Additional Thoughts About the Damascus Chemical Warfare Incident

Background paper by Dan Kaszeta, dan@kaszeta.org Twitter: @DanKaszeta

Date: 4 September 2013

Introduction. I have many questions about what actually happened in Damascus, and the amount and quality of information that is coming out of Syria has not been conducive to getting to the bottom of the story. There is ongoing controversy as to what actually happened. Many people, including politicians and the media, are getting many details and technicalities muddled. But these details and technicalities matter. This paper is a really just a list of things that are nagging me. Please do not quote this paper without attributing it to me. The following 13 points encapsulate my current thinking about the incident:

1. **Was it Sarin?** A rush to declare that the agent involved as Sarin seems to have occurred. I can't definitively rule out that Sarin was used with the same degree of certainty that others seem to have. The various concerns I aired in my previous paper[1] have not been alleviated, particularly with the confusing syndrome of signs and symptoms and the various odors reported.

2. **Blood testing for Sarin**. It is not likely that anyone is going to be able to directly test blood for sarin. It hydrolyzes (reacts with water) very quickly. And blood is mostly water. The US Government's own manual says:

   > Analyzing for parent nerve agents from biomedical matrices, such as blood or urine, is not a viable diagnostic technique for retrospective detection of exposure.[2]

   Anyone who says "there was sarin in the blood sample" probably has the facts wrong. What you <u>can</u> detect is the decomposition products of Sarin or other nerve agents. There is a lengthy chapter in Medical Aspects of Chemical Warfare (2008 ed.) that explains the various assays that can be done for nerve agent biomarkers[3]. Most involve testing for various phosphonic acids. For example, isopropyl methylphosphonic acid (IMPA) is a degradation product of Sarin.

3. **We may be dealing with a nerve agent other than Sarin**. Everybody is fixated on Sarin (aka GB), but I can't determine any rational reason why Sarin seems to be the default diagnosis. There are other nerve agents than Sarin. The general Western CBRN defense community largely operates around the assumption that GA, GB, GD, GF, VX, and V_x are all the options available in the family of nerve agents. Unfortunately, this assumes that all research into the area stopped circa 1960 and nothing better has been developed since. There is no reason to

exclude the possibility that Syria has developed another nerve agent in the G or V family that does not behave in the same way as the "normal" members of the nerve agent family. Indeed, there is a great span of difference between GB and VX, for example, so an agent in the same family could have greatly varied

The Assad regime could have invented a new nerve agent for one or more of a number of reasons:

- Economy – Some of the components for some of the traditional nerve agents aren't exactly cheap.
- Precursors that aren't on watch lists
- Ability to foil field detection – an agent that normal detectors won't alert on will have great tactical value against an enemy with sophisticated CW defenses such as Israel or the US.
- Deniability- We need only witness the current bloom of conspiracy theories to realize that a hitherto unseen novel chemical warfare agent can lead to ambiguity and confusion.
- Resistance to medical treatment – Perhaps a novel agent is resistant to traditional medical countermeasures.
- Ease of manufacture - Some of the manufacturing processes for the other agents are very complex.
- The world's intelligence agencies are watching the "official" Syrian chemical stockpile very closely – This might have forced the regime to come up with something new.

4. **Was this a binary agent?** A binary agent is a chemical warfare agent that is made by mixing two or more separate components to create the actual chemical agent. Generally, this is done for the purposes of safely handling the munitions and to avoid having to store chemical weapons or filled munitions. Sarin could be mixed on-site and poured into empty shells/rounds or munitions could be designed to mix two different components in flight. To my knowledge, this was done with GB and VX in the historic US chemical weapons program. A well-made binary weapon would have little or no difference from a unitary fill. A poorly made one would mix the components poorly. There's much more to making a good binary weapon than pouring the components in and hoping they'll mix in flight. It is not actually easy to make an effective in-flight mixing binary device. The US spent a very long time and a lot of money on making sure binary components would mix properly in flight.[4] Google the M687 artillery shell and you will find many interesting items of interest about binary chemical weapons.

A poorly mixed binary device could explain many things about the Damascus incident. Such a device would include a portion of actual agent, with nerve agent effect, and would also have a high percentage of unmixed binary components, all of which would have their own odors and medical effects on victims. In other words, a poorly crafted binary device would result in dissemination of a cocktail of different substances that could, at least in theory, account for the widely divergent picture of what happened.

5. **Knowing the exact agent is important.** The rush to judgment and the apparent declaration that Sarin was the causative agent seems to have outpaced the actual collection and analysis of physical evidence. We still do not know what the actual substance or substances were that caused all of the deaths and injuries. The identification of the substance is very important for the following reasons:

    - Forensics: If we do not know the substance, how can we tie it to a munition or dissemination device? If we can't, then how do we do any credible attribution?

    - Protection: Does normal western military or civil protection equipment protect against the mystery substance(s)

    - Medical treatment: What medical treatment works or does not work on this mystery substance(s)?

    - Collateral effects modeling: If we do not know the substance, then we do not know its physical properties. If we do not know the physical properties, then the US/UK/French militaries cannot do any adequate prediction of how it will behave if the West starts to attack facilities that may contain this mystery substance(s).

6. **We still don't know the method of delivery for certain:** It is widely reputed that rockets were the dissemination device for this chemical incident. The very thorough Brown Moses blog[5] shows photos of two different rocket devices that may have been used to disseminate chemical weapons. However, there is no definitive proof that either of these devices is the actual method of dissemination. In short, there's no firm evidence that has been made public yet that ties these exact devices with chemical fatalities or injuries. Until we can tie these devices to chemical injuries or fatalities, we are faced with assumptions and circumstantial evidence. It is possible that the dissemination mechanism is something that we have not yet seen. Also, the various intelligence agencies in the West have claimed to have attributed the attack to the Assad regime by locating where rockets were launched. This analysis assumes that the rockets were the culprit. This is indeed possible, but is by no means certain.

7. **Proper collection processes and chain of custody are extremely important in this situation.** Physical evidence without proper chain of custody cannot give us any assurance of getting to the truth. Also, evidence needs to get properly collected and handled. Evidence that is poorly collected, packaged, handled, and/or transported could easily be degraded to the point of losing its intelligence value. Also, poorly handled evidence poses a risk of cross-contamination. Material that does not contain chemical agent could get contaminated or the contamination. Chain of custody is important as well, as any doubt or murkiness in the chain of people handling a sample can lead to doubt, leave room for tampering, or simply provide a climate for conspiracy theories. Remember, we are accusing the Assad regime of murder. We need to treat the evidence accordingly. Please see my paper on Chemical Warfare Forensics for more information[6].

8. **Superiority of Physical Evidence.** To date, the public (and this author as well) have been largely reduced to examining the video evidence. One piece of physical evidence can be worth more than 100 videos. There are both practical and hypothetical limits to what we can do with videos. They are not a substitute for physical evidence. Unfortunately, conventional warfare is unkind to physical evidence.

9. **UN Team and Chemical Detectors**. Don't get worked up too much about the handheld detectors used by the UN team. Several correspondents have taken much notice of the audible alarms emitted by the handheld LCD 3.3 chemical agent detector seen in use by the inspection team on various videos. This same device is known as the JCAD in the US military. There are many reasons why this could occur, and in the absence of actually seeing what is on the screen of the device or looking at the spectra in its data log, it is impossible to speculate. There are many things that this device can do, but only one audible alarm tone. The manufacturer of this device has some of its specifications online[7], and assiduous researchers will find more information elsewhere on the internet. Anything that a field team did with this device is highly presumptive and not a substitute for any type of laboratory procedure.

10. **Handling of the alleged munition**. The apparent handling of alleged chemical munitions, both before launch and after use, mystifies me. There are videos purporting to show rockets being handled before launch, but the launch crews are not wearing protective clothing or respirators. In my experience, that is inconsistent with a chemical warfare munition, and certainly inconsistent with a scenario in which binary components were mixed on site or if the agent was filled into the munition on site at the launch area. Photos of regime soldiers operating in chemical protective clothing would be a "smoking gun."

    Similarly, there are pictures of people handling expended rockets of the type alleged to have been the dissemination device, without any ill effect. In my own experience, it is not advisable to handle expended chemical munitions. Most of

these videos seem to date from the period right after the attack. This indicates that whatever was in those rockets has completely dissipated by the time they were handled. Or that whatever was in these rockets is not an imminent threat to life or health. We can't tell too much from these videos, but the fact that the munitions are apparently safe to handle adds to the confusion about the incident.

11. **Bombing the CW Infrastructure**. Using conventional ordnance on chemical weapons targets is a really bad idea. There is much talk about the West attacking the Syrian chemical warfare infrastructure. Indeed, conventional attacks could destroy a lot of things. But attacking anything where a chemical weapon is stored risks a lot of collateral effects. Certainly, the US military has done a lot of work on "agent defeat" munitions, and some of the publicity around these systems seems to have given them magical attributes. They are better than just dropping a bomb, but are no miracle cure to the problem of collateral effects. Without going too much into the details, some of the claims of the ability of the West to destroy chemical weapons are a bit far-fetched. If the West drops a bomb on a bunker containing chemical weapons, something is going to get out. That may be of negligible consequences in remote areas, but under other conditions, it could cause catastrophic effects to civilians.

    It is also very hard to calculate what would actually happen. Any attempt to do so is merely a guess, in my professional opinion as a former chemical officer. The US military would simply not have enough data to make the correct calculations. There are software programs designed to calculate the effects of such an attack, and the US has spent many millions on developing them. But they are a garbage in – garbage out problem. If you don't have the correct variables to put into the software, such as how much agent, what agent, how is it contained (all of which we simply cannot know with any degree of fidelity), then any output is garbage. It is often worse than the time-honored chemical officer's technique of, well, guessing.

12. **UXO**. Any class of munition has a dud rate, i.e. the percentage of shells/rockets/etc. that fail to function as intended. Anecdotal evidence is that some older chemical weapons may have quite high dud rates. Even many modern conventional artillery rounds have non-trivial dud rates[8] there's no physical mechanism to explain why chemical rounds would have a radically lower dud rate. This means that if any significant use of chemical warfare happens, there's going to be an unexploded shell out there somewhere, which will be of great intelligence value if it can be safely retrieved. But ongoing conventional warfare in the region could mean that such a device could be destroyed. If that were the case, a smaller secondary incident could occur, but no reports of such an event has reached me.

13. **Quantity of munitions**: I'm bothered by the stark variance between the number of munitions and the effects. There are only a handful of the rockets (reported above) that appear to be accounted for. But there are a large number of fatalities

(estimates vary widely) and the fatalities are spread across a wide area. In my mind, there is a disparity between the amount of munitions reported and the amount of damage caused. This raises a few questions in my mind:

- Are we accounting for all the munitions?
- Are some munitions missing?
- Are these even the munitions that caused the chemical incident?
- Are we looking only at munitions that did not function properly? (In other words, there were others that fully exploded so there is little residue. I can't square that with the apparent safe handling of the existing munitions.)
- Did many munitions get destroyed in conventional bombardments?

Notes:

1. I certainly agree to fair use and distribution of this paper for information purposes. However, I hold the copyright on it. Please do not reproduce this for commercial purposes.
2. This paper is entirely composed of the author's opinions.
3. This paper was finished on 4 September 2013 and reflects information available to the author 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. Mr. Kaszeta also contributes to WikiStrat.

References:

[1] http://strongpointsecurity.co.uk/site/wp-content/uploads/2013/08/Revised-Thoughts-on-Damascus.pdf
[2] US Army Office of the Surgeon General. Textbook of Military Medicine: Medical Aspects of Chemical Warfare. 2008. p. 694. Freely available in public domain online.
[3] Ibid, Chapter 22.
[4] US Department of the Army. *Binary Chemical Munitions Program.* Aberdeen Proving Ground, Md: Chemical Systems Laboratory; 1981: 1–7.
[5] http://brown-moses.blogspot.co.uk/
[6] http://strongpointsecurity.co.uk/site/wp-content/uploads/2013/08/Kaszeta-CW-Forensics.pdf
[7] www.smithsdetection.com/LCD3_3.php
[8] See http://www.landmineaction.org/resources/Cluster_Bombs.pdf for an exhaustive discussion of failure rates of cluster munitions.