Chemical Warfare Forensics and the Damascus Problem

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*** Please see my notes at the end of the paper

Introduction

It would appear that a toxic substance of some description has been used to kill civilians in the outskirts of Damascus. Great hope has been vested in the ability of a small United Nations (UN) investigative team, but there are both practical and theoretical limits to what can be expected of such a small team working in such a complex environment. The purpose of this brief paper is to highlight the practical limitations of an investigation in this environment. Establishing the who and the why in this situation will be made much easier if the what and the how are established.

This paper is not meant to replace any practical guide or manual. I strongly suggest that readers seek out the works of Steven C. Drielak, who has written several works in this area that I consider to be canonical references. Also, there are numerous safety precautions that need to be observed. This type of investigation poses many dangers to life and health, and I do not have time to list them all or to advise the necessary precautions and countermeasures. Nor do I have time to provide a basic overview of fundamental forensic procedures. These can be found in many references.

Obstacles to this type of investigation:

Damascus is an ongoing active war zone. Wars are, by definition, full of charged politics and strong opinions. This is a challenging environment in which virtually every circumstance conspires against the ability to conduct an effective investigation. The following points illustrate how savagely difficult this business can be and represent the basic obstacles to hinder the investigation.

1. ***Transitory nature of chemical evidence***. Chemical warfare agents evaporate or degrade in the environment. Capturing a sample of gas or vapor isn't easy even five minutes after it was released. Gases and vapors drift away with the wind. Liquid agents evaporate. Most CWAs suffer from hydrolysis (reaction with water). Traces of biomarkers in blood and urine do not last forever after an incident.

2. ***Passage of time erodes any crime scene, large or small***. This is a fundamental tenet of criminal investigation. Things that were in the crime scene can be taken away, deliberately or inadvertently. Things can be introduced into the crime scene that were not there during the incident. The passage of any amount of time between incident and collection of evidence gives scope for many potential issues, such as degradation of evidence, tampering or removal of evidence, or loss of witnesses.

3. ***Size and scope of the crime scene***. The size of the crime scene is large. And it is populated with many people coming and going. The traditional concept of trying to secure the scene(s) of the incident simply flies out the window in this type of environment. The size of the incident means that a full investigation could easily eat up the services of over a hundred investigators, a figure that is logistically unreasonable in this circumstance.

4. ***Threats to the safety of the investigators***. The fact that Damascus is an active war zone means that investigators lack the ability to operate freely and unencumbered. The investigators may be accompanied by security teams that may members of or who may be sympathetic to one side or another in the conflict. An unsafe environment adds to stress on the investigators, which can detract from their efficiency and lead to increased probability of errors.

5. ***Conventional warfare will damage or destroy evidence.*** The active and prolific use of conventional munitions means that many items of evidence may have been destroyed. Witnesses die or flee.

6. ***Proper procedures are hard to follow in an active war zone***. The forensically correct procedures in normal use in a criminal investigation are difficult to follow in a war zone. Any reader will note that there will be a significant degree to which these procedures simply cannot apply in a situation such as this most recent incident.

7. ***Politics***. War is an extension of politics. It is impossible to ignore the political aspects of the situation. Some people clearly have made their minds up as to what happened, regardless of the physical findings.

8. ***Distance to support*** - Property laboratory support is very far from the scene of the incidents. Most of the work that a field team can do is presumptive rather than definitive. A competent and well-equipped laboratory needs to backstop the field team. In addition, a competent investigation will use a large volume of expendable materials, which could take days to resupply.

Types of Evidence - What to look for:

Several have asked me what I would do if I was in charge of the investigation (and I am grateful that I am not), and if I had unlimited resources and access (available only in a fantasy world, I fear). The following types of samples can be taken:

- Solid (including powders and soil)
- Liquid
- Aerosol / Vapor / Gas
- Surface
- Dermal (i.e. residue on skin)

I would look to collect the following evidence, in approximate priority order:

1. ***An actual sample of the causative agent***. If at all possible, investigators need to find the murder weapon. What chemical substance(s) caused this catastrophe? As we seem to be looking for a gas or vapor, this will be difficult. It is also important to note the presence of any. In this case, I would take multiple air samples using Tedlar bags and thermal desorption tubes. Some of the things I would focus on:

    a. Corners and crevices in rooms and low lying areas where the attacks have occurred.
    b. The head-space of any bag or container containing rubbish from the time of the attack, with particular attention to any bag or container containing clothing, expended medical items or anything wet from decontamination water.
    c. Shoes of anyone who handled or treated victims.
    d. Gloves used by anyone who handled or treated victims.
    e. Any trapped air in burial shrouds or coffins of deceased victims.
    f. Dermal swabs of deceased victims.
    g. Water in drains at any of the sites where victims were decontaminated. U-bends and traps in pipes and drains may contain some residue of a liquid chemical agent.
    h. Soil around any potential device or munition that is found that may have contained chemicals.
    i. Background samples of air, soil, and water, from areas of the city where no victims were reported and no alleged chemical incidents occurred, for purposes of comparison.

2. ***We need to find the means of dispersal.*** How did the chemical material turn up? How was it dispensed? There needs to be a full search for expended ordnance or devices that may have been the causative agent. Intact or nearly intact devices are ideal, but need to be handled with utmost care. Fragments are better than nothing. Devices that cannot be retrieved should be photographed, geo-located precisely, and measured. Swabs and samples should be taken prior to collection. The orientation of the device or fragments should be noted. Any device in the ground should be accompanied by samples of the soil, as well as a measurement as to how deep the munition was impacted into the soil. Unknown fragments that look like they could be part of a device or munition are of interest as well. Look for any of the following, in whole or part:

    a. Rocket
    b. Missile warhead
    c. Bomblet / submunitions
    d. Artillery shell
    e. Mortar shell
    f. Spray tank
    g. Aerial bomb
    h. Gas cylinders

i. Grenades
j. Any abandoned or wrecked tanker trucks

3. ***Medical evidence***. Medical samples need to be collected from evidence from alleged victims of the atrocity.

    a. Blood
    b. Hair, to include samples from beards
    c. Urine
    d. Vomit
    e. Saliva and nasal secretions
    f. Any clothing that would have been contaminated

4. ***Post-mortem evidence***. Every effort should be made to obtain the bodies of deceased victims of the incident for analysis by competent forensic pathologists.

5. ***Photo/Video evidence*****:** Do victims have video or still photo evidence from the attack? Of particular note are videos or photos that were not uploaded to media sites such as YouTube. Every effort should be made to note the time and place of the video or photo. Videos and photos that cannot be correlated with time or place are of limited investigative value.

6. ***Witness statements*****.** Witness statements should be collected with as much detail as possible. If possible, interview witnesses in isolation from each other to obtain independent accounts. Some information that will be of investigative interest include:

    a. Location of the victim at the time of the attack. Investigators should start building a map. Such a map could identify buildings or areas where large clusters of victims were affected, which should, in turn, be areas of priority focus for physical evidence collection.
    b. How far above or below ground was the victim at the time of onset of symptoms or when they noticed a chemical substance. This can help to establish the vapor density of the chemical substance, i.e was it lighter or heavier than air?
    c. Odor/smell. Did the odor go away or persist? This is useful, as some chemicals eventually eradicate the victim's ability to smell them.
    d. Medical signs and symptoms. What signs and symptoms did the victim suffer from? Use precise language.
    e. Sounds heard at the time. Explosions, popping noises, silence? Different types of dissemination device may be associated with different sounds.
    f. Duration of symptoms. How long did the symptoms last?
    g. Delayed onset. Was there any delay in the onset of symptoms?

7. **Weather data from the time of the incident**. Meteorological data from the time of the incident(s) should be retrieved. Bear in mind that general wind speed and direction data may not be easily applicable to the exact locations of investigative interest. In this particular circumstance. It is unlikely that this data will be of the quality needed for any but the most basic assumptions.

A few points on crime scene procedure:

It would take me too long to encapsulate the world's best practices for crime scene investigation, and that would be beyond the scope of what I am trying to do here. There are many useful books in this subject. But some of the fundamental tenets of evidence preservation and collection are identified here in summary form, if for no other reason than to demonstrate just how difficult this business can be.

1. Investigator safety is important. We are talking about dangerous materials and devices. A dead investigator can't help anyone.

2. An unsecured crime scene leaves room for skullduggery.

3. Cross-contamination is the enemy of good forensic science. Boots, gloves, clothing, and related items may transfer contamination.

4. There are good, well accepted procedures for collecting, storing, preserving, and transporting every type of evidence above. There's no excuse for not looking up these procedures and following them.

5. Sterile gloves, tools and containers must be used to collect samples. The process by which sterilization took place and was verified must be documented. Using the same dirty shovel to collect soil in ten different places means that if you find something in one of the samples, you might find it in all of the samples, even if it wasn't actually there in the first place.

6. Everything, and I mean everything that the investigators do must be documented.

7. Chain of custody is critical. If you can't account for where a sample has been, then it could be planted, faked, or tampered with.

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3. This paper is entirely composed of the author's opinions.
4. This paper was finished on 28 August 2013 and reflects situations as of that date.

About the author: Dan Kaszeta is the author of "CBRN and Hazmat Incidents at Major Public Events: Planning and Response" (Wiley, 2012) as well as a number of magazine articles and conference papers. He has 22 years of experience in CBRN, having served as an officer in the US Army Chemical Corps, as CBRN advisor for the White House Military Office, and as a specialist in the US Secret Service. He now runs Strongpoint Security, a London-based CBRN and antiterrorism consultancy and is also a Senior Research Fellow with the International Institute of Nonproliferation Studies. Dan is also a senior analyst with the online simulation site Wikistrat.

