



Standard Guide for Hazard Awareness for Search and Rescue Personnel¹

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INTRODUCTION

Recognition of hazards associated with search and rescue operations is critical to the decision-making process as it relates to personal safety, the urgency of response, and resource requirements. This guide is intended to ensure that emergency personnel responding to incidents outside their normal operating area are aware of the hazards associated with response to unfamiliar environments.

1. Scope

1.1 This guide is intended for training those who normally work in natural environments, solely subject to terrain and weather-related risks, who may be asked to respond to, or who may encounter, the operations defined in 1.2.

1.2 This guide identifies and describes hazardous situations and environments, and the associated risks affecting search and rescue personnel who may be working on or around the following:

- 1.2.1 Landsearch;
- 1.2.2 Land rescue;
- 1.2.3 Structural collapse;
- 1.2.4 Rope rescues;
- 1.2.5 Confined spaces;
- 1.2.6 Water, both still and moving; and
- 1.2.7 Trench or excavation collapse.

1.3 The knowledge conveyed in this guide is intended to enable search and rescue (SAR) personnel to recognize situations that may require skills or capabilities they have not been trained to perform. This understanding will allow them to seek more knowledgeable personnel to mitigate the hazard and perform such rescues or other activities required to complete their mission.

1.4 This guide is not intended to suggest that all search and rescue personnel must have the training identified within it. However, wherever the authority having jurisdiction (AHJ) deems this training to be appropriate, this document can be used as a guide.

1.5 The AHJ shall determine what level of training constitutes sufficient competence for search and rescue personnel to

enter areas, or carry out missions, which include the hazards described in this guide.

1.6 This guide identifies some of the known disciplines of SAR and their associated hazards. It does not, however, attempt to list all hazards or risks of which a person must be aware to operate safely and effectively in and around any of the areas listed in 1.1 or in Appendix X1.

1.7 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Terminology

2.1 Acronyms:

- 2.1.1 AHJ—Authority Having Jurisdiction
- 2.1.2 ASTM—American Society for Testing and Materials
- 2.1.3 PPE—Personal Protective Equipment
- 2.1.4 SAR—Search and Rescue

2.2 Definitions:

2.2.1 *Authority Having Jurisdiction (AHJ)*, *n*—the organization, office, or individual responsible for enforcing the requirements of a code or standard, or approving equipment, materials, an installation, or a procedure.

2.2.2 *awareness-level knowledge*, *n*—the ability to recognize the following associated with a situation or environment:

- (a) Whether search and/or rescue is necessary;
- (b) Hazards and personal risks;
- (c) Recognition of the need for specific PPE;
- (d) Additional knowledge, skills, or abilities to function safely and effectively; and
- (e) Other resources needed to safely and effectively perform a mission or operation.

2.2.3 *personal protective equipment (PPE)*, *n*—clothing and apparatus that reduces or limits a person's vulnerability to environmental hazards.

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3. Significance and Use

3.1 This guide establishes the minimum level of training required to provide awareness-level knowledge for personnel operating in and around the areas and operations listed in 1.1.

3.2 This guide may be used by individuals and AHJs that wish to identify the minimum training standards for land-based personnel operating in and around these areas and operations.

3.3 A person trained to this guide is considered to be aware of the hazards and risks associated with these areas and operations.

3.4 A person trained solely to this guide is not considered a “searcher” or “rescuer,” or both.

3.5 This guide may be used to augment other training for a searcher or rescuer, or both.

3.6 This guide by itself is not a training document. It is only an outline of some of the topics required for training or evaluating a searcher and/or rescuer, although it can be used to develop a training document or program.

3.7 It is the responsibility of the AHJ to determine the depth or detail of training needed to meet its training requirements.

3.8 Nothing in this guide precludes an AHJ from adding additional requirements.

3.9 This guide does not stand alone but must be used with the reference documents to provide the specific minimum training needed by a ground searcher and/or rescuer operating in these areas.

3.10 This guide can be used as a reference for training of searchers or rescuers, or both.

3.11 The information presented in the following sections is not in any particular order and does not represent a training sequence.

3.12 It is the responsibility of the AHJ to determine the evaluation process to assess a person’s knowledge. This may be by written exam, oral exam, demonstration, or some other means specified by the AHJ.

4. General SAR Operations

4.1 Personnel shall be trained to recognize visible and potential hazards or environments associated with a SAR incident. Such hazards or environments may include, but are not limited to:

- 4.1.1 Any environmental/weather conditions which fall outside the normal operating environment of the AHJ;
- 4.1.2 Terrain considerations such as high angle or moving water;
- 4.1.3 Natural phenomena;
- 4.1.4 Atmospheres that are immediately deadly or hazardous;
- 4.1.5 Spaces that require special equipment or skills such as confined spaces, mines or tunnels, or trenches;
- 4.1.6 Lack or loss of infrastructure (that is, no power, water, and/or equipment);

4.1.7 Industrial accidents or conditions resulting in additional environmental hazards (that is, damaged containers, marked or unmarked, that may contain materials hazardous to life);

4.1.8 Animals that may injure or harm;

4.1.9 Actions and effects of people (that is, devices that may injure or kill SAR personnel);

4.1.10 Illicitly discarded hazardous materials; and

4.1.11 Collapsed or unstable manmade materials;

4.2 Personnel shall be trained to recognize the appropriate PPE selections for eyes, face, head, extremities, and respiratory tract based on the environmental conditions and task to be completed.

4.3 Personnel shall have an understanding of how and where to report potential hazard(s).

4.4 Personnel shall be trained to recognize when a hazard presents a risk that exceeds their training or PPE, or both.

4.5 Personnel shall be trained to recognize when there is a need for specialized resources (including mutual aid) at the outset of a SAR operation and notify search management when these conditions are present. Specialized resources may include, but are not limited to:

4.5.1 Rescue teams specific to the incident or environment, or both;

4.5.2 Material support from local businesses such as lumber suppliers, engineers, or architects; and

4.5.3 Local businesses providing assembly production services, such as construction, demolition, sanitation, and heavy equipment operators.

4.5.4 Specialized resources may be obtained from local, municipal, tribal, state, or federal agencies.

4.6 Personnel shall be trained to describe, identify, and communicate relevant information to search management for the activation of emergency response systems.

5. Incident-Specific Knowledge and Skills

5.1 *Structural Collapse:*

5.1.1 Personnel shall be trained to recognize the additional hazards associated with a structural collapse incident. These may include the following:

5.1.1.1 Potential for secondary collapse;

5.1.1.2 Potential for fire or explosion;

5.1.1.3 Exposure to respiratory contaminants or asphyxiants;

5.1.1.4 Hazardous material spills; and

5.1.1.5 Risk of electrocution.

5.2 *Rope Rescue:*

5.2.1 Personnel shall be trained to recognize the additional hazards associated with a rope rescue incident. These may include the following:

5.2.1.1 Fall hazards;

5.2.1.2 Falling objects;

5.2.1.3 Tripping hazards; and

5.2.1.4 Unnecessary personnel in the general area of the rope rescue incident.

5.3 *Confined Space:*



5.3.1 Personnel shall be trained to recognize the additional hazards associated with a confined space incident. These may include the following:

- 5.3.1.1 Risk of asphyxiation;
- 5.3.1.2 Respiratory contaminants;
- 5.3.1.3 Psychological effects;
- 5.3.1.4 Explosive atmosphere;
- 5.3.1.5 Chemical contaminants; and
- 5.3.1.6 Temperature extremes.

5.4 *Water-Related Incidents:*

5.4.1 Personnel shall be trained to recognize the additional hazards associated with a water rescue incident. These may include the following:

- 5.4.1.1 Risk of drowning;
- 5.4.1.2 Risk of hypothermia;
- 5.4.1.3 Currents;
- 5.4.1.4 Electrocution due to damaged utilities;
- 5.4.1.5 Contamination of water;
- 5.4.1.6 Confined spaces in or around the water; and

5.4.1.7 Unsafe shoreline conditions such as undercut banks, slippery ground, or hazardous debris.

5.5 *Trench or Excavation Collapse:*

5.5.1 Personnel shall be trained to recognize the additional hazards associated with a trench or excavation collapse incident. These may include the following:

- 5.5.1.1 Risk of primary or secondary collapse;
- 5.5.1.2 The effects of soil and debris weight on the scene and/or subject(s);
- 5.5.1.3 Risk of electrocution;
- 5.5.1.4 Hazardous materials, including gas or liquid leaks; and
- 5.5.1.5 Unsafe conditions around the trench or excavation, such as undercut sides, slippery ground, or tripping hazards.

6. Keywords

6.1 awareness; hazards; search and rescue; SAR; training; urban search and rescue; US&R

APPENDIX

(Nonmandatory Information)

X1. SAR HAZARDS AND ENVIRONMENTS

X1.1 Hazard Recognition Associated with a SAR Incident

X1.1.1 Personnel shall be trained to recognize potential and actual hazards associated with a SAR incident. Hazard recognition affects the decision-making process as it relates to personnel safety, urgency, and resource requirements. Such hazards may include, but are not limited to, the following:

- X1.1.1.1 Land search;
- X1.1.1.2 Land rescue;
- X1.1.1.3 Ground SAR;
- X1.1.1.4 Structural collapse/urban SAR;
- X1.1.1.5 Rope rescues;
- X1.1.1.6 Confined space SAR;
- X1.1.1.7 Dive operations, including in/around confined spaces and underground areas such as caves;
- X1.1.1.8 Animal evacuations and rescues;
- X1.1.1.9 Terrain considerations, including but not limited to:
 - (1) Surface angle;
 - (2) Elevation variations;
 - (3) Ground conditions (for example, marshy or slippery); and
 - (4) Amount or type of ground cover.
- X1.1.1.10 Hazardous materials SAR;
- X1.1.1.11 WMD and bio-terrorism; and
- X1.1.1.12 Other environments not defined.

X1.1.2 Such environments and/or weather conditions that may require specialized training, equipment, or abilities to operate in, may include but are not limited to, the following:

- X1.1.2.1 Underground SAR, including but not limited to:

(1) Caves; and

(2) Mines, active and inactive/abandoned.

X1.1.2.2 Water SAR, including but not limited to:

- (1) Swift- and flood-water;
- (2) Surface/still water;
- (3) Surface ice;
- (4) Surf and/or ocean;
- (5) Swamp;
- (6) Canyoneering;
- (7) Extremes of precipitation, wind, or temperature;
- (8) Storms;
- (9) Lack of visibility;
- (10) Natural phenomena, including but not limited to:

- (a) Tornadoes;
- (b) Hurricanes;
- (c) Landslide, mud, and debris flows;
- (d) Tsunamis;
- (e) Volcanoes; and
- (f) Avalanches.

(11) Aircraft crash/aircraft SAR;

(12) Bridge SAR;

(13) Elevated crane SAR;

(14) Elevated train/subway SAR;

(15) Elevator and escalator SAR;

(16) Farm and industrial machinery SAR;

(17) Industrial site SAR;

(18) Arborist-related rescue;

(19) Power line/utility tower rescue;

(20) Scaffolding collapse rescue;

(21) Shipboard SAR;

(22) Storage silo SAR;

(23) Train/light rail rescue;
 (24) Tram/gondola/ski lift rescue;
 (25) Trench and excavation rescue;
 (26) Tunnel SAR;
 (27) Utility vault/switching station SAR;
 (28) Well/cistern SAR;
 (29) Wildland fire operations or working environment;
 (30) Winery tank SAR;
 (31) Lack of or loss of infrastructure, including, but not limited to:

- (a) Food or water supply;
- (b) Power supply;
- (c) Communications;
- (d) Transportation; and
- (e) Medical care.

(32) Industrial accidents or conditions resulting in additional environmental hazards including, but not limited to:

- (a) Radiation exposure;
- (b) Electrocuting risk;
- (c) Hazardous materials; and
- (d) Atmospheric contaminants.

X1.1.2.3 Actions and effects of people, including:

- (1) Those involved in the incident;
- (2) Those responding to the incident;
- (3) Those who may wish to take advantage of the incident;
- (4) Bystanders;
- (5) Those otherwise unrelated to the incident; and
- (6) Other incident-specific hazards, environments, or conditions not listed in this Appendix.

X1.2 Structural collapse incidents pose additional hazards including, but not limited to:

- X1.2.1 Secondary collapse;
- X1.2.2 Respiratory risks;
- X1.2.3 Hazardous materials spills;
- X1.2.4 Fire or explosion;
- X1.2.5 Electrocuting; and
- X1.2.6 Recognition and possible non-entry retrieval of victims.

X1.3 Rope rescue incidents pose additional hazards including, but not limited to:

- X1.3.1 Fall hazards;
- X1.3.2 Falling objects;
- X1.3.3 Tripping hazards;
- X1.3.4 Lack of appropriate PPE; and
- X1.3.5 Recognition and possible non-technical retrieval of victims.

X1.4 Confined space incidents pose additional hazards including, but not limited to:

- X1.4.1 Respiratory contaminants and air displacement (lack of breathable oxygen);
- X1.4.2 Asphyxiation;
- X1.4.3 Psychological effects;
- X1.4.4 Explosive atmosphere;
- X1.4.5 Chemical contaminants and carcinogens, including off gassing of standing water/liquid and decomposing organic materials;
- X1.4.6 Temperature extremes;
- X1.4.7 False floors and other structural instability;
- X1.4.8 Smoke, fire, and explosion potential;
- X1.4.9 Sudden rain/water runoff flooding into the space;
- X1.4.10 Injured, volatile animals (for example, bats or snakes);
- X1.4.11 Recognition and possible non-entry retrieval of victims;
- X1.4.12 Electrocuting; and
- X1.4.13 Recognition and possible non-entry retrieval of victims.

- X1.5 Water related incidents pose additional hazards including, but not limited to:
- X1.5.1 Drowning;
- X1.5.2 Debilitating hypothermia;
- X1.5.3 Water currents and flows;
- X1.5.4 Electrical and other utilities;
- X1.5.5 Contamination of water: waterborne diseases and hazardous chemicals;
- X1.5.6 Confined spaces in or around the water, including manholes and water grates;
- X1.5.7 Blunt trauma from floating or partially/completely submerged objects in water;
- X1.5.8 Floating propane/fuel tanks and ruptures;
- X1.5.9 False (collapsed) submerged riverbed and roadway bottoms;
- X1.5.10 Strainers and sieves;
- X1.5.11 Undercut banks, slippery ground, hazardous debris, collapse of shore, or fall from shore into water; and
- X1.5.12 Recognition and possible non-entry retrieval of victims.

X1.6 Trench or excavation incidents pose additional considerations including, but not limited to:

- X1.6.1 Secondary collapse;
- X1.6.2 Effects of soil and debris weight on the scene and/or subject(s);
- X1.6.3 Undercut sides, slippery ground, and tripping hazards;
- X1.6.4 Electrical systems;
- X1.6.5 Gas or liquid leaks; and
- X1.6.6 Recognition and possible non-entry retrieval of victims.

X1.7 Animal evacuations and rescues pose additional considerations including, but not limited to:

X1.7.1 The animals' given situation and their ability to survive with little or no assistance;

X1.7.2 Untrained citizens and agencies attempting evacuation, capture, or rescue;

X1.7.3 Animal owner refusing to leave without the animal;

X1.7.4 Animal strength and normal instinctual physical struggles;

X1.7.5 Animal venom, zoonotic, or vector borne diseases;

X1.7.6 Pulled under water or off of high-angle ledge by animal;

X1.7.7 Corrals, pens, cages, and other capture device integrity;

X1.7.8 Animal-specific hazards include, but are not limited to, health and safety hazards to the animal such as prolonged standing in water, drinking bad water, and hypothermia; and

X1.7.9 Escaped animal dangers to public.

RELATED MATERIAL

*ASTM Standards*²:

F1490 Terminology Relating to Search and Rescue (Withdrawn 2011)

F2209 Guide for Training of Level I Land Search Team Member

²For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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