**April 11th,2003**

**Terroristic Use of Ricin**

Ricin, although extremely toxic, must be delivered in sufficient amounts to cause mortality in humans. To be used as a terrorist weapon, Ricin must be distributed either through a food source for human consumption or aerosolized for inhalation. (It would be highly unlikely that Ricin would be delivered intravenously or subcutaneous in this setting). Due to modern methods of food packaging, the most likely distribution of Ricin as a weapon of mass destruction would be through aerosolization.

**Mechanism of Toxicity**

The toxins are made up of two polypeptide chains, an A chain and a B chain, which are joined by a disulfide bond. Ricin is very toxic to cells. It acts by inhibiting protein synthesis. The B chain binds to cell surface receptors and the toxin-receptor complex is taken into the cell; the A chain has endonuclease activity and extremely low concentrations will inhibit protein synthesis. A single molecule of Ricin entering a cell can inactivate over 1500 ribosomes per minute.

When inhaled as a small particle aerosol, this toxin may produce pathologic changes within 8 hours and severe respiratory symptoms followed by acute hypoxic respiratory failure in 36-72 hours. When ingested, Ricin causes severe gastrointestinal symptoms followed by vascular collapse and death.

When tested on rodents, there are microscopic cellular changes after aerosol exposure. These changes are characterized by necrotizing airway lesions causing tracheitis, bronchitis, bronchiolitis, and interstitial pneumonia with alveolar edema. There is a latent period of 8 hours post-inhalation exposure before microscopic lesions are observed. In rodents, Ricin is more toxic by the aerosol route than by other routes of exposure.

There is little toxicity data in humans. The exact cause of morbidity and mortality would be dependent upon the route of exposure. During the 1940's there were several accidental sub lethal aerosol exposures of Ricin, which were characterized by an onset of fever, chest tightness, cough, dyspnea, nausea, and arthralgias, which occurred in the first four to eight hours. The onset of profuse sweating some hours later was commonly the sign of termination of most of the symptoms. Although lethal human aerosol exposures have not been observed, the severe pathophysiologic changes seen in the animal respiratory tract, including necrosis and severe alveolar flooding, are probably sufficient to cause death if enough toxin is inhaled. Time to death in experimental animals is dose dependent, occurring 36-72 hours post inhalation exposure. Humans would be expected to develop severe lung inflammation with progressive cough, dyspnea, cyanosis, pulmonary edema, and eventual acute hypoxic respiratory failure.

**Diagnosis**

An attack with aerosolized Ricin would be, as with many biological warfare agents, primarily diagnosed in the clinical setting. Acute lung injury affecting a large number of cases in a suspected terrorist attack should raise suspicion of an attack with a pulmonary irritant such as Ricin, although other pulmonary agents could present with similar signs and symptoms. Biological agents such as Anthrax and SEB as well as some chemical warfare agents like phosgene need to be included in the differential diagnosis.

- There would be no mediastinitis as seen with inhalation Anthrax.
- SEB would be different in that most patients would not progress to a life-threatening syndrome but would tend to plateau clinically.
- Phosgene induced acute lung injury would progress much faster than that caused by Ricin.

An important point to remember is that Ricin intoxication would be expected to progress, despite treatment with antibiotics.

**Essential Elements of Prevention and Treatment**

The essential prevention for Ricin in the emergent response setting is the donning of protective masks prior to arrival on scene. Secondary aerosols (similar to off gassing in Nerve agents) should generally not be a danger to health care providers. Clorox diluted to a 0.1% sodium hypochlorite solution and/or soap and water should be sufficient to decontaminate skin surfaces.

- Patients with pulmonary intoxication are managed by appropriate treatment for pulmonary edema and respiratory support.
- Gastrointestinal intoxication is best managed by vigorous gastric decontamination with activated charcoal, followed by use of cathartics such as magnesium citrate.
- Volume replacement of GI fluid loss is also important.
- In percutaneous exposures, treatment would be primarily supportive.

Treatment is based upon the route of exposure. Follow the guidelines on page(s) 44 & 45 of your NBC Field Manual.

Next week I will begin a series on Dirty (Radioactive) Bombs and Explosives.

---

**April 18th, 2003**

**Dirty Bomb**

**The Threat**

There has been much discussion, since 9/11, surrounding the use of a "Dirty Bomb" as a weapon of mass destruction. In fact, 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. The Washington Post reported in March 2002 that the Bush administration's consensus view was that Osama bin Laden's al-Qaeda terrorist network probably had in their possession enough stolen radioactive contaminants such as strontium 90 and cesium 137, which could be used to make a dirty bomb. Getting this material into the United States undetected poses the biggest problem for the terrorists at this time.

In January 2003, British officials found documents in the Afghan city of Herat that led them to conclude that al-Qaeda had successfully built a small dirty bomb. It has also been reported that Iraq tested a one-ton radiological bomb in 1987 but gave up on the idea because the radiation levels it generated were not deadly enough. Based upon this information it appears that the threat is real, however, the jury is still out on how effective a "Dirty Bomb" would be as a weapon of mass destruction.

**What is a Dirty Bomb?**

A "Dirty Bomb", also known as a Radiological Dispersal Devise (RDD), is in no way a conventional nuclear device. A nuclear weapon detonation involves a fission reaction that generates an extreme amount of heat (several tens of millions of degrees centigrade), neutrons, x and gamma rays, electromagnetic pulse, and a large area of thermal blast devastation. The triggering device for a nuclear weapon is extremely sophisticated, well beyond the technical abilities of most terrorist agents.

In contrast, a "Dirty Bomb" is quite easy to manufacture because it is assembled utilizing conventional explosives such as dynamite, ANFO, C-4, etc. combined with low level radiological material in the form of powder or pellets. However, since September 11, 2001, stringent reporting measures involving theft of radiological material have been put into place regulating this material and hospital waste products. Only one stolen high-risk radioactive source, Iridium-192, has not been recovered in the last five years in the United States. However, this source (Iridium-192) would no longer be considered high-risk because much of the radioactivity has decayed away since it was reported stolen in 1999. In fact, the combined total of all un-recovered sources over a 5-year time span would barely reach the threshold for one high-risk radioactive source.

The idea behind a dirty bomb is to blast radioactive material into the area surrounding the conventional explosion. This could possibly cause buildings and people to be exposed to radioactive material. However, at the levels created by most probable sources, not enough radiation would be present in a dirty bomb to cause severe illness from exposure to radiation. In fact, the primary cause of death in the use of such a device would be from the conventional blast itself.

The main purpose of a "Dirty Bomb" is to terrorize citizens and make buildings or land unusable for a long period of time. Cleanup after such an event would take several months costing perhaps tens of millions of dollars. This is why the "Dirty Bomb" has often been referred to as a *Weapon of Mass Disruption*.

**Response Profile**

There are several things that must be considered when responding to events involving explosions. First of all - **Don't assume that the event is over after the initial explosion.** Treat every event involving explosion as if there were secondary material involved, in other words, as if it were a Haz-Mat event. There could even be secondary explosive devices timed to explode after the area is saturated with emergent personnel. Use extreme caution when approaching the scene. Always approach upwind and maintain a safe distance from the scene. **Remember: Time, Distance, & Shielding**. Always wear your bunker gear and respirator when outside of your vehicle. This will provide you the best protection from radiological emissions as well as from biological contaminants both at the scene and when treating patients or the walking wounded. Above all else, use your common sense. Don't rush in and become a victim yourself.

Next week I will continue the explosives series with suicide bombings and soft targets of opportunity.

---

**April 25th, 2003**

**Suicide Bombing**

**The Threat**

Suicide terrorism is the readiness to sacrifice one's life in the process of destroying or attempting to destroy a target to advance a political goal. The aim of the psychologically and physically war-trained terrorist is to die while destroying the enemy target.

In the 1980s suicide terrorism was witnessed in Lebanon, Kuwait and Sri Lanka. In the 1990s it had spread to Israel, India, Panama, Algeria, Pakistan, Argentina, Croatia, Turkey, Tanzania and Kenya. With enhanced migration of terrorist groups from conflict-ridden countries, the formation of extensive international terrorist infrastructures and the increased reach of terrorist groups in the post Cold War period, suicide terrorism is likely to affect Western Europe and North America in the foreseeable future.

**Key Characteristics**

Examination of suicide terrorism across a range of groups has revealed that terrorist groups use suicide bombers when they are both strong and weak. Suicide-capable groups differ in form, size, orientation, goal and support. There are now 10 religious and secular terrorist groups that are capable of using suicide terrorism as a tactic against their governments and/or foreign governments. They are: the Islam Resistance Movement (Hamas) and the Palestinian Islamic Jihad of the Israeli occupied territories; Hezbollah of Lebanon; the Egyptian Islamic Jihad (EIJ) and Gamaya Islamiya (Islamic Group - IG) of Egypt; the Armed Islamic Group (GIA) of Algeria; Barbar Khalsa International (BKI) of India; the Liberation Tigers of Tamil Eelam (LTTE) of Sri Lanka; the Kurdistan Worker's Party (PKK) of Turkey; and the Osama bin Laden network (Al Qaeda) of Afghanistan. A review of the key characteris tics of the 10 suicide-capable groups reveals that any group can acquire suicide bomb technology and engage in suicide terrorism.

**Method of Operation**

The organization of suicide operations is extremely secretive. The success of the mission depends on a number of elements: level of secrecy; thorough reconnaissance; and thorough rehearsals. Secrecy enables the preservation of the element of surprise, critical for the success of most operations.

Thorough reconnaissance enables the group to plan, often by building a scale model of the target. Thorough rehearsals allow the bomber to gain stealth and speed. There are other elements, such as getting the bomber to the target zone and then to the target itself. The bomber is usually supported by an operational cell, responsible for providing accommodation, transport food, clothing and security to the bomber until he/she reaches the target. Resident agents help generate intelligence for the operation, from target reconnaissance to surveillance. The cell members confirm the intelligence. Often, immediately before the attack, the bomber conducts the final reconnaissance.

As a comprehensive knowledge of the target is essential for the success of a suicide operation, terrorist groups depend on building solid agent-handling networks. Some security and intelligence agencies have succeeded in penetrating the agent-handling network of various terrorist groups. In some cases, the only form of defense is to penetrate the terrorist group itself. This is because bombers penetrate governments or societies as sleepers and gradually gain acceptance as a trusted member. Thus the bomber can reach and destroy a valuable target - human or infrastructure.

**Method of Delivery**

There are six types of suicide improvised explosive devices (IEDs). These are: the human-borne suicide IED, also known as the suicide bodysuit; the vehicle-borne suicide IED; the motorcycle-borne suicide IED; naval craft-borne suicide IED; scuba diver-borne suicide IED; and aerial- (microlight, glider, mini-helicopter) borne suicide IED. All these categories have been used in South Asia and the Middle East.

The largest number of suicide IEDs used has been the suicide bodysuit. The suicide body suit has evolved to improve concealment and is becoming increasingly small. Initially, the device was a square block of explosives worn in the chest and the belly area. Gradually, the device evolved into a heart shaped block of explosives placed just above the navel. As body searchers for suicide devices are usually conducted around the abdomen, a group is also developing breast bombs.

Most suicide body suits have no/little electronics, making it difficult for security agencies to develop counter-technologies to detect these devices. A suicide body suit can be made from commercial items. With the exception of the malleable plastic explosives and detonator, all the other components can be purchased from a tailor shop (stretch denim) and an auto shop (steel ball bearings, wires, batteries and switches). Furthermore, when a device is sophisticated it becomes difficult to operate, as well as fixing it when it fails to function. Suicide devices will thus remain simple.

However, there are likely to be variations of suicide devices. Terrorists tend to select from a repertoire of tactics. This is to retain an element of surprise and to evade the attention of security authorities directed at countering a standard set of tactics.

A Growing Threat

The threat of suicide terrorism is likely to spread with time. It is likely that suicide terrorism will affect Western Europe and North America in the future.

Terrorist groups are increasingly providing intensive training to their bombers, with the intention of increasing their endurance. For instance, the suicide bomber who destroyed the U.S. embassy in Nairobi in 1998 had been resident in Kenya for four years. He had married in Kenya and lived in the capital before carrying out the suicide operation. Similarly, the suicide bomber who assassinated President Premadasa of Sri Lanka had lived in the capital, Colombo, for three years before carrying out the attack.

Terrorist groups are setting a dangerous trend of using suicide bombers to destroy targets far away from their traditional theatres of operation. Many groups are likely to use suicide bombers to infiltrate target countries and conduct suicide attacks against Western VIPs and critical infrastructure in the foreseeable future.

---

**May 2nd, 2003**

**Targets of Opportunity**

**The Target**

Over the past couple of weeks, I have looked around Sedgwick County in an attempt to find areas where terrorists might find "targets of opportunity". Traditional sights for terrorism such as federal and state buildings, airports, county offices, and city facilities have become somewhat "hardened" over the past two years. Security measures at these sights have become a priority for State and Local officials limiting their "attractiveness" for terrorist attack. As an alternative, terrorists may seek out "soft targets" such as malls, shopping centers, and other public places as they have done in Israel over the past several years, however, these type of attacks are limited in scope and will not have the potential for creating a significant number of casualties that would overwhelm our emergent response for an extended period of time. There is, however, one "target of opportunity" in which a terrorist might seek out that could create a catastrophic scenario for Sedgwick County and the surrounding area. This target is located approximately 6 miles southwest of Wichita in the area of 55th south and Ridge road.

On May 1st 2003 at approximately 1100 hours, I drove to the area of 55th and Ridge just to observe the region around Vulcan and Atofina Chemicals. I was in the area for approximately 30 minutes. During that time I observed less than six civilian vehicles on 55th south, no law enforcement officers and no Vulcan security vehicles. I did, however, notice at least 3 Vulcan transport vehicles leaving the area east bound on 55th. I also noted several Hydrogen Fluoride rail cars parked along the west side of the Garvey grain elevators, well outside of the "secured" fence line of Vulcan and Atofina. In fact, one could walk along the tracks from either Ridge road or 55th south and not encounter any significant barriers that would limit access to these HF rail cars. There were also several chlorine rail cars parked along side the HF cars well outside of the Vulcan fence line. Both the HF and Chlorine vehicles were readily accessible along the dirt access road located on the west side of the grain elevators.

The following is a list of chemicals found at Vulcan. This data was obtained from year 2000 Risk Management Plans (RMP) located on the RTK website.

**Atofina Chemicals**
**No longer in business, however, Hydrogen Fluoride rail cars are visible at the site, of which are not listed in Vulcan's RMP report. Quantity therefore may be inaccurate as it relates to Atofina & Vulcan Chemicals.**
6010 S. Ridge
Wichita, KS 67215

HF Railcar Storage & Unload
  Hydrogen Fluoride - 3,400,000 lbs.
Bulk HF Storage
  Hydrogen Fluoride - 850,000 lbs.
Unit III Reactor System
  Hydrogen Fluoride - 3,600 lbs.
Unit IV Reactor System
  Hydrogen Fluoride - 6,800 lbs.
HF Absorption/Recovery System
  Hydrogen Fluoride - 77,000 lbs.
HCl Purge Acid Storage
  >37% Hydrochloric acid solution - 120,000 lbs.
Chloroform Storage

Chloroform - 1,200,000 lbs.

**Vulcan Chemicals**
6200 S. Ridge
Wichita, KS 67215

Chlorine - 2,200,000 lbs
Sulfur dioxide - 60,000 lbs
Methyl chloride - 460,000 lbs
Chloroform - 15,000,000 lbs
Vinyl chloride - 18,000 lbs
Vinylidene chloride - 250,000 lbs

As you can see from the RMP data, there is several thousand pounds of Hydrogen Fluoride and over 2 million pounds of Chlorine located within one mile of this site. Each Hydrogen Fluoride rail car alone is capable of holding over 167,000 lbs. Each Chlorine car is rated at 90-ton capacity. (Pictures depicting this data are located on pages 4 & 5) As you can see from the photographs, there are several railcars containing these two toxic chemicals both on and off site.

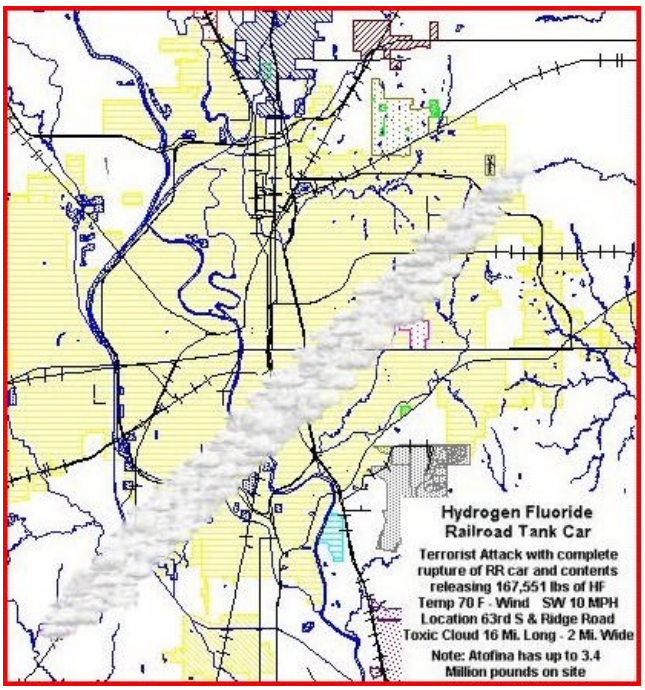
**Worst Case Scenario**

I wondered what would happen if a terrorist targeted just one rail car with an explosive device that would rupture the tank causing the sudden release of the entire contents. To satisfy my curiosity, I obtained several programs from the EPA website that would assist me in making such a determination. Utilizing a program called the RMP Computer, I was able to determine the following for Hydrogen Fluoride (results for Chlorine dispersal are almost identical):

RMP*Comp Ver. 1.07
Results of Consequence Analysis

Chemical: Hydrogen fluoride (anhydrous)
CAS #: 7664-39-3
Category: Toxic Gas
Scenario: Worst -case
Liquefied under pressure
Quantity Released: 167000 pounds
Release Duration: 10 min
Release Rate: 16700 pounds per min
Mitigation Measures: NONE
Topography: Rural surroundings (terrain generally flat and unobstructed)
Toxic Endpoint: 0.016 mg/L; basis: ERPG-2
**Estimated Distance to Toxic Endpoint: >25 miles** (>40 kilometers); report as 25 miles

-------- Assumptions About This Scenario ---------
Wind Speed: 1.5 meters/second (3.4 miles/hour)
Stability Class: F
Air Temperature: 77 degrees F (25 degrees C)
---




Applying the same information regarding such a release utilizing CAMEO, ALOHA, and MARPLOT computer programs, I was able to depict what the toxic cloud emanating from a single HF tank car (167,551 lbs) or a single Chlorine tank car (180,000 lbs) would look like superimposed over a map of Wichita.

As you can see from the picture, results of such an attack would be devastating to our community. The toxic cloud release from just one Hydrogen Fluoride or Chlorine railcar would create an area of devastation over 16 miles long and 2 miles wide affecting several thousands of citizens.

## Conclusion

Based upon my 30 minute observation of security in the area surrounding Vulcan Chemicals and Atofina, it appears that this area may well be classified as a "Soft Target of Opportunity". We have no way of knowing if terrorist organizations have evaluated this site as a possible target, however, based upon what I observed on May 1st and from information readily available on the internet it appears to me that a potential terrorist *target of mass destruction* does indeed exist within our community.