The information contained in the following presentation applies solely to the Los Angeles County Sheriff's Department, which does not assume responsibility for its use by other entities. Check consistency with local laws and department policies before using this presentation for training.
Explosive and Booby Trap Recognition

Presented By
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WARNING

The following presentation is for law enforcement personnel only. Please do not attempt to copy or share this material with non-law enforcement personnel.
With terrorism and national security concerns on the rise, you need to be prepared to recognize and safely respond to incidents that may involve explosives and/or booby traps. This presentation is designed to heighten your awareness and provide you with some survival skills.

If you have technical questions, please contact the LASD Arson/Explosives Detail at (562) 946-7222 or after hours (323) 526-5541.
Explosions Defined

“The instantaneous conversion of a solid, gas, or liquid into a rapidly expanding mass of gases, accompanied by heat, light, noise, over pressure, and a shock wave.”

Types of Explosions

 ✓ Mechanical
 ✓ Chemical
 ✓ Nuclear
Pressure inside a container overcomes the strength of the container causing it to rupture.

- Steam Boiler
- Pressure Cooker
- Dust Explosion
- Pipe Bombs

A container is required for a mechanical explosion.

Mechanical explosions involve the failure of some type of container. The most common examples of this type of explosion are steam explosions involving boilers or water heaters. In both cases, there is some degree of internal pressure within the container that causes a mechanical failure of the container by either over pressurization and/or a flaw within the shell of the container.
Extremely rapid conversion of solid or liquid explosive compound into gases having much greater volume than the substances from which they are generated.

- Dynamite
- TNT
- C-4 Plastic Explosive
- Ammonium Nitrate Fuel Oil

A container is **NOT** required for a chemical explosion.
Nuclear Explosions

Accomplished by:

✓ Fission (Splitting) of atoms
✓ Fusion (Combining) of atoms

Extremely complicated and precise process.

A nuclear explosion is a nuclear fission reaction. In a fission reaction the nuclei of the materials involved are actually split apart with the release of a great deal of energy.
Effects of an Explosion

- **Primary Fragmentation**
  - Pieces of device
  - Pipe fragments, hand grenade fragments, nails, bolts, etc.

- **Secondary Fragmentation**
  - Items not from device, but propelled as a result of the explosion.

- **Incendiary Effect**
  - Heat (fireball)

- **Blast Pressure**
  - Release of rapidly expanding gases from explosives
  - Pressure of about 700 tons PSI
  - Velocities of up to 13,000 MPH
Explosive substances may be classified by their reaction, composition, or service use. Explosives are divided into two general classes, **high explosives** and **low explosives**, according to their rates of decomposition (+/- 3300fps). They may be further classified according to use.
Accidental Detonation Causal factors

✓ Heat
  ✓ Open flames
  ✓ Smoking
  ✓ Sparks
  ✓ Static electricity

✓ Shock
  ✓ Dropping
  ✓ Kicking or hitting
  ✓ Rough handling
  ✓ Stepping on

✓ Friction
  ✓ Sliding containers
  ✓ Opening lids
  ✓ Dragging

Hazards After the Explosion

A major area of concern is the effect an explosion has on the explosive material itself. If an explosion was a “high order explosion”, all of the explosive was detonated. However, if the detonation was of a “low order”, there will be bits and pieces of unexploded material littering the area. This type of situation may exist after an incident involving an explosion. It is of the utmost importance to realize that any of the remaining pieces of explosive material are of great danger. Due to the explosion, the remnants have been made extremely sensitive and may require very little force to initiate another explosion.

The area must be contained and access denied until the Bomb Squad has cleared the scene. It must be remembered that all explosive materials, including most illegal fireworks are dangerous. Should you find explosive materials, do not handle them or transport them. Contain the location, evacuate a minimum of 500 feet, and call Arson/Explosives Detail.
Low Explosives

Low explosives are mostly solid combustible materials that decompose rapidly, but do not normally explode. This action is known as deflagration. Low explosives do not usually propagate a detonation. Under certain conditions, however, they react in the same manner as high explosives and they may detonate. Generally speaking, low explosives burn rather than detonate.

Examples of Low Explosives:

✓ Black Powder
✓ Fireworks
✓ Propellants

Low explosives are extremely sensitive to heat, shock, and friction.
Black Powder is the oldest known explosive. The Chinese are thought to have invented black powder, perhaps as early as the 10th century. Black powder is a low explosive, composed essentially of a mixture of potassium nitrate or sodium nitrate, charcoal, and sulfur. It is hydroscopic and subject to rapid deterioration when exposed to moisture. The size and shape of the individual granules will influence how fast the powder will burn. Generally, the smaller the granules, the faster it will burn. Primarily used in the powder of safety fuse and in fireworks, black powder, burns progressively.

Flash powder, which was once used to provide “Flash” for photography at its infancy and is now used for special effects and inside firecrackers, is made up of a special formula that is very fine and burns the quickest. Both Black Powder and Flash Powder are extremely dangerous explosives to handle because of the ease with which they ignite by heat, friction, or spark.
Smokeless powder is basically black powder that has been reformulated to produce “less” smoke when ignited. Smokeless Powder is used almost exclusively as the propellant for gun and rocket ammunition. It is manufactured under uniform conditions and grained to a uniform size in the form of flakes, strips, sheets, balls, cords or perforated cylindrical grains. Some of the more frequently used types of smokeless powder are gun-cotton, Ballistite, and Cordite N.
"Consumer" fireworks are those fireworks devices formerly classed as "Class C Common Fireworks" and now classed at "Fireworks 1.4G" by the U.S. Department of Transportation.

State laws may vary as to what types of devices are deemed to be "fireworks" under state law.

CONSUMER FIREWORKS

Specifically permitted: “Safe and Sane Fireworks" where not specifically prohibited

Specifically prohibited: Firecrackers, skyrockets, rockets, roman candles, chasers, sparklers over 10", surprise items, friction items, torpedoes, items resembling food, fireworks containing arsenic, phosphorus, magnesium (magnesium alloys permitted), mercury salts, picrates or picric acid, gallates or gallic acid, chlorates, (except those of alkali or earth metals), boron, titanium (except larger than 100 mesh), zirconium, gunpowder, and “make your own" firework kits.

Sales: Generally, June 28 through July 4th (Varies by local ordinances). Items for sale must be of a type approved by the state fire marshal. Must be 16 years or older to purchase.
Pyrotechnic compositions, with respect to rapidity of action, are low explosives because of their low rates of combustion. The functional characteristics of pyrotechnic compositions are their luminous intensity (candlepower), burning rate, color, color value, and efficiency of light production.

Pyrotechnic substances are commonly used to send signals by visual means, such as color, to illuminate areas of interest. Some common examples include a signal flare or road flare.

**Incendiaries** - An incendiary may be a solid, liquid, or a gelled semiplastic material that, by its intense heat and flame, can start fires and scorch combustible and noncombustible materials. Examples of incendiaries include napalm and the phosphorus used on matches.
Pyrotechnic compositions are very dangerous. Only properly licensed and trained pyro technicians can process or handle them. There are also local and state fire ordinances that limit where and under what conditions they may be used. In February 2003, a rock band illegally used pyrotechnics in their act which quickly sent the nightclub they were playing in up in flames resulting in nearly 100 fatalities.
High Explosives

High explosives are very powerful and release large amounts of energy. They are characterized by the extreme rapidity with which decomposition occurs; this action is known as detonation. When initiated by a blow or shock, it decomposes almost instantaneously. High explosives are used worldwide both commercially and in military applications.

- Detonate Rapidly (+3300 FPS)
- Initiated by Shock (blasting cap)
- Detonating Velocities up to 29,900 FPS

- Dynamite
- TNT
- RDX
- Nitroglycerin

Must be initiated by shock from a blasting cap or other explosives to achieve high order detonation.
High Explosives

Explosives are commonly used commercially for demolition, mining, and tunneling projects. In controlled demolition projects, buildings and other structures are “cut” down by high explosives to make them “cave-in” or implode on themselves. In the mining process, explosives are commonly used to blast a solid body, such as rock, to fragments. Blasting like this is used for the construction of mines, tunnels and also making trenches during wartime.

Box-type magazine - A small, portable magazine used to store limited quantities of explosives for short periods of time at mine or construction projects.
Dynamite

In 1852 Alfred Nobel took up the task of making nitroglycerine more stable so it could be used as a commercially and technically useful explosive. This proved to be very dangerous and resulted in the death of many people including his brother Emil. He soon found that mixing nitroglycerine with silica would turn the liquid into a paste which could be shaped into rods of a size and form suitable for insertion into drilling holes. In 1867 he patented this material under the name of dynamite.

More basically, dynamite is simply some sort of absorbent material (like sawdust) soaked in nitroglycerin. The absorbent material makes the nitroglycerin much more stable. It is usually found in cylindrical form which is called a stick or cartridge. You normally use a blasting cap to detonate dynamite - a blasting cap creates a small explosion that triggers the larger explosion in the dynamite itself. Dynamite has a detonating velocity of about 17,000 FPS.

Dynamite was one of the first high explosives. People used the new explosive for excavating and tunneling. Alfred Nobel got the credit for not only nitroglycerin but dynamite, too. Nobel became very rich and famous. He knew the amount of destruction his invention would cause and he did not want to be associated with thousands of deaths, so he left a large amount of money to the awarding of prizes every year. The prizes were given to the best in Chemistry, Medicine, Physics, Literature, and the promotion of peace. The prizes and still are given out every year.
Other High Explosives

Nitro methane stock solution mixed with liquid propane under blanket of pressurized nitrogen. Detonates with blasting cap or detonating cord.

Gelamex

Tamptite

Slurry or “Sausage” Explosive

Lexfoam (Nitro methane)

ANFO Blasting Agent

Ammonium Nitrate & Fuel Oil is a very common commercial blasting agent. The material itself consists of white pellets and smells like diesel fuel.

Binary-Kinepak Explosive

Explosive Bolt

Ammonium Nitrate Pellets
Other Types of Explosives

Oil Well Perforators

Oil well holes are typically lined with steel pipe and/or concrete casing that usually must be perforated with tiny high-explosive charges ("oil well perforators") prior to pumping. Perforation allows production of oil from specific depths predetermined from logging data. The perforators are inserted into the well hole inside "carrier tubes" and then detonated when the tube has been lowered to the prescribed depth. They are designed to make clean holes in the casing and to penetrate several inches outward into the surrounding oil-bearing strata. The perforators are "shaped" charges that come in a wide variety of shapes and sizes.

Detonation Cord

"Det Cord" is used to detonate secondary high explosives. Detonation cord is a high explosive in itself.

Shaped High Explosive Charge

A "Shaped Charge" is basically a metal housing (usually copper) that contains a high-explosive. The charge is shaped to direct the force of the blast in a specific direction. Used commercially to blast holes or cut through steel beams.
Blasting Caps/Detonators

Often called blasting caps, detonators are designed to initiate high explosives. They may be electric or non-electric. In either case, the sequence, including the detonator, that leads to the main explosive charge is known as a firing train.
Primary Explosives

“Primary” Explosives are sensitive, powerful explosives used in blasting caps and military fuze detonators, which in turn detonate main charges or secondary explosives. They are extremely sensitive to heat, shock, friction, and static electricity. Common examples of primary explosives include Lead Azide, Mercury Fulminate, and Lead Styphnate.
MILITARY EXPLOSIVES AND MUNITIONS
TRINITROTOLUENE (TNT)

This type of high explosive is very stable and can be stored over long periods of time. It is relatively insensitive to shock or friction. It resembles light brown sugar, and when pure it is crystalline and has a very pale straw color. Ammunition loaded with TNT can be stored, handled, and shipped with comparative safety. It may be used for bursting, demolition, blasting, and general detonation.
Composition C-4 Explosive

C-4 is a puttylike material with a dirty white to light brown appearance. This material is used in military demolition blocks and other specialized operational uses involving various types of shape and cutting charges. It can be molded to any shape. The British equivalent is called PE-4. It has a high velocity of detonation and high shattering effect.
Sheet explosives are mixtures of high explosive (RDX or PETN) molded into a rubberized gasket like material. The sheet thickness can range from .042 of an inch to .333 of an inch. They can be cut to a specific shape and used in a variety of applications. Sheet explosives are a favorite choice for terrorist group because of the ease of concealment. Sheet explosives are referred to by several commercial names, such as Deta-Flex (U.S. Military), Detasheet (Dupont), Prima-sheet (Ensign-Bickford), and LX-02-1 (U.S. Department of Energy).
**TETRYL**
Commonly known as “Tetryl” which is short for Trinitrophenylmethylnitramine. This is a standard booster explosive. It is a yellow crystalline solid powder material, practically insoluble in water. It burns readily and is more powerful and more easily detonated than TNT. It is detonated by friction, shock, or spark and is very stable. Its rate of detonation is 23,600-23,900 feet per second.

**PENTAERYTHRITETETRANITRATE (PETN)**
This is one of the most powerful military explosives, almost equal to Nitroglycerine. PETN is very much used in Detonating Cord of which it is the explosive core (Primacord), where it develops a velocity rate of 21,000 feet per second. Detonating cord is insensitive to friction and ordinary shock, but may be exploded by rifle fire. It also detonates sympathetically with the detonation of an adjacent high explosive.

**MERCURY FULMINATE**
This explosive is a yellowish-white crystalline explosive substance, which is highly sensitive to heat, impact and friction. It is insensitive when wet and is usually handled wet in manufacture. Mercury Fulminate detonates completely and with great violence on ignition by means of a flame or by means of an electrically heated wire. These characteristics together with its property of initiating detonation of other explosives, make it especially suitable for use as a detonator material.

**PICRIC ACID**
Picric Acid or Trinitrophenol is a lemon-yellow crystalline solid high explosive, only slightly soluble in cold water. It is not as toxic as TNT, but also produces fumes when molten explosives are packed in loading shells. Picric Acid is entirely stable and has about the same sensitivity to shock or friction as TNT. Its high strength or concussive effect is due to its high rate of detonation which, for the cast or highly compressed explosive is approximately 23,000 feet per second which is greater than that of TNT, but exceeded only by Tetryl.
Hand Grenades

A grenade is a small bomb. It is filled with a high explosive charge or a chemical agent (or it may also be just an empty container, used for training and practice, containing a reduced charge or no explosive or chemical at all). It comes in different sizes, shapes and types, and since it is basically thrown by hand, it is called a Hand Grenade.

Mk II Fragmentation Hand Grenade with storage containers.

Although not a true "Hand" Grenade, this 40mm Grenade is designed to be launched from a 40mm Grenade Launcher.

Note the blue colored "spoon" on the fuse assembly of this grenade. The color blue is normally associated with "inert" or practice munitions. However, don’t you believe it. Always treat all munitions as if they were the real deal.

Wooden Packing Box MKII Fragmentation Hand Grenades

Various grenades that have been rendered safe for training purposes.

Foreign hand grenade. The wooden handle is designed to help extend the throwing range.
Grenade Basics

**Time Delay Grenade:** The most common type of grenade is the time-delay fragmentation anti-personnel hand grenade. The primary function of this grenade is to kill or maim by launching dozens of small metal fragments in every direction when it explodes. The conventional design uses a simple chemical delay mechanism. The outer shell of the grenade, made of serrated cast iron, holds a chemical fuze mechanism, which is surrounded by explosive material. Time-delay grenades are very effective, but can be unpredictable. In some chemical fuzes, the delay time may vary from two to six seconds.

**Impact Grenades:** Impact grenades explode as soon as they hit their target. A grenade launcher is used to hurl the grenade to its target. Grenade launchers can be attached to assault rifles. Most impact grenades are propelled by the gas pressure generated by firing a blank cartridge, although some launcher systems, such as rocket-propelled grenade launchers have their own built-in primer and propellant. Impact grenades have an automatic arming system. In some designs, the arming system is triggered by the propellant explosion that drives the grenade out of the launcher. In other designs, the grenade’s acceleration or rotation during its flight arms the detonator.
1. Grenade, Hand, Smoke, WP, M15
2. Grenade, Hand, Smoke, HC, M8
3. Grenade, Illuminating, MKII
4. Grenade, Incendiary, M14
5. Grenade, Hand, Fragmentation, HE, MKII
6. Grenade, Hand, Offensive, MKIIA2
7. Grenade, Hand, Fragmentation, MKIIA1
8. Grenade, Hand, Fragmentation, HE, MKII

1. Containers for MKII Frag Hand Grenades
2. Containers for M14 Incendiary Grenades
3. M15 WP Smoke Hand Grenade
4. MKIIA1 Frag Hand Grenade
5. M14 Incendiary Grenade
Rifle Grenades increased the range of the grenade dramatically. On the battlefield, they cover the ranges between the maximum for hand grenades and the minimum for mortar shells. A specially modified launcher is mounted at the end of the barrel that holds the grenade. The rifle is aimed down range and a special blank cartridge is used to project the grenade down range. The angle of the rifle as the grenade is launched will determine how far the grenade will travel. Usually, the maximum range is several 100 yards.

M9A1 Rifle Grenades, with M7 Rifle Grenade Launcher (M1 Garand) and M8 Grenade Launcher (M1/M1A1 Carbine)

Various Smoke and Fragmentation Grenades and there associated launchers.
Specialty Grenades

Many specialty grenades exist for both military and law enforcement applications. Shown below are just a few on the market.

This is a “stingball” grenade. It is designed to disperse a mob by bursting with a loud report and showering the area with small rubber pellets.

This is a “flashbang” grenade. It is designed to momentarily disorientate by giving off a bright flash of light and loud report.

This is another type of “flashbang” grenade.

Military Simulator and distraction grenades.
Chemical agents are designed to stop or slow down an attacker by irritating the attacker’s breathing, mucus membranes, and vision. Some of the more common ingredients are Oleoresin Capsicum (Pepper Spray), CN, and CS gas.

This photo depicts many of the chemical agents used by the Los Angeles County Sheriff’s Department.

Various Riot Control Chemical Agent Grenades.

A CS Gas Grenade shown before and after use.
Various other Military Munitions

- Sub-munitions (Bomblets)
- Aerial Bombs
- Torpedoes
- Anti-Vehicle Mine
- Anti-Personnel Mine
- Mortar Shell
- Rocket Propelled Grenade & Rocket
- Missiles and Rockets
Land Mine Basics

Landmines are basically explosive devices that are designed to explode when triggered by pressure or a tripwire. These devices are typically found on or just below the surface of the ground. The purpose of mines when used by armed forces is to disable any person or vehicle that comes into contact with it by an explosion or fragments released at high speeds.

Mines are typically placed in the ground by hand. While more than 350 varieties of mines exist, there are basically only two types, Anti-personnel (AP) and Anti-tank (AT) mines. The basic function of both of these types of landmines is the same, but there are a couple of key differences between them. Anti-tank mines are typically larger and contain several times more explosive material than anti-personnel mines. Additionally, more pressure is usually required for an anti-tank mine to detonate.

Anti-personnel landmines are designed specifically to kill or disable their victims, and are activated by pressure, tripwire or remote detonation. There are also smart mines, which automatically deactivate themselves after a certain amount of time. These are the most common types of mines currently used by the U.S. military. Anti-personnel mines fit into three basic categories:

**Blast** - The most common type of mine, blast mines are buried no deeper than a few centimeters and are generally triggered by someone stepping on the pressure plate. These mines are designed to destroy an object in close proximity, such as a person’s foot or leg. A blast mine is designed to break the targeted object into fragments, which can cause secondary damage, such as infection and amputation.

**Bounding** - Usually buried with only a small part of the igniter protruding from the ground, these mines are pressure or tripwire activated. You may also hear this type of mine referred to as a "Bouncing Betty." When activated, the igniter sets off a propelling charge, lifting the mine about 1 meter into the air. The mine then ignites a main charge, causing injury to a person’s head and chest.

**Fragmentation** - These mines release fragments in all directions, or can be arranged to send fragments in one direction (directional fragmentation mines). These mines can cause injury up to 200 meters away and kill at closer distances. The fragments used in the mines are either metal or glass. Fragmentation mines can be bounding or ground-based.
Claymore Anti-Personnel Mine

- Shipping Plug
- Priming Adapter
- Sight
- Detonator Well
- Control Fired by Defending Troops
- Trip Wire
- 50 Meters
- 60° Kill Area
- Activated by Enemy Striking Trip Wire
- Pull Firing Device
- Detonating Cord
# Small Arms Ammunition

Small arms ammunition can be purchased at most sporting goods and gun stores. Military munitions are painted to prevent rust, and to provide color codes as a ready means of identification. Listed below are standard military color codes that you may encounter:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N210</td>
<td>High-explosive = olive drab with yellow markings</td>
</tr>
<tr>
<td>WP022</td>
<td>Illuminating = gray, with white band and white markings</td>
</tr>
<tr>
<td>VX NG</td>
<td>Casualty Gas = gray, with green band and green markings</td>
</tr>
<tr>
<td>CS GAS</td>
<td>Harassing Gas = gray, with red band and red markings</td>
</tr>
<tr>
<td>SMOKE</td>
<td>Smoke = gray, with yellow band and yellow markings</td>
</tr>
<tr>
<td>WP022</td>
<td>Incendiary = gray, with purple band and purple markings</td>
</tr>
<tr>
<td>WP022</td>
<td>Practice = light blue, with white markings</td>
</tr>
<tr>
<td>WP022</td>
<td>Dummy / Inert = black, with white markings</td>
</tr>
</tbody>
</table>

## Notes

- Small arms ammunition can be purchased at most sporting goods and gun stores.
- Military munitions are painted to prevent rust, and to provide color codes as a ready means of identification.
- Listed below are standard military color codes that you may encounter.
Ammunition Containers

In order to facilitate handling, military munitions are packed in protective containers. These containers are designed to help facilitate transportation and storage of the munitions. Machinegun, rifle, and small arms ammunition comes packed in metal boxes that are easy to handle and provide protection against adverse weather conditions and field use.

When shipping or storing large items or quantities, standard wooden packing boxes are used. They are designed to withstand all conditions commonly encountered in handling, packing, transportation, and storage of ammunition. At the same time these standard types are complying with I.C.C. (Interstate Commerce Commission) Regulations. In general, Small-Arms Ammunition is issued in the standard wooden packing box with moisture-proof metal liner. In these boxes, cartridges are either packed in Cartons, Bandoleers, or Machine-Gun Belts (Belted or Linked). The outer wooden cover is held in place by 6 wing nuts. These boxes have watertight metal liners of which the cover is closed by soldering; this cover can readily be torn or ripped off by use of a wire handle provided for this purpose. All boxes contain an identification card showing quantity, type, caliber, model, and ammunition lot number.
1. To provide Los Angeles County, unincorporated areas, contract cities, and upon request, other incorporated cities with the following investigative, technical and emergency response services:

A. Fire investigation capabilities, providing experienced investigative personnel who are formally trained in the determination of the origin and cause of all fires, and qualified as expert witnesses in both criminal and civil courts.

B. Explosive ordnance disposal capabilities, providing experienced investigative personnel who are formally trained and qualified as expert witnesses for court testimony, rendering safe of all conventional explosives, improvised explosive devices, and United States and foreign ordnance.

C. Explosives investigation capabilities, providing experienced investigative personnel formally trained and qualified to conduct technical analysis of both criminal and accidental post-blast incidents.

D. Security support capabilities, providing EOD and explosive detection K-9 support to the Secret Service, State Department and Departmental security operations involving visiting United States and foreign dignitaries.

E. Weapon re-numbering capability, providing the Departmental Agent for Southern California, authorized by the State Department of Justice, to investigate and certify approval of re-numbering firearms.
2. In the unincorporated areas and contract cities the Arson/Explosives Detail:

   A. Has primary jurisdiction in the investigation of:
      1. All bombings that occur in unincorporated or contract cities.
      2. The manufacturing, sales or possession of all explosives.
      3. All arson fires and accidental fires with a dollar loss of $1500 or more

   B. Has the concurrent assignment in responses to and investigations of:
      1. Thefts of Explosives
      2. Thefts of radioactive materials or threatened use of same.

3. Has primary responsibility for maintaining:

   1. Explosives storage magazines with evidence integrity acceptable to courts of law.
   2. Departmental explosives training range and explosives training facility.
   3. The Detail specialized technical equipment and emergency response vehicles.
   4. The emergency response capabilities with an explosives detection K-9 and handler. In addition we shall provide the necessary care and training for canines to maintain their proficiency.
   5. The formal training and technical skill levels of investigators in the fire/arson, explosives, and investigative disciplines.
   6. The ongoing close liaison with federal, state, and local agencies on matters of mutual concern; included but not limited to FBI, Secret Service, State Department, ATF, FAA, D.O.D./Military Bomb Squads, State Fire Marshal, local police departments and fire department.
   7. Public Lectures:
      1. To enhance community awareness and knowledge relating to bombings, bomb threats, search procedures and related arson/explosive functions.
      2. To support the Department programs by providing subject matter experts and display at station open houses, citizen academies and career days, etc.
The Los Angeles County Sheriff’s Department Arson/Explosive detail will investigate cases that involve:

Arson, Bombings, Burglary where explosives are taken or a magazine is victimized, Explosions both criminal and accidental, Explosives (except fireworks), Fires causing damage to public utility or public property, Fires causing personal injury, Fires causing $1500 or more damage, Incendiary devices, heavy weapons greater than 60 caliber and silencers, Illegal manufacture, sale or possession of bombs, explosives, or destructive devices, Illegal manufacture of fireworks (fireworks factories), Series and patterns of crimes related above.

Responsibilities of this detail include:

- Transporting, storing and disposing of found, abandoned or surrendered explosives, and explosive devices,
- Processing requests to assign and stamping serial numbers on handguns and long guns,
- Collecting, preserving, and analyzing evidence for presentation in court,
- Acting as advisors to, and instructors for, the training academy staff regarding arson/explosives training for Deputies and Sergeants,
- Safe handling of large caches of illegal fireworks.
When dealing with Military Explosives, the Los Angeles County Sheriff’s Department Arson/Explosive Detail defines their jurisdictional responsibilities as follows:

Military explosives are defined as all types of explosives used in warfare, whether of enemy origin or accidentally released by friendly forces. Except on military installations, explosive ordnance reconnaissance shall be the responsibility of the law enforcement agency within the jurisdiction. The following agencies are responsible for explosive ordnance reconnaissance under the conditions which follow:

Military explosive ordnance disposal in navigable waters and up to the high tide mark on ocean frontage is the responsibility of the U.S. Navy. Military explosive ordnance disposal above the high tide mark on land in this area shall be the responsibility of the U.S. Sixth Army. When any reported objects appear to be military explosives, Detective Division, Arson/Explosives Detail, shall respond, and either recover, evaluate and/or notify the 710th Explosive Ordnance Detachment located at Ft. Rosecrans, San Diego, California.

Examples of recovered military ordinance
The Los Angeles County Sheriff's has developed a bomb threat checklist to help apprehend the bomber. The checklist identifies helpful characteristics of the call that otherwise may go unnoticed, such as:

- Where did the caller say the bomb was placed,
- When is the bomb going to explode,
- What did the caller say the bomb looked like,
- What kind of bomb did the caller say had been placed,
- What did the caller say would make the bomb explode,
- Did the caller personally place the bomb,
- Why was the bomb placed,
- What is the caller's name and address,
- Exact wording of the threat,
- Sex, race, and age of the caller,
- Time and date of the threat,
- Description of the caller's voice,
- Description of any background noises.

The above information is extremely helpful for follow-up investigation. Additionally, the handling unit should confer with the victim and/or management, to determine if they desire to conduct a search for the bomb. The victim should be made responsible for this decision. By having the victim make this decision, law enforcement's liability is reduced in terms of damage or loss of business concerns. If the victim decides for a search, they should gather up employees or others that are familiar with the location and participate in the search since they are in the best position to know what is out of place or does not belong. Of course, prior to the search they should be instructed not to touch anything suspicious, but simply report back their concerns. If no bomb or suspicious package is found or the victim does not desire a search, the patrol unit should initiate a report and take no further action.
Los Angeles County Sheriff’s Department Policy mandate’s that a victim desiring a search shall be advised that personnel from the victim’s location must conduct it. Justification being that ANYTHING that does not belong at the location should be treated as a bomb during a bomb threat incident and only the victim’s employees have that knowledge. FIELD PERSONNEL SHOULD NEVER ASSUME RESPONSIBILITY FOR AN UNASSISTED BOMB SEARCH. Statements indicating "THERE IS NO BOMB" should never be issued by field personnel, regardless of the thoroughness of their search.

Additionally, the decision to evacuate and reenter a location during a bomb threat prior to an actual or suspected bomb being found shall always be made by the victim or management in charge of the location. Field personnel shall not order an evacuation unless a real or suspected bomb is found. If an evacuation is necessary, field personnel shall assist in the evacuation procedure. Evacuation of at least 500 feet surrounding a suspected bomb or explosive device is recommended. Floors immediately above and below the found device in a multistory structure should also be evacuated.

The explosives detection dog of the Arson/Explosives Detail will be dispatched only to locations of found devices (suspected and/or real), and to scenes of explosions to search for secondary unexploded bombs. Under certain circumstances, the explosives detection dog team may be used in searches prior to a device being found, e.g., VIP sweeps and bomb threats to airliners, trains, and buses. Due to the fatigue factor, there are definite limitations in the size and complexity of an area to be searched by the dog.
When a suspected bomb, explosive device, or booby trap is found, you as a law enforcement professional should handle it as follows:

- Do not touch the device. Back out slowly the same way you came in.
- Do not make radio transmissions within 300 feet of the device.
- Evacuate nearby personnel to a minimum of 500 feet in all directions.
- Immediately notify Arson/Explosives Detail & Local Fire Department.
- Set-up a containment around the suspected device. Areas containing explosives/booby traps should be roped off, posted and guarded.
- Direct Bomb Squad personnel to the exact location of the suspected device.
If the sight of blood or mangled body parts make you squeamish, you should avoid viewing the next few slides. The section to follow deals with the dangers of making or handling illegal fireworks and explosives.
Most people like to see explosions; it's just human nature. Most of the people who are injured by explosives are injured because of what they do not know, not by what they do know. Simple fireworks injure more people than high explosives. Each year, more than 10,000 injuries are caused by the use of fireworks in the United States. Seventy percent of those injuries are in children and young adults between the ages of 5 and 24 years. Half of all injuries are incurred in the week of the Fourth of July.

**Why people get hurt**

Many people will tell you that they used to play with M-80's and cherry bombs when they were young. If they still have all of their fingers, they were lucky. You can handle numerous illegal fireworks and not get injured by one going off accidentally. The problem is that if one does go off accidentally, you probably will not get a second chance to make another mistake. The law of averages can strike the first time that you pick up an M-80 or it can strike on the 731st time that you pick one up. The one thing that you can be sure of is that eventually one of them will go off accidentally. Home made fireworks and explosives are very unstable. There is no set formula for the explosive that is used in illegal fireworks. Some of the fireworks that are made in Mexico are so unstable and dangerous that they are shipped wet to prevent them from exploding prematurely. The explosive filler can be set off by friction, heat, impact, sparks or flame. If you have a bag full of illegal fireworks and one of them goes off accidentally, you can assume that all of the fireworks in the bag will go off at the same time. A small amount of fireworks going off at the same time in a vehicle can kill everyone who is in that vehicle and scatter parts of the car in all directions.

This is a photo of the left leg of a juvenile. The juvenile built a CO2 cartridge bomb by filling a CO2 cartridge with gun powder. When the juvenile lit the fuse, it was too short, detonating the bomb. A metal fragment went all the way through his left leg and probably would have killed him if it had hit him in the torso.

This is a photo of the left hand of an 18 yr old. His ring finger, little finger, and a portion of his palm were blown away when a pipe bomb he was building detonated.
Static electricity is everywhere. It is created by motion. Wind or walking on a carpet can create static electricity. You can create static electricity by running your fingers through your hair. I am sure that everyone has been shocked by static electricity when they grab a door handle after sliding across a car seat. Synthetic clothing tends to create static electricity and cotton clothing tends to prevent static electricity. A simple spark of static electricity near an explosive mixture will quite often cause an explosion. Many fatal fireworks accidents have been caused by static electricity and these accidents can occur at any time.

Commercial explosives, with a few exceptions, are usually stable and safe to handle. Home made explosives are usually very unstable and will often explode for no apparent reason. To intentionally make an explosive compound is like playing Russian Roulette. Even commercial explosives can be unpredictable. Crystallized dynamite can detonate with a sudden temperature change of 3 degrees or more. ANFO can be made touch and friction sensitive if it has been contaminated impurities.

What you don't know will hurt you

This person was attempting to burn off the protective wax coating on the fuze of an M-80 type of firework. Injuries to the hands and face are the most common types of fireworks injuries.

This person was using black powder to assist in lighting a "Sparkler Fountain" on the 4th of July. What he did not know was that the fountain was smoldering. When the black powder exploded, it drove the container into his knee. The black cloth is where it drove his pants into his knee. He received several burns in addition to this injury.

This young boy did not live long enough to discover that it is not very wise to put explosives in your mouth.
Military devices are designed to kill. Some of them have complicated fuses that are designed to detonate the explosive by a slight movement, or impact. Some of them contain poisonous gas. It is usually not the actual explosion of a military device that kills people. It is usually the shrapnel (small pieces of metal) from the explosion that kills people. Shrapnel can travel at 3000 feet per second in all directions from the explosion. The metal pieces are razor sharp and will cut through the human body causing fatal wounds. Military devices are often altered by civilians and become even more dangerous. Military explosives experts will not handle any found military devices until they can be sure that the device contains no explosives or has not been tampered with. If you want to stay alive, follow their example. These are just some of the things that most people do not know. For security reasons, we cannot release the rest of the reasons why people get injured by explosives, but you can be assured what you don't know may kill you.
California Explosive Related Laws

12305 H&S - Unlawful possession of an explosive
12505 H&S - Defines dangerous fireworks
12677 H&S - Possession of dangerous fireworks without a permit
12671 H&S - Unlawful to sell, offer for sale, possess, store, discharge, use, or transport any fireworks which have not been registered by the California State Fire Marshal
12680 H&S - Place, throw, ignite, discharge fireworks at a person/crowd where injury can occur
12689a H&S - Sell, give, deliver dangerous fireworks to anyone under the age of 18
12681 H&S - Unlawful to sell or transfer Safe and Sane Fireworks at other than the approved fixed place of business
12688 H&S - Unlawful to sell any class of pyrotechnics, including dangerous, Safe and Sane fireworks without a license or permit
12689b H&S - Unlawful to sell, give, or deliver Safe and Sane Fireworks to anyone under the age of 16.
148.1 PC - Making or sending a hoax or real bomb threat
12301 PC - Defines terms for destructive devices.
12303 PC - Possession of a destructive device.
12303.6 PC - Sales/Transportation of a destructive device
12308 PC - Explode a destructive device with the intent to commit murder
12309 PC - Explode a destructive device that causes bodily injury
12310 PC - Explode a destructive device that causes great bodily injury
12312 PC - Possession of materials to make a destructive device
12355a PC - Assemble, maintain, place or cause to be placed a booby trap device

A misdemeanor is punishable by up to a year of confinement in the county jail. A felony is punishable by a year or more in the State Prison. Upon conviction for a felony you can no longer be in possession of a firearm, hold public office or vote. A person who is convicted of an offense involving an explosive device is not eligible for probation. An M-80 can be considered to be an illegal explosive and possession of an M-80 can be a felony. It is a felony to possess or explode a container by the use of expanding gas (example: vinegar and baking soda or a CO2 device) A simple rule of thumb is that if it explodes, it is probably illegal.
Improvised Explosive Devices

A Improvised Explosive Device, or “IED” for short, is basically any homemade device that has been built or modified to explode. The amount of books and recipes for building IED’s is enormous. This presentation will show you just a few of these devices in the hope that you become better aware of how to recognize an IED when you come across one. This presentation is not intended to show you how to build these devices, but hopeful it will encourage you to be more cautious in your search techniques and give you a greater appreciation for the mechanical aptitude and cleverness of those who build them.
Improvised Explosive Devices

Pipe bombs are one of the most common and dangerous Improvised Explosive Devices that you may encounter. The explosive filler may react with the metal in the pipe, causing it to explode unexpectedly. The explosive filler may get into the threads of the pipe and a small amount of movement may be enough friction to cause the pipe bomb to explode. Static electricity may jump from your hand to the pipe causing the pipe bomb to explode. A pipe bomb can easily kill someone who is 300 feet away from the explosion because it will throw many pieces of shrapnel in all directions. Eventually, you can be sure that it will blow up in your face.

This is what happens when a person tries to use a pipe bomb and it goes off while they are holding it. The pieces that could be found were placed back in approximately their correct location for this photograph. The head is at the bottom of the screen and the right foot is at the top of the screen.
Improvised Explosive Devices
Improvised Explosive Devices
Improvised Explosive Devices

Dry Ice or Acid Bombs have become very popular with teenagers looking for some fun. These devices can be very deadly. Once the ingredients are inserted into a normal plastic soda bottle the bottle will continually build up internal pressure until it explodes. This can be anywhere from near instantaneous to an hour or more depending on the amount and strength of ingredients.

I wonder if this young man still thinks playing with bombs is fun?
Title 18, United States Code, Section 1705 deals with mailbox vandalism. It is a federal felony offense, punishable by up to three years in prison, and up to a $250,000.00 fine. This includes maliciously injuring, tearing down or destroying any mailbox. It also includes injuring, defacing or destroying any mail inside the mail box.

Title 18, United States Code, Section 1716 makes it unlawful to mail anything dangerous or flammable, specifically, explosives, poisons, alcohol, firearms, blood, certain knives, fireworks, bullets, etc. There are exceptions for medical or law enforcement purposes. The penalty is in three parts. The first is a misdemeanor, punishable by no more than one year in jail, if the items are mailed. The second part, if the item was mailed with the intent to kill or injure, is a felony punishable by a $10,000.00 fine and up to 20 years in prison, or both. The third part is if the mailing resulted in someone’s death. This is a felony punishable by the death penalty or to life imprisonment.
Suspect Letter & Package Indicators

Letter containing Anthrax sent through U.S. Mail

Precautions:
1. Never accept mail, especially packages, while in a foreign country.
2. Make sure family members and clerical staff know to refuse all unexpected mail at home or office.
3. Remember - IT MAY BE A BOMB - Treat it as suspect.
Homemade Baby Powder Bomb

In December 2005, the Cumberland County Sheriff’s Office in the state of Maine made a traffic stop and found the device shown here in the car. The driver was a teenager who advised he and his friends play a game similar to paintball where the device is filled with baby powder instead of explosives. A CO2 cartridge is used to detonate the fake bomb and the target gets covered with baby powder.... as opposed to dying. Further investigation has found this is an up and coming new “game”. Be advised the make-up and construction of the baby powder bomb is extremely similar to one with explosives.
Claymore Mine Simulator

In January 2006, the Orange County Sheriff’s Office (Florida) reported the existence of a "Toy" claymore mine that fires airsoft (plastic) bb’s and baby powder using a spring. www.supercelldev.com

The devices are manufactured by Supercell Development Corporation and can be purchased on their website at www.supercelldev.com. This simulator resembles the actual military version. The airsoft version is intended to be used for applications in paintball competitions and other "game type scenarios". This device is activated through remote system (auto alarm remote) or trip wire. Caution should be exercised in dealing with this item due to it resembling the actual device. It is not known if this item could be converted to employ actual shrapnel to cause injury or death.

- Manufacturer Specs:
  - Power Source: Spring Powered. NO gas. NO explosives.
  - Lightweight: Weighs 2 lbs.
  - Dimensions: 8 1/2” L x 2” W x 3 3/4” H - Exactly the same as a real claymore.
  - Set up: Can be set up in the field in less than a minute
  - Inexpensive: Reusable. Can use damaged, odd shaped or recycled BBs
  - Safe: Uses NO explosives. Consistent velocities.
  - Firing Method: Trip wire and/or Electronic Command Detonation

- CLAYMORE EFFECTIVENESS
  - Payload: Holds 200+ Airsoft 6mm BBs --- but 25-50 cover very nicely
  - Distance: Airsoft .2 g bbs over 40' Spread: 30-45 degree radius
**Drano Bomb**

This is a chemical reaction type bomb, using household products (Water, Aluminum Foil and Drano). Water reacts with the Drano, but the process is accelerated by the excessive amounts of aluminum foil. The bomb will create a loud bang and is not likely to cause any serious property damage. It certainly will cause chemical burns to any person standing too close to the device when it explodes. It could also cause injuries if a glass bottle was used.

- **Photo - A**: 500g can of Crystal Drano. 750ml or 1 liter Plastic Ocean Spray Bottle. The bottle is partially melted from the heat caused by the chemical reaction. The large hole in the side was caused when the bottle ruptured from the high pressure generated from the chemical reaction.
- **Photo - B**: Ocean Spray bottle cut open. The blue substance is the left over Drano. The black objects are small stones. Their only use would be as projectiles. The object on the right and some of the gray material in the bottle is the melted Aluminum Foil.

- Information on construction the bomb is readily available on the Internet. Users are instructed to be at a safe distance of 10 to 20 meters to avoid the spray of the corrosive liquid.

- As a side note, another popular chemical reaction type of bomb is called a “dry ice” bomb. This involves the mixing of dry ice and water into a closed container such as a plastic soda bottle. A slow chemical reaction will occur that will increase the pressure in the container and will eventual cause the container to violently rupture. The time it takes to rupture is dependant on the ratio of ingredients, temperature, and strength of the container, usually between 5-20 minutes is the norm.
Homemade PVC Flamethrower

This homemade flame thrower was manufactured by a teenager (NFD) and has made its way to numerous bomb making websites on the internet. The manufacturer claims to love PVC weaponry and states he manufactured the device in his garage with materials purchased at a local Home Depot for under $100. The flame thrower is made of two main parts, a gun/hose assembly, and the tank. The tank is made of PVC pipe that has been glued together and pressure tested. It is compressed with normal air. The gun is made from regular metal pipe with normal valves and a propane torch. The hose connects to a stop valve, which connects to a short pipe nipple that's tapped directly into the tank. For fuel, he is using denatured alcohol. The range appears to be in excess of 30’. It is unknown if this individual was ever apprehended. As a side note, pyromaniacs have used a wide variety of items to mimic flamethrowers, such as “supersoaker” water guns, H2O fire extinguishers, to something as common as hair spray and a cigarette lighter.
In April 2005, the Barron County Sheriff's Department (Wisconsin) responded to a report of an explosion in their county. When Deputies arrived they found a burning vehicle in the middle of a field. It was learned through investigation that a male suspect blew the vehicle up using a bomb he constructed from a compound called "Tannerite". Tannerite is the product name for explosive grade ammonium nitrate. It is a white powder substance that needs to be mixed with a catalyst, such as zirconium or aluminum, and then detonated. Tannerite was developed to be used by snipers and other long range riflemen as an indicator for their targets. The explosion caused when they hit the target would alleviate the need to walk hundreds of yards to check the target. Tannerite is available for sale over the internet and is available to anyone over the age of 21.

The "Tannerite kit" comes with zirconium and is mixed together in specific ratios just prior to use. In this instance, the suspect mixed up a large quantity into a one gallon plastic jug and then suspended the jug inside the interior of a vehicle. To detonate the IED, the suspect fired at the jug with a rifle at a distance.

The results of the explosion can be seen in the attached pictures. Debris from the vehicle was found up to 500 yards away and the explosion was heard for miles. The vehicle was an abandoned vehicle and no one was hurt in the incident.
A "COLLAR BOMB" IS A IMPROVISED EXPLOSIVE DEVICE (IED) THAT IS PLACED AROUND THE NECK OF THE VICTIM. THERE HAVE BEEN LESS THAN A DOZEN REPORTED USES OF IT IN SOUTH AMERICA, PARTICULARLY COLOMBIA AND VENEZUELA. IT IS USED MOST OFTEN TO EXTORT MONEY. IN AUGUST 2003, A COLLAR BOMB WAS USED IN ERIE, PENNSYLVANIA TO FORCE A PIZZA DELIVERY MAN TO ROB A BANK. THE BOMB DETONATED AND KILLED THE VICTIM BEFORE IT COULD BE REMOVED. IN JUNE 2000, A COLLAR BOMB EXPLODED IN COLOMBIA WHILE A EOD TECH ATTEMPTED TO DEFUSE IT, KILLING THE VICTIM AND BOMB TECH. ALTHOUGH MOST OF THESE DEVICES HAVE BEEN "COLLAR" TYPE DEVICES, THESE DEVICES CAN BE MODIFIED FOR DIFFERENT EXTREMITIES. FOR EXAMPLE, IN DECEMBER 2003 A "BELT" BOMB WAS USED UNSUCCESSFULLY IN COLOMBIA TO GET A BANK EMPLOYEE TO EXTORT MONEY.

WHAT IS A "COLLAR BOMB" AND HOW DO THEY WORK? THESE DEVICES CAN BE VERY SOPHISTICATED, WITH MULTIPLE ARMING DEVICES, AND POSSIBLY ANTI-TAMPERING MECHANISMS. A COLLAR BOMB IS USUALLY CONSTRUCTED IN TWO PIECES AND ASSEMBLED ONLY AFTER BEING PLACED AROUND THE VICTIM'S NECK. ONCE AFFIXED, IT IS ARMED AND THE VICTIM IS GIVEN INSTRUCTIONS TO REFRAIN FROM ATTEMPTING TO REMOVE OR DISARM THE DEVICE.

THE PROLIFERATION OF THIS TECHNOLOGY REPRESENTS A VIABLE FUTURE THREAT.
The Explosive Formed Penetrator (EFP) (shape charge) is an Improvised Explosive Device (IED) that poses an extremely serious threat to armored vehicles used by the military and in dignitary protection missions. In August 1995, Georgian President Eduard Shevardnadze’s motorcade was targeted by a EFP IED. He narrowly missed being assassinated as the device launched a copper shaped charge into the front engine block of his armored vehicle. In the war in Iraq, these devices have been generally used in areas where natural slow down points exist, interchanges, traffic circles, etc.

Typical EFP IED devices recovered in Iraq are constructed of large diameter (6”-9”) steel pipe, one end of which is sealed with a welded steel plate drilled in the centre to take a blasting cap. The weapon is filled with high explosive and a inwardly dished steel or copper plate is fitted to the front of the weapon. It is this plate that is formed into the projectile when hit by the detonating wave from the explosive. The explosion projects the metal plate thru the pipe and forms a metallic dart capable of penetrating armour plate. This relatively simply constructed weapon is highly directional and capable of being aimed to a fair degree of accuracy.

Some of these devices incorporate very sophisticated targeting technology using Passive IR (heat) Sensors that are designed to not be affected by radio jamming counter measures. Additionally, remote car alarms or garage door controllers have been used to remotely arm these devices as the target approaches. These devices have been found hidden in camouflaged foam designed to blend in with the area where the device is to be emplaced. Once armed, any movement of a person or vehicle in the field of view of the sensor will cause the device to detonate.
In January 2006, the Washington Times reported American helicopters in Iraq are facing a new threat from so-called "aerial" bombs that are fired from the ground and explode close to passing aircraft. The home-made weapons, known to the Americans as "aerial improvised explosive devices," have been used on numerous occasions. "The enemy is adaptive. They make changes in the way they fight, they respond to new flying tactics," Brig. Gen. Edward Sinclair, a U.S. Army aviation commander said.

The devices are placed along known flight paths and are triggered when insurgents see a low-flying helicopter approaching. They are then fired to a height of about 50 feet before a proximity fuse detonates the explosive, filling the air with thousands of metal shards. Based on old anti-aircraft or artillery shells, the bombs would have a devastating effect if detonated close to a thin-skinned helicopter.

The picture at right depicts a possible similar mortar type IED launcher that was manufactured by a so-called "Militia group" in Canada. This particular mortar launcher was constructed from a metal pipe, approximately 3" x 3’. A metal base was welded to the bottom for stability with a hole near the base to house an initiator. The pipe contained gunpowder as filler, with a rocket engine igniter as the Initiator. The projectile consisted of a plethora of metal screws, nails, live 22 rounds, jigsaw blades, metal hooks nuts and bolts, rocks, and a chain. The launcher was designed to function with the use of a remote control.
Peroxide based explosives have become the favorite of terrorists. The two most common improvised peroxide-based explosives are Triacetone Triperoxide (TATP) and Hexamethylene Triperoxide Diamine (HMTD). The ingredients necessary to make TATP and HMTD are found in common household items. TATP specifically is the most common of these two explosives. It is formulated from acetone, hydrogen peroxide, and an acid. It is a white crystalline substance that is highly sensitive to spark, shock, or friction.

It is relatively simple to make, which makes it well suited as a homemade explosive. Instructions for its production, and its use in making improvised detonators, are readily available on the Internet and in a variety of publications. Many terrorists have been injured and killed making TATP. As such, law enforcement should pay close attention when investigating incidents in which individuals have been injured in home chemistry experiments. Terrorists have used TATP both as a explosive main charge and as an improvised detonator. TATP was used in the 2005 London Bomb attacks, and in numerous other terrorist bombings. TATP is more stable in a cold environment, as such, the presence of a frig or ice chest may be used to store or transport the explosive. Law Enforcement and security personnel may encounter this substance when searching the person, possessions, or residence of suspected terrorists.
Improvised Chemical Dispersal Device

A Improvised Chemical Dispersal Device (ICDD) can be fabricated from commonly available materials, and in most cases is designed to asphyxiate its victims. Such a device could produce cyanogen chloride (CICN) gas and/or hydrogen cyanide (HCN) gas. Little or no training is required to assemble and deploy such a device due to its simplicity. Law enforcement and security personnel should be aware of this threat along with the variety of symptoms related to these chemical substances.

According to available information, a improvised chemical dispersal device may consist of a pierced container or canister, such as a large milk container or paint can which contains glass bottles or vials filled with acid. Holes may be drilled into the side of the container to allow toxic gas to exit. The bottles would be placed in the bottom of the container which would be partially filled with white solid and reddish-brown cyanide crystals. The device may be used with or without a detonator. A detonator, or other means, would be used to break the glass containers, releasing the acid and allowing the chemicals to mix, creating a vapor. The device could be placed near air intakes or ventilation systems, in crowded or enclosed spaces.

HCN has a characteristic odor of bitter almonds that could provide a degree of warning to exposed individuals. CICN has an acrid, choking odor and causes burning pain in the victim’s eyes below lethal concentrations. Cyanide compounds disrupt cells’ ability to utilize oxygen, leading to suffocation. Exposure to high concentrations of cyanide may produce nausea, vomiting, palpitations, confusion, hyperventilation, anxiety and vertigo which may progress to agitation, stupor, coma, and death.
Radio Controlled Airplane and Vehicle Bombs

Although rare, terrorists have attempted to use both radio controlled vehicle and model airplane bombs in Columbia and along the Palestinian / Israeli border.

The use of Radio controlled aircraft (RCA) offers a number of benefits that make this tactic attractive to terrorists. First, these aircraft have low visual and radar signatures, making detection difficult. Second, their remotely-operated nature enables terrorists to conduct standoff attacks, reducing vulnerability to the terrorists perpetrating the attack and facilitating escape. Third, the ease of operation of RCAs enables almost anyone to become proficient in their use. There are few defenses against RCAs beyond the use of small arms. These factors make RCAs a low-cost, relatively low-risk terrorist attack option. Law enforcement should not discount the possibility of encountering one of these devices.

In 1990, FARC terrorists rigged a vehicle loaded with explosives to operate by radio control and attempted to drive it into a police station.

In August 2002, the Colombian Army seized nine RCAs from FARC camps in Aruaca. One of these aircraft contained a payload of two kilograms of explosives.
Homicide bombers are persons who deliver and detonate a homemade improvised explosive device near innocent victims and killing themselves in the process. This is often accomplished by hiding their bomb underneath their clothing and detonating their bomb in the targeted area. Two common types of homicide bomber bombs are built into a vest or belt for support. They often use TATP as the primary explosive and will detonate the device using a electronic switch. The bombs often contain or are surrounded by metal shrapnel such as bolts or BB’s. Israeli authorities have reported that some terrorists are putting rat poison in their bombs. Rat poison works as an anticoagulant causing victims to continue bleeding after suturing.
Flashlight IED Bomb

In September 2002, a city employee was seriously injured by a flashlight bomb he found in a portable toilet in the city of Turlock, CA. Since 1979, The ATF has reported over 50 incidents involving these types of IED in the United States. No particular model or make has become prevalent.

Some explode when turned on, some have a fuse, and some have been laden with nails, BB’s, ball bearings, nuts and bolts for shrapnel.
In December 2001, an al-Qaeda operative named Richard Reid attempted a shoe bombing on board an American Airlines flight from Paris to Miami. With the help from nearby passengers, he was prevented from detonating the explosives hidden in his shoe. Authorities later identified these materials as plastic explosives (PETN) with a TATP detonator. Reid had attempted to light a fuse with a cigarette lighter that was hidden in the sole of his shoe. The fuse was connected to a detonator made from TATP. Subsequent analysis expressed surprise that Reid was able to walk with TATP in his shoes without the explosive detonating early, as TATP is extremely sensitive to shock and friction.

Shoe bombs represent a additional security concern for law enforcement, security and airport screening personnel. Clearly the attraction of a non-metallic detonator (TATP) has obvious benefits to those hoping to penetrate airline security. In November 2005, three Ethiopians were arrested at Nairobi International Airport in Kenya with shoe bombs in their possession.
Terrorists and bomb makers continue to make lethal explosives from readily available materials, many of which are uncontrolled and which attract little attention. Law enforcement officers should be alert if they come across any one or combination of these materials in the course of their duties.

- **Acetone**: A common industrial solvent that is also used in household and commercial products typically found in hardware and paint stores. Often sold in metal or plastic containers, it is a clear liquid that has a strong, unique odor.
- **Alcohol**: A common material used in industrial, household, and commercial products typically found in hardware and other stores. Toxicity and hazards differ depending on type involved. It is usually a clear liquid, but it may have color additives. It is sold in metal, plastic, or glass containers.
- **Aluminum Powder**: Also known as silver bronzing powder. A common additive to silver paints and inks typically found in art, hardware, and automotive paint supply stores. It usually appears as finely ground silver powder or flakes. It is typically sold in metal or plastic containers, but it can also be made from finely ground aluminum stock or shavings.
- **Ammonium Nitrate**: Also known as nitrate of ammonia it is often mixed with fuel to produce an explosive mixture. Usually sold as a fertilizer, in bags, barrels, or similar bulk packaging, at agricultural or garden supply stores. It is a primary ingredient in medical cold packs, which are often used by athletes and physical therapists. It typically appears as small, white prells (resembling “BBs”), but it may be ground into a powder. Mixtures with other fertilizers and additives may change color, which will usually be dull or pastel.
- **Citric Acid**: Also known as sour salt. It is often used in cooking and is commonly added to cleaners and other household products. It usually appears as a white, crystalline powder, and it can be extracted from tart citrus fruit such as lemons – giving it a faint citrus odor.
- **Glycol**: A clear, odorless, slightly syrupy liquid used in antifreeze and deicing solutions, brake and hydraulic fluids, and artificial fog and/or smoke solutions. It is usually sold in metal or plastic containers. Not hazardous by itself, its associated hazards depend largely on additives – some of which are flammable.
- **Hexamine**: Also known as hexamethane or hexamethyl-enetriamine. It is commonly sold in tablet or bar form for use in camping stoves and similar portable heating equipment. Tablets normally appear as white or off-white and are about the diameter of a quarter.

(Continued)
Homemade Bomb Maker Ingredients

- **Hydrogen Peroxide**: A common material used in industrial, household, and commercial products typically found in hardware and other retail stores. It is usually a clear liquid, and it is sold in metal, plastic, or glass containers. Distillation procedures are available on the Internet.

- **Mercury**: Found in older, analog thermostats, barometers, thermometers, blood pressure measuring equipment, and fluorescent lighting fixtures. Usually appears as a silver or silver-white metallic liquid.

- **Nitric Acid**: Also known as aqua fortis or azotic acid. A common material used in metalworking, electronics manufacturing, electroplating, and specialty fuels for rockets and missiles. It is typically found in chemical warehouses, but instructions for distillation are on the Internet. Hazards differ depending on type involved.

- **Nitromethane**: A colorless liquid with a fruity odor that is used as a solvent and high performance fuels for automobile racing and model aircraft. It is sold in metal or plastic containers and is typically found near racetracks or related hobby shops.

- **Potassium Permanganate**: Commonly used as a disinfectant and iron removal additive in home water treatment systems, and it has woodworking, taxidermy, and photographic processing applications. It can be in solution, but it usually appears as purple or bronze crystals when sold in solid form. Typically sold in metal, plastic, or glass containers in medical supply and chemical warehouses, hardware and photography supply stores.

- **Silver Nitrate**: Also known as lapis or lunar caustic, it appears as a clear, odorless liquid. It is commonly used in glasswork and photographic processes.

- **Sodium Azide**: A toxic, white, water reactive metal that appears as common table salt. It is available in 50 to 200 gram amounts in many passenger vehicle air bag systems.

- **Sulfuric Acid**: Also known as oil of vitriol or battery acid, it usually appears as a clear to dark brown, odorless, dense, and oily liquid. Commonly used in batteries and metalworking, it is usually sold in metal or plastic containers in automotive, metal, and chemical supply shops. Distillation processes are described on the Internet.

- **Toluene**: Also known as toluol, methylbenzene, or methylbenzol. A common solvent used in painting, leather dressing, and other industrial processes. It is usually sold in metal containers in hardware and paint supply stores and leather tanning supply shops.

- **Urea**: Commonly used as a fertilizer that is sold in bags, barrels, or similar bulk packaging, at agricultural or garden supply stores. Usually appears as white crystals or powder, with a slight ammonia odor.
Miscellaneous IED’s

**CO2 Cylinder bombs:**
Cylinders packed with black powder w/45-second fuses

**Soda Can bombs:**
Can is packed with a primer, paper, battery, and explosives. Initiator is a nail which protrudes through the bottom of the can. Upon impact the nail strikes the primer detonating the IED

**Explosive Light Bulbs:**
This IED is made by carefully drilling a small hole in light bulb and injecting a flammable/volatile substance into bulb. When the light is turned on, it explodes.
Booby Traps

A Booby Trap is any type of hidden trap, bomb, or device placed so that it will be set off by an unsuspecting person. The purpose of a booby trap varies considerably, some of the more common purposes include:

✓ Alarm and Warn Suspects
✓ Delay, Impede and Confuse Intruders or Police
✓ Deny Access to an Area
✓ Inflict Casualties
✓ Channel Intruders into “Kill Zones”
✓ Prevent Theft

WARNING!!!!
This Location Is Boobytrapped (Not LIABLE For DEATH or Injury)
“DANGEROUS”

Booby Trap Examples:
- Spike Strips
- Animal Trap
- Black Powder placed inside light bulb

IS THERE LIFE AFTER DEATH??
TRESPASS HERE AND FIND OUT.
Alarm and Warn the Suspect

- Audible Warning Devices: i.e. Door Chimes, Bell on Strings, and Air Horns.

- Visual Warning Devices: i.e. Motion Lights, Military Trip Flares, Smoke Grenades, Fireworks, Shotgun Blanks, and Video Cameras

- Animals: i.e. Dogs, Peacocks, Geese, etc.
Fences, walls, and doors are designed to delay, impede, and confuse. They deny access and are sometimes used to channel you into the targeted area that may contain booby traps. Many times fences are topped with razor wire or may be electrified. Doors are often reinforced with steel or solid wood and build right into the structure of the building itself. Walls may unknowingly “topped” with grease, paper tacks, or broken glass.
Dogs, birds, and other animals are often deployed to act as a verbal alarm and deterrent to entry. In a small number of incidents, wild animals and poisonous snakes have been used.

Some of the more common attack dogs you may encounter are Pit Bulls, Rottweilers, Doberman Pinchers, and German Shepherds. Because of their aggressive nature, many of these breeds cannot get along with one another. In this case, suspects have chained them to center stakes within the perimeter of the yard just out of reach of one another. However, often times the suspects may have an entry/exit route through the yard that is just out of reach of the dogs.
Booby traps are often deployed by drug dealers, marijuana farmers, criminal gangs, outlaw bikers, clandestine drug labs, hate groups, militia groups, anti-government groups, business owners, vehicle owners, home owners and basically anywhere criminal activity may be in play. Booby traps are also used for revenge, retaliation, and often times just by the curious. Most booby traps are non-explosive devices, such as concealed pit falls, animal traps, nails through boards, punji sticks, or fish hooks that are left dangling at eye level.

Who uses booby traps?

- Marijuana Growers
- Street Gangs
- Militia Groups
Marijuana growers are very protective of their crop and are notorious for setting booby traps. Most growing operations are conducted clandestinely on public lands where the growers feel immune to blame or prosecution. As such, both lethal and non-lethal booby traps may be deployed. Shown below are a few of the traps that have been used in the past.

This is a glass bottle containing acid and an explosive device. It is mounded high in a tree and is designed to be activated by a trip wire at ground level.

These three photos depict various Improvised Explosive Devices that are embedded with nails. They were designed to go off electronically by tension/release trip wires.

This is a tree branch pulled back and tied down. Fastened to the branch are a string of nails and a small bag of rat poison. The branch was designed to release by a pressure sensitive trip wire.

This board with nails sat at the bottom of this wooden frame that was buried and concealed along a pathway leading to a marijuana patch.
Marijuana Growers

This 12 gauge shell uses a mousetrap to detonate the primer when a trip wire is activated.

Fish hooks are hung on branches at eye level.

Military fragmentation grenade rigged to a trip wire.

False trip wires are strung amongst live ones.

Trip wire release weighted board with spikes.

Trip wire activated shotgun and mouse
Marijuana Growers

Military fragmentation grenade rigged with a trip wire.

This is a improvised electrical switch made from a mouse trap. When the paper tag is pulled away by a tripwire, the electrical circuit will close and fire off the explosive booby trap.

Pipe bomb activated by trip wire that is connected to a normal clothes pin. When the wire is pulled away, the clothes pin snaps together completing an electric firing circuit.

Trip wire crossbow, silencer, and firearms confiscated from a marijuana growing site.
This device was one of several devices found "guarding" a marijuana patch. They were loaded with 12 gauge shotgun shells (#8 shot). The devices are designed to be activated by a hidden tripwire. The tripwire pulls the safety catch away from the spring loaded trigger. The trigger then slams down on the nail which hits the shotgun shell primer.

A test of flawlessly the device worked
Marijuana Growers

Unfortunately, every so often a person such as a hiker may unknowingly stumble upon a clandestine marijuana growing operation. When that happens, a booby trap may hazardously take an innocent life.
If after having viewed all of the dastardly devices that those marijuana farmers are using and you happen to find yourself in the middle of a marijuana patch, here are some do’s and don’ts that may keep you alive. These steps also apply to any scenario where you suspect the immediate area is booby trapped.

What if…

- Stay still, don't panic.
- If you can, call for help (bomb squad) verbally, i.e don't use a radio
- If you cannot call for help, back out cautiously the same way you entered
- Be observant, do everything slowly, look up and down
- Don’t cut or pull any type of wire
- Don’t drag your feet, be sure to “High Step”
- Don’t take chances, don't disturb anything
- Don't open things as designed
- If you must open something, use remote opening techniques
- Avoid touching the obvious such as evidence, weapons, or valuables
- Avoid stepping over or around items in plain view like logs
- Be aware of secondary devices
Indicators of Possible Booby Trap Activity

Suspect Profile

- Background of Suspect:
  - Criminal History
  - Military or Police Training
  - Psychiatric Problems

Outside of Location

- Unnatural Straight Lines
- Unexplained Electrical Cords
- Fragments, burns, blast damage.
- Unused Doors
- Possible “Anti Vehicle” Devices
- Suspicious Items in Trash
- Evidence of Explosive Experimentation

Inside of Location:

- Military or Police Equipment
  - Clothing
  - Manuals and Books
  - Badges, Raid Gear, Gun Belt & Equipment
  - Suspicious literature:
    - “How to manuals”
    - Anti government literature
    - “Poor Man’s James Bond” or “Get Even”...
  - Out of place items - gasoline inside house
- Unexplained lights and noises
- Video monitoring systems
- Military Ordnance
- Guns, reloading & black powder equipment
- Trip wires or any unknown or suspicious items
- Unlawful fireworks or exploded fireworks
Indicators of Possible Booby Trap Activity

Wires from light switch?

I don’t think so...

Bad dude?

Wires from light switch?
Examples of sale items...

**BOOBY TRAP MATERIALS**

**ELECTRIC MATCH**
Electric igniters that are useful in detonating or firing specialized devices such as model rockets and booby traps. The minimum detonation voltage requirements are 1.5 volts AC/DC. Each Unit has 36" leads.

ORDER # HT101 (Set of 10) $49.99 $32.99
ORDER # HT150 (Set of 50) $149.99 $119.99
ORDER # HT200 (Set of 100) $239.99 $229.99

**50 ft ROLL CANON FUSE – WATERPROOF**
This high quality American made fuse has a burn rate of 30 seconds per foot. Both are lacquered for extreme conditions and underwater use. This type of fuse is the choice of pyrotechnic experts from fireworks to underwater demolition. Comes in 50 foot rolls and choice of either green or red in color.

ORDER # FUSE01 (RED) $21.99 $19.99
ORDER # FUSE200R (RED - 200 FT) $72.99
ORDER # FUSE200G (GREEN - 200 FT) $72.99

**G.I. TRIP WIRE**
This is the genuine G.I. camouflage trip wire used by U.S. Forces in Vietnam. Its special matte finish, 24 gauge steel wire does not reflect sunlight or moonlight. Ideal for any trip-wire activated device. Each spool contains four 38 ft lengths of wire (2 olive drab & tan colored), for a total of 152 ft.

ORDER # FQ409 (4 SECTION SPOOL) $6.99

**HV-5 Booby Trap System**
This particular device, when used outdoors, serves as an effective early warning signal against intruders on your property. This system is all steel construction that can be used over and over. Designed to accommodate both 12ga. blanks and 12ga. flares. Kit contains all the necessary hardware to install, where required (tree, fence, post, etc). Includes one 12ga. blank cartridge.

ORDER # G12-008 3 UNITS PER PACKAGE $10.99 $13.99
ORDER # G25-008 25 UNITS PER PACKAGE $50.99 $59.99

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Please note: Military tripwire is hard to detect. Nylon fishing line reflects light and is easily detected. However, flyline is harder to detect. It comes in matted natural looking colors and is the trip wire of choice.

**Common statutes for prosecution:**

- Booby Trap – 12355(a) PC
- Destructive Device – 12303 PC
- Bomb Components – 12312 PC
- Unlawful Possession of Explosives – 12305 H&S
Booby traps can be activated in many ways. They are most commonly activated by some type of physical action such as pulling, pushing, pressure, or vibration. Shown below are a few of the more common activation devices and methods.
Booby traps and bombs can also be activated electronically by remote control. Shown below are a few of the type of devices that have been improvised to remotely activate a device. Keep in mind that basically any type of electrical transmitter/receiver combination can be improvised.

- Digital/Mechanical Alarm Clocks
- TV Remote
- Water timer
- RC Car Controller
- Beeper
- RC Airplane Controller
- Cellular Phone
- Digital Watch Alarm
- Garage Door Opener
- Remote Car Alarm
One unfortunate aspect of living in a free society is the freedom to write and purchase “how to” books on topics that depending on the intent of the reader can lead to death and harm for our fellow citizens. There are thousands of books available over the internet, dealing with such topics as making homemade explosives, booby traps, and how to kill, poison, or commit arson just to name a few. Shown below are a few of the titles available for purchased.
Booby Trapped Weight

In Los Angeles, Officers serving a arrest warrant at a residence in North Long Beach were surprised by a booby trapped door that had a 50 pound barbell weight attached above the inner door frame.

Fortunately, the device did not come down immediately upon entry. It wasn't until after the entry team had concluded their sweep of the inside of the structure that they noticed the device hanging from the top frame of the doorway. This could have been somebody's head.
Booby Trapped Doors

Doors can be booby trapped to discharge firearms. In this first example, the door was equipped with a counter-weight to discharge the weapon when the door was opened.

In this second example, an officer picked up this shotgun out of a closet during a search warrant and the weapon discharged, narrowly missing the officer. The weapon was cocked and loaded and had a string tied around the trigger that was attached to the bottom of the closet. When the officer picked up the weapon, the string tightened and discharged the weapon.

In the third and final example, officer’s searching a marijuana growing operation struck a trip wire that discharged the shotgun, again narrowly missing the officer. In the same instance, all the marijuana plants were found to contain randomly spaced fish hooks embedded in the plant stems.
These photos depict an improvised “trap” encountered by Phoenix Police during a search warrant on a drug house. On the ground on the opposite side of the fence was a “nail board” concealed by grass and leaves. A officer landed on the board resulting in puncture wound injury to his foot.
NBC/Terrorism Addendum
On May 8, 2002, the FBI captured Abdullah Al Muhajir, a U.S. citizen allegedly working with al Qaeda to set off a dirty bomb in an American city. This was unsettling news, to say the least. A dirty bomb is an explosive designed to spread dangerous radioactive material over a wide area. Conceptually, a dirty bomb (or radiological dispersion bomb) is a very simple device. It’s a conventional explosive, such as TNT, packaged with radioactive material.

The basic idea of a dirty bomb is to use the gas expansion as a means of propelling radioactive material over a wide area rather than as a destructive force in its own right. When the explosive goes off, the radioactive material spreads in a sort of dust cloud, carried by the wind, that reaches a wider area than the explosion itself.

A dirty bomb would boost the normal radiation level which would increase the risk of cancer and radiation sickness to some degree. Most likely, the bomb wouldn’t kill many people right away, but it could possibly kill people years down the road.

The main limitation on making a dirty bomb would be obtaining radioactive material. In May of 2002, The United States Nuclear Regulatory Committee announced that U.S. businesses and medical facilities have lost track of nearly 1,500 pieces of equipment with radioactive parts since 1996. Additionally, there are a number of sources for radioactive material around the world. For example: Hospitals use small quantities of radioactive material, such as cesium-137, in nuclear medicine, Universities use similar materials to conduct scientific research. Food irradiation plants use radiation from cobalt-60 to kill harmful bacteria on food. Natural radioactive uranium isotopes are mined for use in nuclear energy. Terrorists could conceivably acquire uranium from various mines in Africa. There are a number of abandoned "nuclear batteries" scattered around the former Soviet Union. These portable thermoelectric generators contain a sizable amount of strontium-90, a highly potent radioactive isotope. Terrorists could also collect spent radioactive fuel from Russian reactors, which have been abandoned in old nuclear submarines, among other places. They could also put something together using various low-level radioactive materials available to anybody, such as the radioactive material in smoke alarms. The big question, of course, is what would actually happen if terrorists set off bombs containing any of this material.
**Terrorist Weapons - Dirty Bombs**

It's difficult to predict the extent of a dirty bomb's damage because there are a huge number of variables at work. The type and quantity of the explosives and radioactive material make a big difference, of course, but completely random things like wind speed would also have an effect. There's also a lot of debate on what the long-term health effects would be.

If people got rid of contaminated clothes, showered and evacuated the area within a day or so of a small or medium blast, they would probably be fine. The bomb would boost radiation levels above the normal, "safe" level, but not by a lot. In the short term, the human body could handle this increased exposure fairly easily. People very close to the blast could conceivably suffer radiation sickness and might require hospital care.

The main concern would be prolonged exposure. Many radioactive isotopes bind with other materials, including concrete and metal, extremely well. This would make it nearly impossible to completely remove the material without demolishing all contaminated structures. Clean-up crews could wash away a lot of the radioactive material, but a small amount would probably remain in the city for many years, even decades. Anybody living there would be exposed regularly to this radiation, which could conceivably cause cancer.

There's no precedent for a dirty bomb attack, but we can learn from cities like Nagasaki and Hiroshima were both exposed to a very large amount of radioactive material, from an actual nuclear blast, and today, they're both considered completely safe for habitation. On the other hand, there are still areas around Chernobyl that are considered unsafe due to high radioactivity.

Most experts agree that a dirty bomb would be more of a disruptive weapon than a destructive weapon. The news of radioactive contamination would probably cause widespread panic, and the rush to evacuate the targeted city could actually cause more damage than the bomb itself. The economy would take a dive, especially if the bomb went off in major city like Washington, D.C., or New York. Even if the government did assure the public that the area was habitable, real estate values and tourism would plummet. This is the precise reason dirty bombs are such an attractive weapon to terrorists. Their main goal is to get people's attention and inspire terror, two things a dirty bomb would certainly accomplish.

This scenario uses a 1 x 12" or "pencil" rod of cobalt-60, like that typically found in a food irradiation facility. If exploded near the capitol building in Washington D.C., the result would be much more deadly. However, cobalt is harder to obtain and use.

In this scenario, there is a higher level of contamination. It would be decades before the city was inhabitable again, and demolition might be necessary.

**Assuming 30 years' of exposure:**

- Inner ring: 1 cancer death per 100.
- Middle ring: 1 cancer death per 1000.
- Outer ring: 1 cancer death per 10,000.

![Detector](image) This is a portable radiological isotope detector developed by the Lawrence Berkley National Laboratory. It can be used to detect radioactive material being smuggled into the country.
Terrorist Weapons - Shoulder Fired Missiles

Portable surface-to-air missiles (SAM's), such as the American made “Stinger” are designed to be fired from the shoulder. They are a “fire and forget” type weapon that locks in on the infrared heat signature of jet aircraft. Manufactured by many different countries, they typically have a maximum range of about five miles. Hundreds of them are believed to have found their way into the hands of terrorist organizations. In December 2002, terrorists attempted to bring down a Israeli Jetliner as it departed Mombassa, Kenya using two Soviet portable surface-to-air missiles. In May 2002, terrorists fired a Soviet made portable surface-to-air missile at an American plane as it took off from Prince Sultan Air Base in Saudi Arabia. The U.S. Defense Intelligence Agency reported 29 portable SAM attacks on civilian aircraft between 1978 and 1998 with more than 400 fatalities. Most of the attacks were in Africa.
Terrorist Weapons - Biological and Chemical

Like a nuclear bomb, a chemical or biological weapon is a weapon of mass destruction. An effective attack using a chemical or biological agent can easily kill thousands of people. A chemical weapon is any weapon that uses a manufactured chemical to kill people. The first chemical weapon used effectively in battle was chlorine gas, which burns and destroys lung tissue. Chlorine is not an exotic chemical. Most municipal water systems use it today to kill bacteria. It is easy to manufacture from common table salt. In World War I, the German army released tons of the gas to create a cloud that the wind carried toward the enemy. Modern chemical weapons tend to focus on agents with much greater killing power, meaning that it takes a lot less of the chemical to kill the same number of people. Many of them use the sorts of chemicals found in insecticides. When you spray your lawn or garden with a chemical to control aphids, you are, in essence, waging a chemical war on aphids.

In 1988, Iraq launched chemical gas attacks against Iraqi Kurdish villages that killed thousands of civilians. The chemical agent used was a “cocktail” of the blistering agent called Mustard Gas, and the nerve agents Sarin, Tabun, and VX. In 1995, the group Aum Shinrikyo released Sarin gas, a nerve gas, in the Tokyo subway. Thousands were wounded and 12 people were killed. The terrorists used small exploding canisters to release the gas in the subway.
A biological weapon uses a bacteria or virus, or in some cases toxins that come directly from bacteria, to kill people. If you were to dump a load of manure or human waste into a town's well, that would be a simple form of biological warfare -- human and animal manure contain bacteria that are deadly in a variety of ways. In the 19th century, American Indians were infected with smallpox through donated blankets.

A modern biological weapon would use a strain of bacteria or a virus that would kill thousands of people. There are many ways to implement a biological attack, but these are some of the most feared agents:

**Anthrax** - Anthrax is a bacteria, but it has a spore form that is very durable. If the spores or bacteria get into your lungs, they reproduce and create a toxin that can be fatal.

**Smallpox** - Smallpox is a virus. It was a major killer until it was controlled with vaccinations in the 20th century. It has been eradicated world-wide, but the fear is that terrorists could release new strains.

The main problem with smallpox, unlike with anthrax, is that it is highly contagious. It spreads and kills very quickly. Up to 40 percent of people who catch the virus die from it in about two weeks, and there is no good treatment for the disease. Vaccinations are the main protection, but they must be given prior to infection in order to work.

**Botulin toxin** - Botulin bacteria produce the botulin toxin, and this toxin is deadly to people in incredibly small quantities (as little as a billionth of a gram). The toxin inhibits the release of the chemicals in nerve cells that cause muscle contractions, so it causes paralysis.

**Ebola virus** - The Ebola virus takes about a week to kill the victim, and spreads through direct contact.

It would also be possible to cause significant problems by targeting the food supply. For example, “foot-and-mouth disease” has recently been a huge problem in Europe. Spreading the disease to the United States would be relatively easy and very disruptive.
Terrorist Weapons - Biological Weapons

There are three ways to spread a chemical or biological agent so that it would infect a large number of people, they are through the air, through a municipal water supply, or through the food supply.

The most-feared scenario is through the air with the use of a crop-duster or other aircraft. They can also be spread by a car or truck driving through the city spraying a fine mist along city streets in crowded areas. Another possible method would be through the use of small bombs or aerosol canisters that release agents in crowded areas like subways, sports arenas or convention centers.

Properties of Probable Biological Warfare Agents

<table>
<thead>
<tr>
<th>Agent</th>
<th>Type</th>
<th>Untreated mortality</th>
<th>Relative infectivity/dose</th>
<th>Incubation period</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthrax</td>
<td>Bacteria</td>
<td>99%</td>
<td>Moderate 1000+ spores</td>
<td>1-4 days</td>
<td>Antibiotics*</td>
</tr>
<tr>
<td>Viral Equine Encephalitis (VEE)</td>
<td>Virus</td>
<td>1%</td>
<td>High 25 viruses</td>
<td>2-5 days</td>
<td>Symptomatic</td>
</tr>
<tr>
<td>Plague</td>
<td>Bacteria</td>
<td>99%</td>
<td>High 10 organisms</td>
<td>2-3 days</td>
<td>Antibiotics</td>
</tr>
<tr>
<td>Q fever</td>
<td>Rickettsia</td>
<td>1%</td>
<td>High 1 organism</td>
<td>2-10 days</td>
<td>Antibiotics</td>
</tr>
<tr>
<td>Smallpox</td>
<td>Virus</td>
<td>30%</td>
<td>High</td>
<td>7-14 days</td>
<td>Vaccine*</td>
</tr>
<tr>
<td>Tuleremia</td>
<td>Bacteria</td>
<td>30%</td>
<td>High 25 organisms</td>
<td>2-4 days</td>
<td>Antibiotics</td>
</tr>
<tr>
<td>Hemorrhagic fevers (ebola, lassa, marburg, hanta)</td>
<td>Virus</td>
<td>50-90%</td>
<td>High</td>
<td>2-7 days</td>
<td>Symptomatic</td>
</tr>
</tbody>
</table>
Terrorist Weapons - Chemical Weapons

An effective chemical attack would use chemicals that are extremely toxic to people in small quantities. The most commonly feared agents include:

**Sarin** - Sarin is a nerve agent. This means that, once inside your body, it affects the signaling mechanism that nerve cells use to communicate with one another. Muscles start to contract uncontrollably, which eventually causes death by suffocation (since the diaphragm is a muscle). Sarin is not particularly difficult to manufacture, and about 1 milligram in the lungs will kill a person.

**VX** - VX is very similar to Sarin. It works in the same way, but is more toxic. One milligram on the skin will kill a person.

**Mustard Gas** - Mustard gas has been around since World War I. It blisters the skin and destroys lung tissue. About 10 milligrams in the lungs will kill a person.

**Lewisite** - Lewisite, like mustard gas, is a blistering agent, and has also been around since World War I.

One of the problems with these chemical agents is that there is no easy way to protect yourself. On the battlefield, soldiers wear gas masks and complete skin covering when chemical or biological attack is deemed possible. If a city were to experience a large-scale VX attack, people would have to be wearing a waterproof and airtight suit and a gas mask at the time of the attack in order to be protected.
Respiratory Protection

In the spring of 2003, the Los Angeles County Sheriff’s Department began issuing a new respirator mask to all sworn personnel. The new respirator mask is the Model FM12 made by the Avon Technical Products Company. The Model FM12 is designed to provide short term respiratory protection from certain Nuclear, Biological, and Chemical Agents. The FM12 Respirator was issued with a black nylon carry bag that is designed to be worn on the belt. Also issued with the mask was the DPF12 Filter Canister. The filter canister was issued in a protective sealed plastic bag and should not be opened until it is to be used. The shelf life of the filter is approximately 10 years. Do not connect the canister to the mask until you are ready to use it, otherwise the filter will prematurely lose its filtration capability. The manufacture claims that the filter canister may offer protection for up to 4 or 5 days. However, the effective exposure time of the filter canister is actually unpredictable due to such variables as the type of chemical, concentration of the chemical, the rate of the person’s breathing, indoor or outdoor use, the air temperature, wind, and other factors.
Respiratory Protection

The FM12 respirator mask should only be used for escape use (i.e., getting out of a contaminated area) and tactical deployment (e.g., riot control with tear gas). It will not provide protection from smoke or fire and should not be used for the purpose of entering a clandestine methamphetamine or PCP lab.

The life of the canisters will depend on the exposure, environment, and the employee. There is no definitive time usage of the canisters. Employees should evaluate their breathing pattern when they dawn the masks and be aware of any changes. As soon as the employee is in a safe free environment, the mask should be doffed. If the employee encounters a viable chemical incident in which the canister is used, the canister should be replaced immediately and not reused. The concept "Do what you have to do and get out" should be exercised, after that, let the experts come in and handle it. These masks and canisters are not intended for long term exposure and should only be used in temporary and emergent situations.

Per the National Institute for Occupational Safety and Health, a federal oversight agency, all employee respirator masks must be properly fitted to the employee. Prior to having received your mask, you should have completed a medical evaluation form that was reviewed by a physician. After the physician’s approval, you should have been fitted by a certified staff member that has been trained to properly fit the mask to your person.
The FM12 Respiratory Mask

The FM12 is a high performance respirator incorporating the very latest design concepts and materials and provides exceptional protection and performance. The mask provides improved levels of protection, communication, vision, comfort, compatibility and maintainability over previous models. It is constructed of lightweight Chlorobutyl rubber, and designed to provide a high level of wearer resistance. Scratch and impact resistant eyepieces provide a good field of vision and have a non-misting system. The mask includes low profile polycarbonate correctional lenses that may be inserted to help individuals who are near or far sighted. The mask incorporates a horn-type design that enhances your voice. Although not included with the mask, an optional electronic speech transmitter is available for use with communications equipment such as handsets, telephones and microphones. A internal safe drinking system is provided which includes a double safety valve feature. Additionally, it is possible to mount the filter canister on the left or right side.

The mask has a high-performance integrally moulded reflex seal. The facepiece is available in three sizes and has a minimum of moulding crevices which improves contamination efficiency. The facepiece is held on the head by a flexible fabric buckle harness arrangement that allows the respirator to be repeatedly donned and removed in seconds.
Respiratory Filter Canisters

DPF12 Filter Canister

The Department issued FM12 Respiratory Mask comes with the Avon DPF12 Filter Canister. This is a NBC Filter Canister that is in service with a number of NATO forces and is compatible with all NATO respirator masks. The filter utilizes charcoal impregnated with metallic salts and other ingredients for gas absorption. A sophisticated glass fiber design is used for high efficiency particulate filtration. The DPF12 filter protects against all nerve, biological, and chemical agents in aerosol, liquid and vapour form. It also provides protection against blister and chemical agents such as, Mustard Gas, Lewisite, Hydrogen Cyanide, Cyanogen Chloride, Chloropicin, and Riot Control Agents such as CS, CN, and OC. The filter comes with protective plastic caps which cover both the inlet and outlet ports until it is ready to be used.

CTF12 Filter Canister

Although not initially provided with the FM12 respiratory mask, the Avon CTF12 Filter Canister is an available option. This filter is specifically designed for protection against riot control agents. This is not an NBC filter canister. The filter uses a Carbon bed for the removal of vapours including tear gases, CS, CN and OC pepper spray. Provides up to 24 hours protection from continuous exposure to CS, CN and OC.
Protective Clothing

There is a variety of protective clothing available for people specifically trained to work in situations in which they might encounter chemical or biological warfare agents. These clothing types include protective suits, gloves, boots, and hoods. Any durable impermeable fabric that can be manufactured reliably (special attention to the seams) without pinholes should be an adequate barrier against biological or chemical warfare agents.

While surgical gloves are adequate as under gloves to provide secondary protection, they are not suitable as outer gloves because of permeation and penetration protection and durability issues. Standard chemical and biological warfare gloves that meet military specifications are between 25mm and 35 mm thick and do not provide sufficient dexterity for most applications. Most chemical and biological gloves are made of butyl rubber and should not be exposed to solvents or oils, though chloroprene/butyl gloves are available that provide broader resistance.

There are two ways to provide foot protection. The primary chemical barrier should be booties attached to the suit. These may be sized so that they fit over stocking feet or over shoes (e.g., sneakers, safety shoes). If worn over stocking feet, the over-boots selected should be fairly heavy duty and, for field use, should have an impact resistant toe and a puncture resistant sole. In no case should suit booties be worn as an outer layer.

The clothing item most often overlooked is the chemical splash hood, which is essential to cover the head when a full-face respirator is worn with a sack suit. It also covers that gap that exists when the mask is worn with a zip-front coverall. Hoods usually come in two types. The most common hood type is the butyl-coated nylon military style hood, which usually is provided with the respirator and fitted closely around the lens with elastic. The other type of hood is the suit hood, which is purchased from the suit manufacturer and made of the same material. It is designed to provide a universal fit with any mask. This usually is accomplished by using a clear vinyl window to completely cover the respirator. While the first choice generally provides greater visibility, the universal hood provides more positive splash protection. Both types of hoods can increase the overall resistance of the entire personal protective equipment system to intrusion by vapor and aerosol because they trap some of the user's exhaled air, providing an additional buffer area.

Universal hoods will protect almost any suit and respirator with an additional clear visor.

Army style butyl-coated hoods are available for many civilian masks, and they protect the critical mask and suit interface from splash.
There are several rules that should be applied when evaluating the effectiveness of personal protective equipment. When the system is completely donned and the user goes through the full range of motion, no skin should be exposed. This seems obvious, but many times large gaps are obvious, especially around the neck and face. Users should obtain the correct size, never just slap on duct or surgical tape.

If the system passes the first test, it should be sprayed with a squeeze bottle of soapy water that has food coloring added. The food coloring helps distinguish the water from perspiration, and leaks can be identified. Leaks are particularly common at the cuffs and closures. A key issue in suit design is how to safely remove it after decontamination. In many cases, decontamination will not be completely effective, and serious exposures can result if the mask is removed before the suit or if the suit is touched while it is being taken off. For this reason, it is important to wear a second pair of lightweight synthetic gloves under the outer gloves. It also is important to consider removal when selecting a suit design. It is important that the last item to be taken off is the respiratory protection so that the wearer is protected from any residual contamination on the suit. With some suits, the wearer must take the mask off and don another one or even try to hold his breath for an extended period while taking off the suit.

In summary, providing adequate protection against chemical and biological warfare applications for first responders is not an impossible task, but it cannot be done by picking up a catalog and ordering what is on sale. Samples of each of the items to be purchased must be obtained, and they must be looked at as a complete system. If personal protective equipment commonly available is not adequate, vendors should be contacted directly with specific questions and requirements. It is becoming more common for large vendors to have arrangements with knowledgeable personnel who can answer chemical warfare and biological warfare related inquiries, and it is the responsibility of the first responder to know all the facts before using personal protective equipment.
As a first responder, you may arrive at the scene of an incident involving hazardous materials. One way to minimize your exposure is to understand the various warning placards used by transportation vehicles such as trucks and trains.

**An EXPLOSIVE (Class 1)** means any substance or article, including a device, which is designed to function by explosion (i.e., an extremely rapid release of gas and heat) or which, by chemical reaction within itself, is able to function in a similar manner even if not designed to function by explosion.

**A FLAMMABLE GAS (Division 2.1)** means any material which is a gas at 68°F or less and 14.7 psi of pressure which:
1. Is ignitable when in a mixture of 13% or less by volume with air; or
2. Has a flammable range at 14.7 psi with air of at least 12%, regardless of the lower limit.

**OXYGEN**, compressed, in cylinders.

**NON-FLAMMABLE, non-poisonous compressed gas**, including compressed gas, liquefied gas, pressurized cryogenic gas, compressed gas in solution, asphyxiant gas and oxidizing gas.

**A POISON GAS** (gas poisonous by inhalation) means a material which is a gas at 68°F or less and a pressure of 14.7 psi and that:
1. Is known to be so toxic to humans as to pose a hazard to health during transportation, or
2. In the absence of adequate data on human toxicity, is presumed to be toxic to humans because when tested on laboratory animals it has an LC50 value of not more than 5000 ml/m³.
## DOT Warning Placards

### A FLAMMABLE LIQUID
A FLAMMABLE LIQUID means a liquid having a flash point of not more than 141 °F.

### A FLAMMABLE SOLID
A FLAMMABLE SOLID means any of the following three types of materials: (1) Desensitized explosives, (2) Self-reactive materials that are thermally unstable and that can undergo a strongly exothermic decomposition even without participation of oxygen (air), (3) Readily combustible solids which may cause a fire through friction, such as matches; or metal powders that can be ignited and react over the whole length of a sample in 10 minutes or less.

### A SPONTANEOUSLY COMBUSTIBLE MATERIAL
A SPONTANEOUSLY COMBUSTIBLE material means: (1) A pyrophoric material which is a liquid or solid that, even in small quantities and without an external ignition source, can ignite within five (5) minutes after coming in contact with air OR (2) A self-heating material which is a material that, when in contact with air and without an energy supply, is liable to self-heat. A material of this type which exhibits spontaneous ignition or if the temperature of the sample exceeds 392 °F during a 24-hour test period.

### A DANGEROUS WHEN WET MATERIAL
A DANGEROUS WHEN WET material means a material that, by contact with water, is liable to become spontaneously flammable or to give off flammable or toxic gas at a rate greater than 1 liter per kilogram of the material, per hour.

### A RADIOACTIVE MATERIAL
A RADIOACTIVE material means any material, either liquid, gas, or solid that is radioactive.
An ORGANIC PEROXIDE means any organic compound containing oxygen in the bivalent structure and which may be considered a derivative of hydrogen peroxide, where one or more of the hydrogen atoms have been replaced by organic radicals.

A POISONOUS material means a material, other than a gas, which is known to be so toxic to humans as to afford a hazard to health during transportation, or which, in the absence of adequate data on human toxicity, is presumed to be toxic to humans when tested on laboratory animals.

A CORROSIVE material means a liquid or solid that causes full thickness destruction of human skin at the site of contact within a specified period of time; or a liquid that exhibits a corrosion rate on steel or aluminum surfaces exceeding 0.25 inch a year at a test temperature of 130°F.

An OXIDIZER means a material that may, generally by yielding oxygen, cause or enhance the combustion of other materials.
Remember to always wear your vest, life is valuable... Please stay safe.
If you have any questions or comments concerning this presentation, please contact Deputy John Williams at (213) 893-5171 or jdwillia@lasd.org, thank you.

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