <li>5. False/A-4-39</li> <li>6. True/A-4-40</li> <li>7. True/A-4-40</li> <li>8. False/A-4-39</li> <li>9. A/A-4-40</li> <li>10. B/A-4-37</li> </ol>

Unit 5 Landslides Answer/Page 1. True/A-5-3 2. True/A-5-2 3. False/A-5-3 4. True/A-5-2 5. True/A-5-1 6. True/A-5-1 7. False/A-5-3 8. True/A-5-4 9. C/A-5-2 10. A/A-5-1	Unit 5 Earthquakes Answer/Page 1. False/A-5-6 2. False/A-5-9 3. True/A-5-8 4. False/A-5-9 5. False/A-5-9 6. True/A-5-10 7. False/A-5-10 8. False/A-5-10 9. C/A-5-8 10. C/A-5-6	Unit 5 Tsunamis Answer/Page 1. True/A-5-12 2. False/A-5-12 3. False/A-5-12 4. False/A-5-12 5. True/A-5-12 6. False/A-5-12 7. True/A-5-13 8. A/A-5-12 9. D/A-5-12 10. B/A-5-13
Unit 5 Volcanoes Answer/Page 1. True/A-5-17 2. False/A-5-16 3. False/A-5-16 4. True/A-5-16 5. True/A-5-16 6. False/A-5-15 7. True/A-5-17 8. D/A-5-16 9. D/A-5-16 10. B/A-5-16	Unit 6 Hazardous Materials Answer/Page 1. False/A-6-1 2. False/A-6-2 3. True/A-6-2 4. False/A-6-3 5. True/A-6-3 6. True/A-6-3 7. False/A-6-3 8. C/A-6-2 9. A/A-6-4 10. B/A-6-5	Unit 6 Radiation Answer/Page 1. True/A-6-8 2. True/A-6-10 3. False/A-6-10 4. True/A-6-10 5. True/A-6-11 6. True/A-6-12 7. False/A-6-10 8. D/A-6-7 9. C/A-6-9 10. D/A-6-9
Unit 7 Answer/Page 1. False/A-7-2 2. True/A-7-2 3. True/A-7-2, A-7-5 4. True/A-7-7 5. False/A-7-8 6. False/A-7-9 7. False/A-7-2 8. False/A-7-5 9. D/A-7-6 10. D/A-7-8	Unit 8 Answer/Page 1. False/A-8-4 2. True/A-8-5 3. True/A-8-6 4. False/A-8-3 5. False/A-8-9 6. True/A-8-9 7. False/A-8-5 8. B/A-8-3 9. D/A-8-9 10. C/A-8-6	

## Appendix I

### FEMA-Related Acronyms

ARC	American Red Cross
AVMA	American Veterinary Medical Association
CA	Cooperative Agreement
CBRA	Coastal Barrier Resources Act
CDBG	Community Development Block Grant
CDC	Centers for Disease Control and Prevention
CDRG	Catastrophic Disaster Response Group
CEM	Comprehensive Emergency Management
CERT	Community Emergency Response Team
CFR	Code of Federal Regulations
CHEMTREC	Chemical Transportation Emergency Center
COE	Corps of Engineers
COG	Continuity of Government
CRS	Community Rating System
CSDP	Chemical Stockpile Disposal Program
CSEPP	Chemical Stockpile Emergency Preparedness Program
DAE	Disaster Assistance Employee
DCO	Defense Coordinating Officer
DFIRM	Digital Flood Insurance Rate Map
DFO	Disaster Field Office
DHO	Disaster Housing Assistance
DOD	Department of Defense
DOT	Department of Transportation

DRC	Disaster Recovery Center
DRM	Disaster Recovery Manager
DRO	Disaster Recovery Operations
DSR	Damage Survey Report
DUA	Disaster Unemployment Assistance
EAP	Emergency Action Plan
EAS	Emergency Alert System
EDA	Economic Development Act
EENET	Emergency Education NETWORK
EMERS	Emergency Management Exercise Reporting System
EMI	Emergency Management Institute
EMS	Emergency Medical Services
EMT	Emergency Management Training
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency
ERT	Emergency Response Team
ESF	Emergency Support Function
EST	Emergency Support Team
FCO	Federal Coordinating Officer
FDA	Food and Drug Administration
FEMA	Federal Emergency Management Agency
FHA	Farmer's Home Administration
FIA	Federal Insurance Administration
FIRM	Federal Insurance Rate Map
FRERP	Federal Radiological Emergency Response Plan
FRP	Federal Response Plan
FRS	Field Reporting System

GAR	Governor's Authorized Representative
GIS	Geographic Information Systems
HM	Hazard Mitigation
HMRT	Hazard Mitigation Response Team
IC	Incident Commander
ICS	Incident Command System
IEMC	Integrated Emergency Management Course
IEMS	Integrated Emergency Management System
IFGP	Individual and Family Grant Program
IHMT	Interagency Hazard Mitigation Team
JIC	Joint Information Center
LEPC	Local Emergency Planning Committee
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MWEAC	Mount Weather Emergency Assistance Center
NACA	National Agricultural Chemical Association
NAWAS	National Warning System
NEP	National Earthquake Loss Reduction Program
NEPA	National Environmental Policy Act
NETC	National Emergency Training Center
NFA	National Fire Academy
NFIP	National Flood Insurance Program
NGA	National Governors' Association
NOAA	National Oceanic and Atmospheric Administration
NPSC	National Processing Services Center
NRC	Nuclear Regulatory Commission

NRT	National Response Team
NTC	National Teleregistration Center
OES	Office of Emergency Services
OSHA	Occupational Safety and Health Administration
PDA	Preliminary Damage Assessment
PIO	Public Information Officer
RACES	Radio Amateur Civil Emergency Services
REP	Radiological Emergency Preparedness
RERO	Radiological Emergency Response Operations
ROC	Regional Operations Center
RRT	Regional Response Team
SARA	Superfund Amendment and Reauthorization Act
SBA	Small Business Administration
SCM	Survivable Crisis Management
SCO	State Coordinating Officer
SHMO	State Hazard Mitigation Officer
SITREP	Situation Report
SLE	State and Local Exercise
SLG	State and Local Guide
SOPs	Standard Operating Procedures
SPCA	Society for the Prevention of Cruelty to Animals
USDA	U.S. Department of Agriculture
USFA	U.S. Fire Administration
US&R	Urban Search and Rescue
VMAT	Veterinary Medical Assistance Team
VOLAG	Volunteer Agency



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