

OSC 10
Ohio Safety Congress & Expo

The complicated hazardous materials puzzle:
Where does the EMT fit in?
205
Captain Robert Lantman

Tuesday, March 30, 2010 2:15 to 3:15 p.m.

The Complicated Hazardous Materials Puzzle
Where does EMS fit in?

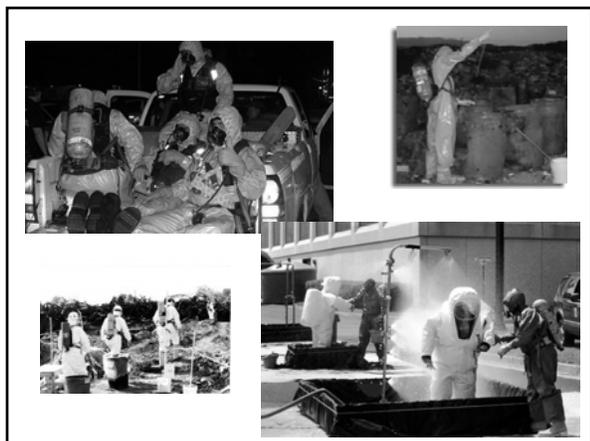
Robert Lantman
Captain
Clearcreek Fire District

Objectives

- The EMT will understand the dynamics behind a HazMat scene
- The EMT will know where they fit in for treatment and transportation of the injured
- EMT will know what treatment challenges Haz Mat scenes can have

The Scene

- Hazardous Material scenes can be intimidating and confusing for responders
- There is a lot going on and many decisions need to be made and some need to be done quickly
- **HOWEVER...**They need to be taken very seriously and time is needed to be sure and make the proper decision



Responses

- They need to be planned and planned carefully
- More than likely, you will be first on the scene
- Implementation of the ICS may rest upon **YOU!**
- The first 5 Minutes will depict the next 5 hours

OSHA HAZWOPER

- Occupational Safety and Health Administration
 - 29 CFR 1910.120
 - Title Code 29
 - CFR – Code of Federal Regulations
 - 1910 – OSHA Part Number
 - .120 – Section Regulation
- HAZWOPER
 - Hazardous Waste Operations and Emergency Response

OSHA HAZWOPER

- Mandates that all incidents that are HazMat related must have the Incident Command System in place
- Where does that leave EMS???



ICS and the Haz Mat scene

- Familiar yourself with the Incident Command System
 - NIMS 700
 - NIMS 100
 - NIMS 200
 - NIMS 800



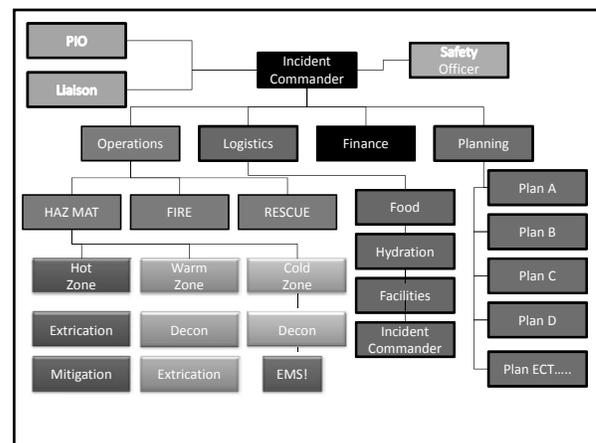
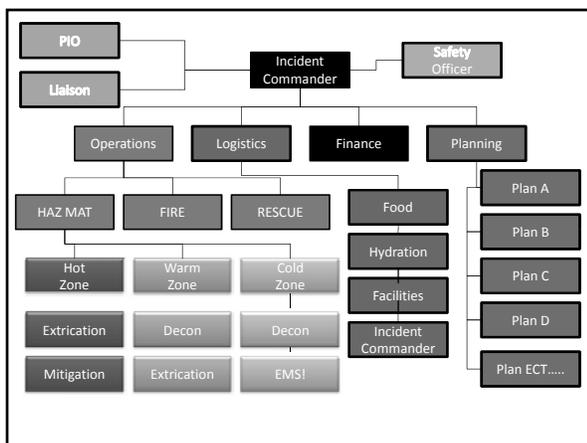
(NIMS 300 and 400 for officers and those that may find themselves in a large scene)

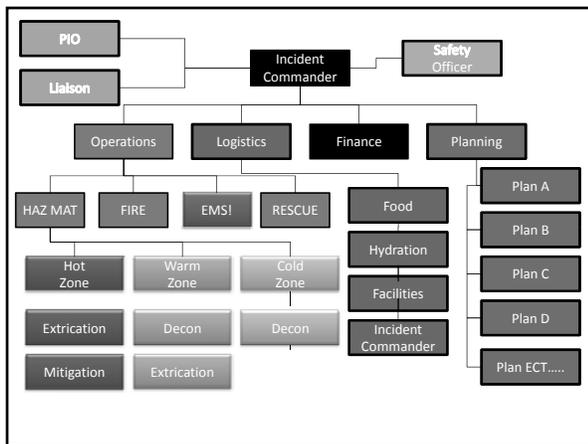
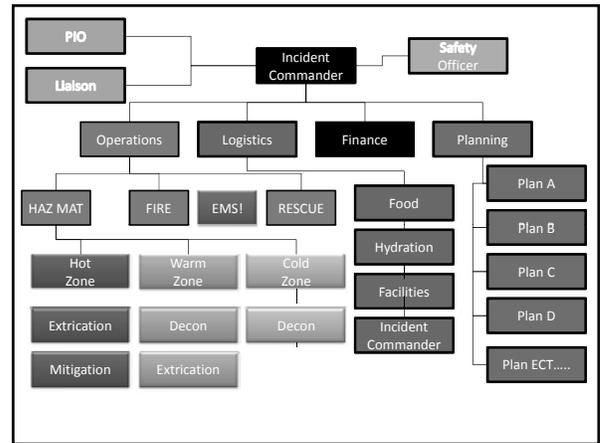
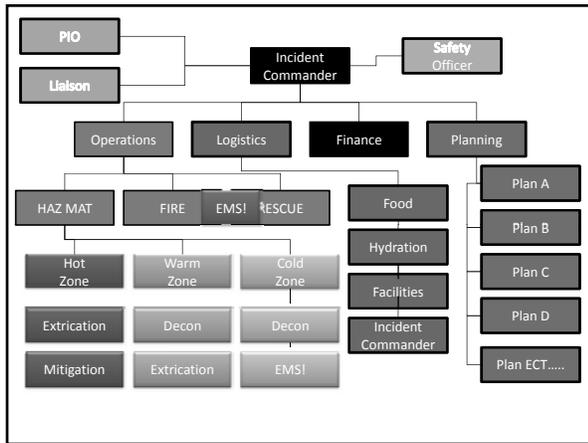
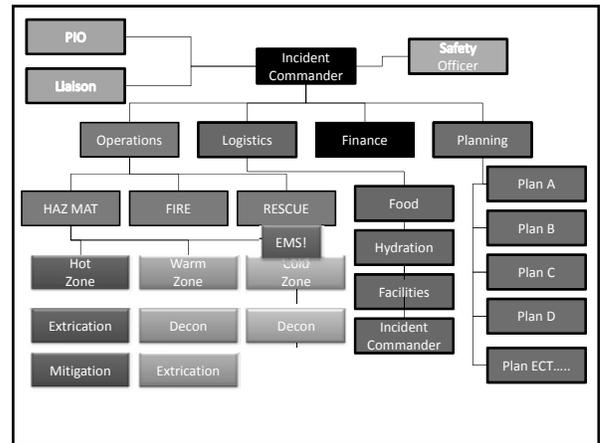
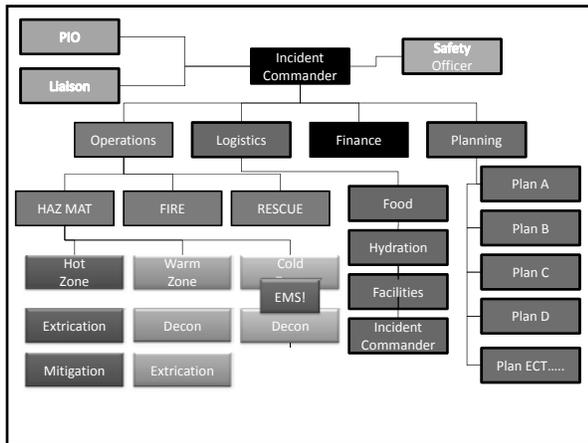
EMS in the Command set up

- Often overlooked
- Placed out of the way
- Stay back
- Call when needed....



- Sometimes good.....But EMS needs to be integrated in the Command Structure





ICS

- EMS Group needs to be just under the Operations Chief
- EMS NEEDS to be in the loop
- EMS functions on the scene for both responder and the victims

Responder Break up

- First responding units
- Long term scene support
- Victim care
- Responder care
- Triage
- Treatment
- Transport



EMTS

- Will play a key role in the overall outcome of the incident
- All personnel should be trained to a level where they understand the way a scene will run
- During training, EMS should be included and utilized

Levels of EMS Response

National Fire Protection Agency (NFPA)
Set forth three levels of EMS training

- Awareness Level
- EMS Level 1
- EMS Level 2



Awareness Level

- This level is for all responders that may become a first responder for a possible incident
 - Size up
 - Incident Risk
 - Initiate an establish a Command

Level 1 EMS

Operations Level

- Training is focused on “Cold” zone treatment
- Patients and Responders have been decontaminated
- Operations in this zone do not pose a significant risk of contamination

Level 1 EMS

- Treatment focuses:
 - Hazard Assessment
 - Patient assessment
 - Patient care to victims and responders that have been previously decontaminated

Level 2 EMS

Technician Level

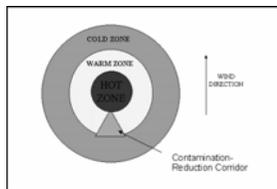
- More training where the EMT will treat the patient in the “Warm” zone
- The EMT will have a moderate risk of contamination
- EMT will need to be decontaminated

Level 2 EMS

- Training focuses:
 - Use of personal protective equipment
 - Proper decontamination procedures
 - Treatment of patients as they proceed through decontamination

Contamination

- Most common Haz Mat medical issue
- All victims in the “Hot” and “Warm” zones are considered contaminated



Contamination

- The EMT must understand contamination
- This is the exposure of a person to a hazardous substance
 - Primary – Direct exposure
 - Secondary – When a person comes in contact with a contaminated person

Contamination

- Understand routes of exposure
 - Injection
 - Inhalation
 - Absorption
 - Ingestion



Effects of Contamination

- Acute effects
 - Manifests immediately after exposure
 - Chlorine
 - Shortness of breath, bronchospasm
- Delayed effects
 - Symptoms develop hours, days, weeks or even years
 - Exposure to a carcinogen, asbestos

Effects of Contamination

- Local Effects
 - Physical effects to the localized area of exposure
 - Blisters
- Systemic Effects
 - Physical effects that occur throughout the body
 - Hydrofluoric acid may cause local skin burns but it can trigger hypocalcemia and dysrhythmias

Patient Care

- There are a wide range of chemicals that patients can be exposed to
- Treatments can range from supportive care to specific antidotes

Patient Care

- Remember:
 - Never assess or treat a patient that is contaminated without first making sure that the scene is safe and the patient is decontaminated or you are in proper personal protective equipment
 - Once your safety is ensured..continue care to the patient

Patient Care

- Remember the basics:
 - Level of Consciousness
 - Airway
 - Breathing
 - Circulation
- Remember...decontamination takes time



Patient Care

- While we are unable to explore all possible chemicals and situations
- We will look at 5 types of common chemical types
 - Corrosives
 - Pulmonary Irritants
 - Pesticides
 - Chemical Asphyxiants
 - Hydrocarbon Asphyxiants

Corrosives

- Acids and alkalis (bases)
- Everyday materials, household cleaning supplies, laundry products
 - Drain cleaners
 - Bleach
 - Ammonia based cleaners

Corrosives

- Route of exposure:

- Inhaled
- Ingested
- Absorbed
- Injected



- Primary effects:

- Skin burns, respiratory burns and edema

Corrosives

- Treatment

- Supportive
- Eye exposure gets flushed and tetracaine for eye pain
- If pulmonary edema is present, Lasix and albuterol can be considered
- DO NOT INDUCE VOMITING if ingested

Pulmonary Irritants

- Fuming chemicals, usually result of mixing two or more chemicals together
- Cannot be decontaminated due to being in the lungs

Pulmonary Irritants

- Chlorine gas will mix in lungs with secretions and produce hydrochloric gas
- Ammonia can mix with lung secretions and produce ammonium hydroxide gas
- Both gasses in the lungs will cause extensive lung damage and possible pulmonary edema

Pulmonary Irritants

- Route of exposure

- Inhaled



- Treatment

- Supportive care
- Consider Lasix and Albuterol for severe respiratory issues

Pesticides

- Primarily in the classes of:

- Carbamates
- Organophosphates

- Exposure Routes

- Inhalation
- Absorption
- Ingestion
- injection



Pesticides

- The pesticides will block acetylcholinesterase (AChE)
 - Enzyme that stops the action of acetylcholine in the body, a neurotransmitter
 - This results in the over stimulation of muscarinic receptors
 - SLUDGE syndrome

Pesticides

SLUDGE

- S- Salivation
- L- Lacrimation
- U- Urination
- D- Diarrhea
- G- Gastrointestinal Distress
- E- Emesis

Pesticides

- Decontamination is needed prior to treatment
- If on skin, large amounts of water
- Use of Tincture of Green Soap is essential
- Remove clothing that is contaminated and jewelry

Pesticides

- Airway
- Breathing
- Circulation
- Atropinization - Administration of Atropine until the symptoms stop
 - Increase dosage until SLUDGE stops
- Pralidoxime – for Organophosphates only will not work on Carbamates

Chemical Asphyxiants

- One of the most common forms of haz mat exposures
- Route of exposure
 - Inhalation
- Common Products:
 - Carbon Monoxide
 - Cyanide



Chemical Asphyxiants

- Carbon Monoxide
 - 200 times affinity to Red Blood Cells
 - Displaces Oxygen in red blood cells
- Cyanide
 - Inhibit the action of Cytochrome oxidase, the enzyme complex that creates adenosine triphosphate (ATP). Required for muscle energy

Chemical Asphyxiants

- Treatment usually rarely includes decontamination
- Remove from environment

- Airway
- Breathing
- Circulation

Chemical Asphyxiants

- CO exposure will require oxygen for treatment
 - Hyperbaric therapy to replace the carbon monoxide in the hemoglobin.
- Cyanide Exposure requires one of two routes
 - Older treatments with cyanide antidote kit
 - Newer treatment with Cyanokit

Chemical Asphyxiant

- Cyanide antidote kit
 - Amyl nitrite
 - Sodium nitrite
 - Sodium thiosulfate
- Cyanokit
 - Hydroxocobalamin

Hydrocarbon Solvents

- Found usually in a liquid form
- Fumes from liquid cause most problems
 - Xylene- solvent in printing and leather industry
 - Methylene chloride – used as a paint stripper and to decaffeinate coffee
- Routes of exposure:
 - Inhalation
 - Ingestion
 - Absorption

Hydrocarbon Solvent

- Most common route is by inhalation
- Newer way is by drug abusers to get a “High”

- Attacks the central nervous system and can cause dysrhythmias, pulmonary edema, and respiratory failure.
- Has some long term effects as well such as CNS damage and renal failure.

Hydrocarbon Solvent

- If there is absorption, decontaminate with copious amounts of water and tincture of green soap

- Airway
- Breathing
- Circulation

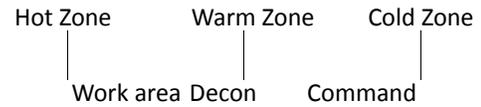
Working on scene

- Constant situational awareness needs to take place
- What you cannot see CAN kill you



Working on Scene

Three Zones



Working on Scene

- Areas of work
 - Medical monitoring
 - Treatment areas
 - Warm zone
 - Cold zone
 - Transport
 - Command



Working on Scene

- Personal protective equipment
 - Level A
 - Highest level of protection
 - Sealed, pressurized
 - Difficult to treat patient
 - Hot Zone



Working on Scene

- Personal Protective Equipment
 - Level B
 - Full respiratory protection
 - Chemically resistant suit
 - Not pressurized
 - Decon Team in Hot – Warm zone



Working on Scene

- Personal Protective Equipment
 - Non permeable
 - Air purifying respirator
 - Warm zone operations including EMS



Working on Scene

- Personal Protective Equipment
 - Level D
 - Structural fire gear
 - Not suitable for Haz Mat incidents and scenes where zones are set up



Working on Scene

- Working on a Haz Mat scene needs to include some form of PPE
- Ideal should be protection in accordance to the situation



Working on Scene



- If operations are emergent, uses something
 - Tyvex
 - Gloves
 - Respiratory protection
- Should be used as self rescue last resort

Final Thought

- Haz Mat scenes are dangerous
- If it is green, gooey and not yours.....
DON'T TOUCH IT!
- What you can not see
WILL kill you
- Stay safe, you cannot help if you become the problem.
- Protect yourself FIRST!