



Technical Large Animal Emergency Rescue

# Basic Concepts in Hazardous Materials Incidents With Emphasis on Large Animal Decon

NOTE: This document is for information purposes only, and does not constitute a training manual.

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**The Hazardous Materials Incident Response Process**

The most common HazMat Incident Response Process is the eight-step process developed by Noll, Hildebrand and Yvorra (2005) consisting of:

- 1 - Site management and control
- 2 - Problem identification
- 3 - Hazard and risk evaluation
- 4 - Selection of Personal Protective Equipment PPE
- 5 – Information management and resource coordination
- 6 – Implementation of response objectives
- 7 – Decontamination and Clean-Up
- 8 – Incident Termination

## **HazMat Responder Levels**

Five different HazMat responder levels have been established. A HazMat responder should not become involved in a HazMat Incident beyond her/his level of training/competency.

Any emergency responder who happens to be the first\* on scene, in what appears to be a hazardous materials incident should:

- Know what hazardous materials are, and the risks associated with them.
- Be able to recognize a hazardous materials incident
- Know how to use the Emergency Response Guidebook.  
Every emergency responder should have a copy of the Emergency Response Guidebook.
- Maintain a safe distance from the incident and encourage others to do so.
- If possible, identify the hazardous material involved
- Recognize that additional resources are needed, and contact the appropriate emergency responders.

The above represents **AWARENESS LEVEL COMPETENCY** for any responder

Every first responder should take the following FEMA online course:

Introduction to Hazardous Materials

IS-5.A

Federal Emergency Management Agency

Independent Study Course

[www.fema.gov/emi](http://www.fema.gov/emi)

\*First Responder:” An individual who in the early stages of an incident, is responsible for the protection and preservation of life, property, evidence, and the environment.”

Homeland Security Presidential Directive/HSPD-8

## **OPERATIONAL LEVEL COMPETENCY**

- Be competent at the awareness level
- Determine magnitude of the problem

- Establish and enforce scene control procedures
- Identify containers and materials involved
- Determine whether hazardous materials have been released
- Collect response information
- Predict likely behavior of material and its container
- Estimate potential harm
- Know response objectives
- Be familiar with defensive options
- Use appropriate PPE
- Perform defensive control actions

### **TECHNICIAN LEVEL COMPETENCY**

- Be competent at the operational level
- Estimate size of endangered area
- Identify potential action options
- Select PPE
- Select decontamination procedures
- Develop plan of action
- Implement planned response
- Perform control functions
- Evaluate effectiveness of control functions
- Terminate incident

### **SPECIALIST COMPETENCY**

- Be competent at the technician level
- Be familiar with hazmat survey and identification equipment
- Have knowledge of State Emergency Response Plan
- Knowledge on specialized control, containment and/or confinement of hazardous materials

### **INCIDENT COMMANDER COMPETENCY**

The Incident Commander (IC) is responsible for all decisions related to the incident, and is in charge of the incident site.

- Be competent at the technician level
- Implement Incident Management System
- Collect and interpret hazard and response information
- Estimate potential outcomes
- Identify potential action options
- Develop Incident Action Plan (IAP)
- Approve level of PPE
- Direct government and private resources
- Provide focal point for information
- Evaluate progress of IAP
- Terminate incident
- Conduct debriefing
- Conduct multi-agency critique

- Report and document incident

## **Hazardous Materials Incident Zones**

- **COLD** (support, green) Contains the command post and any other support functions (e.g., staging)
- **WARM** (contamination reduction, decontamination corridor, yellow) Where gross decontamination\* and hot zone support takes place.
- **HOT** (red) Where the hazardous material is located, and humans, animals and equipment are exposed and/or contaminated. The hot zone must extend far enough to prevent adverse effects to reach personnel outside the zone.

### **\*Gross Decontamination**

The initial phase of the decontamination process during which the amount of surface contaminant is significantly reduced. Gross decontamination takes place in the warm (yellow) zone.

## **Current Issues in Hazardous Material Contamination of Animals**

At the present time (2006), no information is available that is tailored to answer specific issues on animals in hazardous materials incidents.

Some of the questions the HazMat technician and/or IC will be faced with in a HazMat incident are:

- Do I have to legally decontaminate this animal, e.g. mounted police horse, search dog, disabled human service animal, etc.?
- Although animals are unequal under the law, is the sentimental value of the animal such that I will have to decontaminate it?
- Am I going to endanger humans if I don't decontaminate the animals?
- Will animal owners either refuse to leave the hot zone, or go into the hot zone to try to save their animals?
- How does one perform gross decontamination in furry animals?
- Where should I perform animal triage (hot zone, warm zone)?
- Should I perform euthanasia in the hot zone?
- How do I perform animal triage?
- Can the Hazmat decontamination team use the same PPE used for human decontamination?
- How do I set up a decon area for cats, dogs, horses, cows?
- Does the Emergency Response Guide apply to animals?
- Which publications or parts thereof related to HazMat from the various government and private entities apply to animals?

# Decon SOP for Horses

- Decon team must include at least one person familiar with handling horses.
- Decon team must include one person qualified to administer injections (sedation).
- Horses must maintain visual contact with each other before, during and after decontamination.
- If at all possible, decon should be performed within a contained area to avoid a hose from running loose.
- Water should not exceed household water pressure (70-80 psi) (Fire engines can deliver water at 150 psi)
- Always talk to the horses. Make them realize you are people.
- Horses use their sense of smell to identify potential threats. While on PPE you smell like butyl and nitrile. Offer the horse a carrot to help present a familiar scent and taste (Kevin Combs).
- Attach muzzle to horse if possible. This will help protect PPE.
- Spray water first on the lower legs to get them used to the water.
- Always decon from top to bottom
- Use copious amounts of water.
- May need to use Dawn detergent also
- Telescopic car wash brushes are soft, deliver water while brushing, and maintain a safe distance from the horse.
- Many horses do not tolerate water sprayed on the face. Use washcloths instead.
- All tack must be removed before decon, and disposed off afterwards.
- Place a clean halter after decon.

## **Classification of Hazardous Materials**

Following is the

**United Nations (UN)/ Department of Transportation (DOT) Hazard Classes and Divisions** with some examples in parenthesis. For detailed information on the different divisions consult the Emergency Response Guidebook

### **CLASS 1 – EXPLOSIVES**

- Division 1.1 Mass explosion hazard (dynamite)
- Division 1.2 Projection but not mass explosion (aerial flares)
- Division 1.3. Fire hazard, minor blast and/or projection hazard (liquid-fueled rocket motors)
- Division 1.4 No more than 25 g of material. Explosion confined to package (line throwing rockets)
- Division 1.5 Very little probability of transition from burning to detonation (fertilizer-fuel oil mixtures)
- Division 1.6 Extremely insensitive detonating substance

### **CLASS 2 – GASES**

- Division 2.1 Flammable and ignitable (propane)
- Division 2.2 Nonflammable, nonpoisonous compressed gas (anhydrous ammonia, liquid nitrogen)
- Division 2.3 Poisonous gas

### **CLASS 3 – FLAMMABLE LIQUID**

- Any liquid with a flash point of not more than 60.5°C (141°F) (acetone, gasoline)
- Combustible liquid Any liquid that does not meet the definition of any other class, and has a flashpoint above a flammable liquid (mineral oil, diesel)

### **CLASS 4 – FLAMMABLE SOLIDS**

- Division 4.1
  - Wetted explosives – Explosives wetted with enough water, alcohol or plasticizers to suppress explosion properties.
  - Self-reactive materials - Materials that can undergo strongly exothermic decomposition caused by high transport temperature or contamination
  - Readily combustible solids – Solids that can cause a fire through friction and metal powders that can be ignited.
- Division 4.2 Spontaneously combustible material
  - Pyrophoric material – A liquid or solid that will ignite within 5 minutes of becoming exposed to air.
  - Self heating material – A material that will self-heat when in contact with air.
- Division 4.3 Dangerous when wet. Materials that, when in contact with water, are liable to become spontaneously flammable or to give off flammable or toxic gas.

## **CLASS 5 – OXIDIZERS AND ORGANIC PEROXIDES**

- Division 5.1 Materials that can cause or enhance the combustion of other materials by yielding oxygen (ammonium nitrate)
- Division 5.2 Any organic compound containing oxygen in the bivalent -O-O- configuration (organic peroxide)
  - Type A - Can detonate or deflagrate rapidly as packaged for transport. Transport is forbidden.
  - Type B – Can neither detonate nor deflagrate rapidly, but can undergo a thermal explosion.
  - Type C – Can neither detonate nor deflagrate, and cannot undergo a thermal explosion.
  - Type D – Can detonate only partially or deflagrate slowly, with medium or no effect when heated.
  - Type E – Can neither detonate nor deflagrate, and shows low or no effect when heated.
  - Type F – Will not detonate nor deflagrate, shows no or low effect if heated, and has low or no explosive power.
  - Type G – Will not detonate, deflagrate, shows no effect if heated, has no explosive power, is thermally stable, and is desensitized.

## **CLASS 6 – POISONOUS MATERIALS**

- Division 6.1 Materials other than gases, that are either known to be so toxic to humans as to afford a hazard to health during transport, or in the absence of toxicity information are presumed to be toxic, including materials causing irritation (aniline, arsenic, hydrocyanic acid, tear gas)
- Division 6.2 Infectious materials, microorganisms and/or their toxins which can cause disease in humans or animals (anthrax, botulism, rabies)

## **CLASS 7 – RADIOACTIVE MATERIALS**

Any radioactive material having a specific activity greater than 0.002 microcuries per gram (cobalt, uranium)

## **CLASS 8 – CORROSIVE MATERIALS**

A liquid or solid that causes visible destruction or irreversible alteration in skin tissue at the site of contact, or a liquid that has a severe corrosion rate on steel or aluminum (nitric acid, sodium hydroxide, sulfuric acid)

## **CLASS 9 – MISCELLANEOUS HAZARDOUS MATERIALS**

A material that presents a hazard during transport, but is not included in another hazard class, including the following:

- 1 – Anesthetic, noxious or other that could cause annoyance or discomfort to a flight crew member.
- 2 – Any material not included in any other hazard class, but is subject to DOT requirements (adipic acid, PCBs, molten sulfur)

## **ORM –D Other Regulated Materials, A-B-C-D-E**

Any material that presents a limited hazard during transportation due to its form, quantity and packaging (consumer commodities, small arms ammunition)

## Organizations Involved with Hazardous Materials Incidents

### **Facts on the use of Personal Protective Equipment (PPE)**

The Occupational Health and Safety Administration (OSHA) standards mandate 8 hours of training, or sufficient experience to demonstrate competency before the use of PPE

*No existing PPE protects against all hazards.* The use of PPE *creates* hazards such as:

- Heat stress
- Claustrophobia
- Impaired vision
- Impaired mobility
- Reduced dexterity
- Impaired communication
- Suit breach

The greater the PPE protection, the greater the risks

PPE should not be either excessive or insufficient.

Medical surveillance must be conducted before and immediately after the use of PPE.

An emergency distress signal should be identified before entering the yellow zone wearing PPE.

### **Levels of PPE in Hazmat Incidents**

#### **A**

- Highest level of protection (respiratory, skin, eye, mucous membrane)
- Fully-encapsulated
- Vapor-tight
- Chemical-resistant suit
- Chemical-resistant boots with steel toe and shank
- Chemical resistant inner-outer gloves
- Hard hat
- Self Contained Breathing Apparatus (SCBA)

#### **B**

- Highest level of respiratory protection, but lesser degree of skin and eye protection
- Fully-encapsulated, non-vapor tight suit
- SCBA

#### **C**

- Same degree of skin protection as B, but lower level of respiratory protection
- Air Purifying Respirator (Filter, APR) or Powered APR (PAPR)
- Airborne substance is known.
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## **D**

- No protection against hazardous materials
- Work uniform

## **E**

Skin

Protection against bacteria, viruses and fungi provided there is no break.

## **Respiratory protection**

The correct respiratory protection must be employed for the specific hazard in question.

Respiratory protection must be fit-tested before exposure to HazMat

Even a small space between the respirator and the skin will result in contamination

Types of respirators:

Air-purifying Purifies ambient air by passing through a filter before inhalation

DO NOT USE when:

Ambient air has less than 19.5% oxygen

Agent is unknown

Concentration of agent exceeds filtration capacity of canister.

Atmosphere-supplying

SCBA (contains its own air source)

Supplied Air Respirators (SAR, depends on line linked to distant air source)

## **Local and State Organizations Involved in Hazardous Materials Incidents**

Local Emergency Planning Committee (LEPC)

County Office of Emergency Management (OEM)

County Animal/Agricultural Response Team (CART)

County/Community Emergency Response Team (CERT)

Selected Fire Departments and/or Rescue Squads

State Department of Transportation

State Division of Emergency Management

State Animal/Agricultural Response Team (SART)

State Emergency Response Commission (SERT)

## **Federal Agencies/Departments Involved with Hazardous Materials Incidents**

Agriculture Department (USDA)

Coast Guard (USCG)

Defense Department (DOD)

Energy Department (DOE)

Environmental Protection Agency (EPA)

Federal Emergency Management Agency (FEMA)

General Services Administration (GSA)  
Health and Human Services (DHHS)  
Homeland Security (DHS)  
Interior Department  
Justice Department  
Labor Department  
National Oceanic and Atmospheric Administration (NOAA)  
Nuclear Regulatory Commission (NRC)  
State Department  
Transportation Department (DOT)

### **Selected References:**

An Orientation to Hazardous Materials for Medical Personnel  
IS 346  
Federal Emergency Management Agency  
Independent Study Course  
[www.fema.gov/emi](http://www.fema.gov/emi)

Competencies for EMS Personnel Responding to Hazardous Materials  
National Fire Protection Association  
NFPA 473, 2002 Edition  
[www.nfpa.org](http://www.nfpa.org)  
Quincy, MA

Emergency Response Guidebook  
ERG 2004  
Pipeline and Hazardous Materials Safety Administration  
U.S. Department of Transportation

Introduction to Hazardous Materials  
IS-5.A  
Federal Emergency Management Agency  
Independent Study Course  
[www.fema.gov/emi](http://www.fema.gov/emi)

Manual of Hazardous Materials Incidents  
Agency for Toxic Substances and Disease Registry (ATSDR)  
Center for Disease Control and Prevention  
Department of Health and Human Services  
[www.atsdr.cdc.gov](http://www.atsdr.cdc.gov)

Material Safety Data Sheet (MSDS)  
[www.msdsonline.com](http://www.msdsonline.com)  
[www.msdssearch.com](http://www.msdssearch.com)

Noll, G.N., Hildebrand, M.S., and Yvorra, J.G. 2005 Hazardous Materials: Managing the Incident  
3<sup>rd</sup>. ed International Fire Service Training Association, Red Hat Publishing Company, Inc.,

Chester, MD.

Oldfield, K.W., Veasey, D.A., McCormick, L.C., Krayner, T.H., Martin, B.N., Hansen, S., Stover, E.R., and Hilyer, B.M. 2005 Emergency Responder Training Manual for the Hazardous Materials Technician John Wiley & Sons, Inc.

Pocket Guide to Chemical Hazards  
National Institute for Occupational Safety and Health (NIOSH)  
Centers for Disease Control and Prevention  
U.S. Department of Health and Human Services  
[www.cdc.gov/niosh](http://www.cdc.gov/niosh)

Professional Competence of Responders to Hazardous Materials  
National Fire Protection Association  
NFPA 472, 2002 Edition  
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Quincy, MA

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Center for Disease Control and Prevention  
U.S. Department of Health and Human Services  
October 2004  
[www.cdc.gov/niosh](http://www.cdc.gov/niosh)

Standard System for the Identification of the Hazards of Materials for Emergency Response  
National Fire Protection Association  
NFPA 704, 2007 Edition  
[www.nfpa.org](http://www.nfpa.org)  
Quincy, MA

Weapons of Mass Destruction (WMD)  
Technical Emergency Response Training (TERT)  
Office for Domestic Preparedness  
U.S. Department of Homeland Security  
Anniston, AL

Guidelines for Mass Casualty Decontamination During a HAZMAT/Weapon of Mass Destruction Incident.  
U.S. Army Chemical, Biological, Radiological and Nuclear School  
and U.S. Army Edgewood Chemical Biological Center  
[www.ecbc.army.mil/downloads/publications/ecbc\\_sp\\_024\\_lake.pdf](http://www.ecbc.army.mil/downloads/publications/ecbc_sp_024_lake.pdf)