

CBRNE Awareness Module 5

Overview of Explosive & Incendiary Agents




Overview 1 NJSP HMRU

CBRNE Awareness

Explosives

- ◆ Terrorist weapon of choice
- ◆ 70 percent of all terrorist incidents in the United States
- ◆ Can deliver death themselves or disperse an agent of death
- ◆ IED's
 - ◆ Vehicle bombs
 - ◆ Pipe bombs
 - ◆ Satchel devices




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CBRNE Awareness

Incendiary Devices

- 20 25% of all Domestic Bombings
- Ignites 75% of Time
- Preceded by Threat Less Than 5% of incidents




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CBRNE - Awareness

Common Components

- **Components**
 - Ignition Sources
 - Combustible Filler
 - Housing or Container
- **Common Material Used**
 - Road Flares
 - Gasoline/Motor Oil
 - Light Bulbs
 - Matches/Fireworks
 - Electrical Components
 - Propane Cylinders
 - Plastic Pipes and Containers



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CBRNE - Awareness

Explosive Devices

- **>70% of Domestic Terrorist Incidents are Explosive**
- **Between 1990-1995 FBI Data Reveals 10,122 Actual Bombings Resulting in 355 Deaths and 3176 Injuries.**



Overview 5 Kenya

CBRNE - Awareness

Energetic Materials

- Pyrotechnics
- Propellants
- Explosives



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CBRNE Awareness **Pyrotechnics**

PURPOSE

- Create smoke, light, heat and sound.

EXAMPLES:

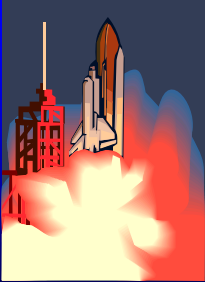
- Display Fireworks
- Road Flares
- Smoke Grenades
- Thermites



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CBRNE Awareness **Propellants**



- Designed to produce a controlled release of gases for the propulsion of objects.



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CBRNE Awareness **Explosives**

- Designed to produce almost instantaneous production of super heated gases which rapidly expand into a greater volume.




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CBRNE Awareness **Explosive Terminology**

Explosives

- Low vs. High
- Explosives
- Blast Pressure
- Fragmentation
- Thermal Effects

Positive Blast Pressure + Negative Blast Pressure



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CBRNE Awareness **Explosive Effects**

- HE in Car
- Car Bomber
- Hazards of being too Close

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CBRNE Awareness **Low Explosives**

- Better known as "propellants"
 - Gunpowder
 - Fuels
 - Designated to burn and produce output as gas.
 - Combustible materials containing both fuel and oxygen.


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CBRNE Awareness **Shock Wave (Effectiveness)**

- Explosive undergo rapid Chemical Reaction.
- Reaction pushes a shock wave
- The Speed of the shock wave is: detonation velocity.

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CBRNE Awareness **Initiation & Fire Train**

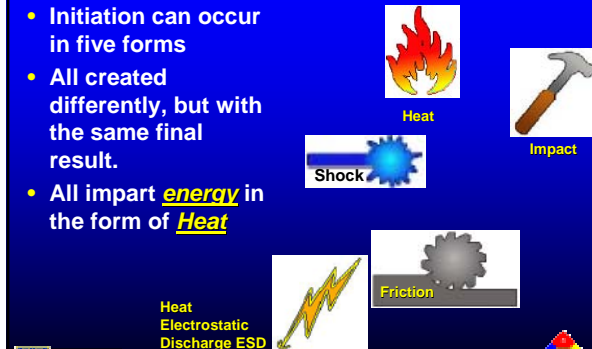


1. Detonated by small impetus (spark, flame, impact)
2. Large impetus that primary required to detonate
3. Requires huge impetus to detonate

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CBRNE Awareness **Stimuli (insults)**

- Initiation can occur in five forms
- All created differently, but with the same final result.
- All impart energy in the form of Heat




Heat
Impact
Shock
Friction
Heat Electrostatic Discharge ESD

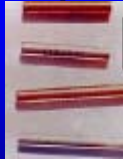
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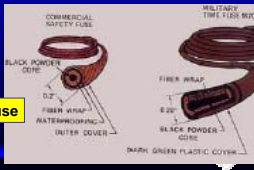
Initiation Components



Electrical Blasting Caps



Non-Electrical Blasting Caps



Time Fuse

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Explosive Components

- Oxidizer
- Fuel
- Heat

Military Explosives

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Potential Oxidizers

Name	Oxidizer	Common Counter Ions
Perchlorates	ClO ₄	K, NH ₄ , Na, Ba, & Ca
Chlorates	ClO ₃	K, Li, Na, & Ba
Hypochlorite	OCl	Ca (OCl) ₂
Nitrates	NO ₃	K, NH ₄ , Na, Ba, Ag, & Sr
Chromates	CrO ₄	Pb, Ba, Ca, & K
Dichromate's	Cr ₂ O ₇	K ₂ Cr ₂ O ₇
Iodates	IO ₃	K, Pb, & Ag
Permanganate	MnO ₄	KMnO ₄
Peroxides	O ₂ -2	Na, & Ba, also H ₂ O ₂

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Potential Fuels

- Energetic Hydrocarbons**
 - Nitrobenzene
 - Nitrotoluenes
 - Nitrocellulose
 - Picric Acid
- Others**
 - Halogens (Cl, F, etc)
 - Powdered Metals (Al, Mg, Sb)
 - Carbon Disulfide (CS₂)
 - Phosphorus (P₄)
 - Sulfur (S₈)
 - Antimony Sulfide (Sb₂S₃)

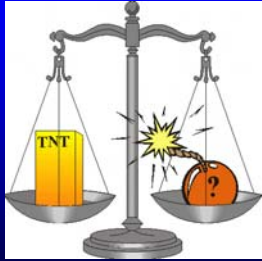
Hydrocarbons

- Petroleum
- Turpentine
- Naphtha
- Castor Oil
- Sugar
- Wax, Paraffin
- Vaseline
- Dextrin
- Shellac
- Rosin
- Saw dust
- Glycerin

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Comparisons



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Relative Effectiveness Factor

Type of Explosive	Relative effectiveness Factor
TNT	1
Black Powder	0.55
Nitroglycerin	1.5
Composition 4	1.34
Composition B	1.1
Dynamite 40%	0.65
Dynamite 60%	0.83
Dynamite, Ammonia 40%	0.41
Dynamite, Ammonia 60%	0.53
Dynamite, Gelatin 40%	0.42
Dynamite, Gelatin 60%	0.76

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TNT Equivalency

- The mass of TNT needed to replicate the effects produced by a test explosion, divided by the mass of the explosive tested

If 2 lbs. of explosives are needed to do the work of 1 lb. of TNT, TNT Equivalency = 1/2 or 50%

If 1/2 lb. of explosives are needed to do the work of 1 lb. of TNT, TNT Equivalency = 2.0 or 200%

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Improvised Explosive Devices

- Vehicle
- Bombs
- Pipe Bombs
- Satchel
- Charges



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Note

- High explosives are not required to make bomb.
- Traditional bomb – steel shell, filler with BP
- Fireworks fills placed in a pipe also common.

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CBRNE Awareness

Summary

- The most common CBRNE/WMD agents in use are still incendiaries and explosives.
- A wide variety of substances can serve as oxidizer and fuel for an explosive device, even common sugar.
- It doesn't have to be a high (1) explosive to be a deadly threat.

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