ATTACKS ON GHOUTA
Analysis of Alleged Use of Chemical Weapons in Syria
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ANALYSIS OF ALLEGED USE OF CHEMICAL WEAPONS IN SYRIA
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Of the 140 rockets fired, 45 hit within 1 km of the 140 km radius of the 4th Armoured Division Base and a mini-missile had a radius of 2 km.
This report details two alleged chemical weapons attacks in Syria on the opposition-controlled Damascus suburbs of Eastern and Western Ghouta, located 16 kilometers apart, on the morning of August 21, 2013. The attacks killed hundreds of civilians, including large numbers of children. Human Rights Watch analyzed witness accounts of the rocket attacks, information on the likely source of the rockets used, and the physical symptoms exhibited by the victims of the attack as documented by medical staff.

Our investigation finds that the August 21 attacks were likely chemical weapons attacks using a surface-to-surface rocket system of approximately 330mm in diameter—likely Syrian-produced—and a Soviet-era 140mm surface-to-surface rocket system to deliver a nerve agent. Evidence suggests the agent was most likely Sarin or a similar weapons-grade nerve agent. Three local doctors told Human Rights Watch that victims of the attacks showed symptoms which are consistent with exposure to nerve gas, including suffocation; constricted, irregular, and infrequent breathing; involuntary muscle spasms; nausea; frothing at the mouth; fluid coming out of noses and eyes; convulsing; dizziness; blurred vision; and red and irritated eyes, and pin-point pupils.

The evidence concerning the type of rockets and launchers used in these attacks strongly suggests that these are weapon systems known and documented to be only in the possession of, and used by, Syrian government armed forces. Human Rights Watch and arms experts monitoring the use of weaponry in Syria have not documented Syrian opposition forces to be in the possession of the 140mm and 330mm rockets used in the attack, or their associated launchers.

The Syrian government has denied its responsibility for the August 21 attacks, and has blamed opposition groups, but has presented no evidence to back up its claims. Based on the available evidence, Human Rights Watch finds that Syrian government forces were almost certainly responsible for the August 21 attacks, and that a weapons-grade nerve agent was delivered during the attack using specially designed rocket systems.
data and satellite imaging were the attention of Ghouta.

HRW also used a division in the monitoring of chemical weapons, including chemical weapon examinations in Iraq’s military in Iraq in the Halabja massacre 25 years ago, on

http://brown-moses.org/

http://www.hrw.org/
From a review of a video of an expended rocket motor found on the street next to the Rawda Mosque in Moadamiya, Human Rights Watch has identified one of the rockets found in the Moadamiya attack as a Soviet-era surface-to-surface 140mm rocket, known as the M-14. A separate video shot on August 27 shows UN inspectors measuring and photographing this rocket motor, which confirmed the remnant’s length and width correspond with the dimensions of the Soviet 140mm rocket motor. The first video clearly shows the 10 venturi (exhaust nozzles) and electric contact plate of the rocket, which is a unique identification characteristic of the Soviet-made 140mm rocket, as well as the factory markings on the casing of the rocket, making the identification definitive. The 09 factory markings on the rocket refer to the Soviet-era “Factory 179” in Novosibirsk, one of the largest producers of artillery and rockets during the Soviet period, and a known manufacturer of the 140mm M-14 rocket.

The expended rocket motor visible in the videos represents only part of the delivery system and not the weapon’s payload. To date, no visual evidence of any type of intact or expended 140mm rocket warhead has been identified in videos shot in the areas of the August 21 attack.

The 140mm rocket is documented in standard reference materials as being present in the Syrian government’s weapons arsenal. Designed in the 1950s, the Soviet Union transferred 200 BM-14 launchers, the most common launcher for 140mm rockets made by the Soviet Union, to Syria in 1967-1969, presumably along with stockpiles of ammunition including suffocating vesicant chemical agents such as Sarin. As does the possibility of improvising field expedient launchers, as seen in the Syrian conflict.


The 140mm rocket was based on witness statements that rockets and the available types of injuries caused by chemical attacks.

8 The rocket is visible in the following YouTube video: http://www.youtube.com/watch?v=nymy8r0Kcag (accessed September 9, 2013).
10 The BM-14 launcher is the most common for 140mm rockets made by the Soviet Union. Other types of launchers exist and are recorded in standard international and regional arms transfer databases.
attack on Moadamiya on August 21 represents the first known appearance of the 140mm rocket, which has not been documented in use in the current Syrian conflict. Human Rights Watch is not aware of any information indicating that opposition forces are in possession of the 140mm rocket, and its associated launching system.

Zamalka, Eastern Ghouta

Human Rights Watch documented the use of apparent surface-to-surface 330mm rockets in Zamalka, Eastern Ghouta on August 21. We found no evidence of any use of the 140mm rocket system used in the Moadamiya attack in Eastern Ghouta.

Human Rights Watch has closely monitored the types of munitions and weapons used in the Syrian conflict, and has extensively reported on unlawful use of weapons by Syrian government forces, including heavy 240mm mortars against populated areas, antipersonnel mines, indiscriminate air-dropped bombs, at least six types of cluster munitions, incendiary weapons against civilians, and indiscriminate tactical ballistic missiles. However, the likely launch zone for the 140mm rocket impact near the Rawda Mosque encompasses multiple Syrian government military bases, training facilities, surface-to-air missile sites, the 4th Armored Division base, as well as the eastern section of the Mezzeh Military Airport.

Witness statements of rockets fouling opposition positions, as well as satellite imagery, both suggest that the rocket likely originated from within the Mezzeh Military Airport, which could account for the impact location in the video. We have found at the site of the attack. The rocket is likely to be a component of the 140mm rocket system, with a possible launch from inside the Mezzeh Military Airport.


- Two rockets struck a government building;
- One rocket struck a civilian council, September, 2012.

Human Rights Watch.

The 140mm rocket is known to contain a 2.2kg standard high explosive warhead and was found at the site of the attack. The rocket is likely to be a component of the 140mm rocket system, with a possible launch from inside the Mezzeh Military Airport.
I started feeling my body aching. I was feeling weak and unable to move. Then my eyes started hurting me and headache started. There was no smoke but there was a smell... I told my friend that I have to go to the hospital. He put me in a car and drove away... I remember very well when we left al-Mazraat in my friend's car, I saw a dog crossing the street. I shouted to my friend to be careful not to hit him but before I finished my sentence the dog by itself collapsed on the ground.

The same witness also confirmed to Human Rights Watch that he had videotaped and uploaded a large number of videos taken at the hospital of the wounded and dead.18

A second witness shared with Human Rights Watch several videos of remnants of the weapons used in the al-Mazraat area on August 21. The videos show the same 330mm rocket type.

The member of the Zamalka media center also shared with Human Rights Watch videos and pictures he took of rockets provided by the Eastern Ghouta alliance. Using the measurements provided by the Eastern Ghouta alliance, Human Rights Watch believes that the 330mm rockets found at the sites were used in the alleged chemical attack.

A member of the Zamalka media center told Human Rights Watch that he visited the scene of one strike in the al-Mazraat area of Zamalka just after the attack.17 He said:

On August 21, I was in the media office when around 2 to 3 a.m. my friends called to say that rockets had hit Zamalka. When I heard that, I went to the field hospital in al-Mazraat neighborhood. After around 30 minutes rockets hit the al-Mazraat area. When the explosion hit I heard a very low sound, it was like the sound of a helicopter buzzing, and not the sound of explosion... I went outside the field hospital and started running towards the explosion site. I didn’t reach the explosions site because I saw injured people on the ground and people screaming and running in all directions... I remember I went into one house and saw a man with his wife on the ground. The house was not destroyed. It was not where the rocket was being examined by the UN weapon inspectors. The 330mm surface-to-surface rocket that appears to be associated with the August 21 attack on Eastern Ghouta is of a type not listed in standard, specialized, international or declassified reference materials. It is a rocket type that has not been documented before the outbreak of the current Syrian conflict, although it has been documented in a num-

Using the measurements of the rocket remnants or videos that were take at the scene of the explosion site, the 330mm rocket appears to be the Falaq-2 Type Launchers. The 330mm rocket appears to be associated with the August 21 attack on Eastern Ghouta and the Eastern Ghouta alliance is not aware of any infor-

Pritchard, see the brochure entitled “Al-Qaeda versus the Islamic State – the implications for the international community in the Syria conflict.”

17 Human Rights Watch Skype interview with member of media center, September 4, 2013.


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Measurements of surviving rocket components collected from the Zamalka neighborhood of Damascus following the attacks of August 21, 2013.

- **d)** Thin exterior wall of warhead, designed to peel off allowing the dispersal of the chemical agent.
- **e)** Chemical agent warhead - Capacity estimated at 50-60 liters with **f)** central tubing.
- **g)** Plug or valve with unidentified function.
- **h)** Filling plug (not present on HE rocket variant).
- **i)** Rocket motor.
- **j)** The chemical variant of the 330mm rocket is identified with red numbers. The high explosive (HE) rocket variant is numbered in black.
- **k)** Stabilizing fins and **l)** ring.
- **m)** No.

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- **(m)** No.

**Measurements:**
- 2200m (Est. 2600mm length for HE variant)
- 1550mm (rocket motor)
- 330mm
- 350mm
- 120mm
- 1050mm length for HE variant
- 550mm
- 2200m (Est. 2600mm length for HE variant)
The 330mm rocket has appeared in its high-explosive form in previous attacks around Damascus. The high-explosive version of the 330mm surface-to-surface rocket appears to have been used in the Daraya suburb of Damascus on January 4, 2013 and in Khalidiya, in Homs governorate, on August 2, 2013. Opposition forces blamed both attacks on the Syrian government, although Human Rights Watch could not independently confirm this allegation.

On August 5, 2013, opposition activists filmed what appears to be the remnants of the chemical weapons-carrying variant (with the extra fill plug visible) as well as the red numbering system of the 330mm rocket in the `Adra suburb of Damascus, in what they alleged was a chemical weapons attack by Syrian government forces. While Human Rights Watch could not independently confirm the allegations that Syrian government forces were responsible for the August 5 `Adra attack, the videos do show the remnants of suspected chemical weapons-delivery variant of the 330mm rocket, as well as dead and dying animals nearby, otherwise uninjured and showing signs of exposure to a nerve agent.

No evidence has been produced that opposition forces are in possession of the 330mm surface-to-surface rockets and their associated launchers. The only documented attacks using this weapon system in Syria have been against opposition-held areas and targets. The Syrian government is known to possess the Iranian Falaq-2 333mm rocket launchers, although no videos have emerged from the Syrian government forces firing the 330mm rockets from truck-mounted 333mm launchers, as several videos have emerged on social media allegedly showing Syrian government forces firing the 330mm rockets from truck-mounted 333mm launchers, although no videos have emerged from the nighttime August 21 attack.

Death Toll

Because the August 5 attacks occurred in areas of Ghouta, an estimated large number of casualties was expected, with several large hospitals and small medical clinics to provide emergency care to the doctors interviewed by Médecins Sans Frontières, at Ghouta. The doctors reported a large number of victims, and many were brought from the clinics and thus bypassed Human Rights Watch could not independently confirm this allegation.

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23 “[Rocket, which was carrying chemical materials and shows around the dead animals after chemical attack],” August 5, 2013, video clip, YouTube, https://www.youtube.com/watch?v=YLcqi_dE9SU (accessed September 6, 2013).
27 Médecins Sans Frontières.
Human Rights Watch analyzed publicly posted YouTube videos from the attacked areas as well as higher-resolution images of weapon remnants provided by a local activist in Eastern Ghouta, and identified and analyzed two separate surface-to-surface rocket systems that are believed to be associated with the delivery of chemical agents.

By directly contacting the activists who videotaped and uploaded the videos of the attack available on YouTube, Human Rights Watch has been able to verify the reliability of the videos, and confirmed that they were filmed in the affected area. In the case of Eastern Ghouta, a local activist provided Human Rights Watch with high-resolution photographs and measurements of the 330mm rocket components. UN inspectors were also videotaped inspecting some of the same rocket remnants during their on-site visit, further confirming that the rockets are located at the scene of the attacks.

The first type of rocket, found at the site of the Eastern Ghouta attacks, is a 330mm rocket that appears to have a warhead designed to be loaded with and deliver a large payload of liquid chemical agent. The second type, found in the Western Ghouta attack, is a Soviet-produced 140mm rocket which according to reference guides has the ability to be armed with one of three possible warheads including a warhead that was specifically designed to carry and deliver 2.2 kilograms of Sarin.

Our analysis does not exclude the possibility that additional weapons delivery systems were used in the Eastern and Western Ghouta attacks that have not yet been identified and analyzed. However, the two analyzed by Human Rights Watch are the only known rocket systems identified as associated with the attacks, according to local activists who have closely inspected both the affected areas.
The large number of videos that were taken of the victims of the August 21 attack. The videos showed that several of the younger victims exhibited cyanosis, a bluish coloring on their face, especially around their eyes and mouth, which is consistent with suffocation or asphyxiation. The suffocation was likely either caused by excessive secretion of mucus and fluids in the lungs and air passages, or damage to the part of the nervous system that supports breathing, or both. A majority of adult victims in these videos also show signs of excessive secretions of fluids or mucus from the mouth and nose. Several of the patients shown in the videos were experiencing involuntary muscle spasms or convulsions. It is significant that there was no obvious indication of bodily trauma or excessive blood loss.

These observations are consistent with reports from witnesses, doctors, and the international aid organization Médecins Sans Frontières (MSF). For example, three local doctors told Human Rights Watch that residents affected by opposition chemical attack showed cyanosis, especially around the eyes and mouth, which is consistent with suffocation or asphyxiation. The suffocation was likely either caused by excessive secretion of mucus and fluids in the lungs and air passages, or damage to the part of the nervous system that supports breathing, or both. A majority of adult victims in these videos also show signs of excessive secretions of fluids or mucus from the mouth and nose. Several of the patients shown in the videos were experiencing involuntary muscle spasms or convulsions. It is significant that there was no obvious indication of bodily trauma or excessive blood loss.

The clinical signs were consistent with reports from witnesses, doctors, and the international aid organization Médecins Sans Frontières (MSF). For example, three local doctors told Human Rights Watch that residents affected by opposition chemical attack showed symptoms of cyanosis, especially around the eyes and mouth, which is consistent with suffocation or asphyxiation. The suffocation was likely either caused by excessive secretion of mucus and fluids in the lungs and air passages, or damage to the part of the nervous system that supports breathing, or both. A majority of adult victims in these videos also show signs of excessive secretions of fluids or mucus from the mouth and nose. Several of the patients shown in the videos were experiencing involuntary muscle spasms or convulsions. It is significant that there was no obvious indication of bodily trauma or excessive blood loss.

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Le Monde newspaper, Laurent Van der Stockt, was exposed to what he believed was a chemical weapon attack while in Jobar in April 2013. In laboratory tests conducted upon his return to France, he tested positive for exposure to Sarin. Sarin was thus a likely agent to have been used in the Jobar attack, and is consistent with the symptoms experienced by those exposed to the agent during the August 21 attacks on Ghouta.

Other samples collected by the Le Monde team from sites of suspected chemical attacks in the Jobar and Ghouta areas also tested positive for Sarin in June 2013. During the same April trip, the Le Monde journalists also collected 21 hair, blood, urine, and clothes samples from victims of suspected chemical weapon attacks in Jobar and Ghouta neighborhoods of Damascus, Syria, by the Centre D’Études et de Recherches médico-biologiques (CERMA) specializing in the analysis of chemical, biological, and radiological agents.

Thus while our findings cannot be conclusive without laboratory analyses of environmental and physiological samples, the large number of victims of the attack, the clinical signs and symptoms that characterized both the victims and, later, the medical workers who treated the victims, and the fact that areas near attack sites were apparently safe to enter soon after the attack, all strongly suggest that the attack involved an organophosphate chemical nerve agent, such as Sarin, which Syria is believed to possess.

The use of Sarin in these latest attacks would be consistent with its apparent use earlier in Syria. There is laboratory evidence that Sarin gas has been used in previous attacks allegedly carried out by Syrian government forces, including an earlier attack in Ghouta. A photographer for the New York Times observed that people were able to visit the sites of the attacks a few hours post attack and to handle remnants of rockets associated with the attacks without suffering signs and symptoms of exposure to nerve agent. This suggests that the nerve agent involved is more likely to be the less persistent and less toxic agent, Sarin, rather than VX.

Sarin is a toxic nerve agent that is highly volatile and quickly degrades and is easily inactivated, whereas VX is both more persistent and more toxic than Sarin. Exposure to Sarin by skin, conjunctival, and mucosal absorption. There are reports that people were able to visit the sites of the attacks a few hours post attack and to handle remnants of rockets associated with the attacks without suffering signs and symptoms of exposure to nerve agent. This suggests that the nerve agent involved is more likely to be the less persistent and less toxic agent, Sarin, rather than VX.

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Syria is not among the 189 countries that are party to the 1993 Convention on the Prohibition of the Development, Production, Stockpiling, and Use of Chemical Weapons and on their Destruction. However, Syria is a party to the 1925 Geneva Gas protocol, which bans the use in war of asphyxiating, poisonous or other gases, and of all analogous liquids, materials or devices. The use of chemical weapons is also prohibited as a matter of customary international humanitarian law, or the laws of war.

The prohibition on the use of chemical weapons applies to all armed conflicts, including so-called non-international armed conflicts such as the current fighting in Syria. The International Criminal Tribunal for the former Yugoslavia, in the Tadic case, stated “there undisputedly emerged a general consensus in the international community on the principle that the use of [chemical] weapons is also prohibited in internal armed conflicts.” In 1977, during a debate in the First Committee of the United Nations General Assembly, Syria supported a complete ban on chemical weapons.

One of the types of rockets used in the attack, the 330mm rocket system – likely Syrian produced, which appear to have been used in a number of alleged chemical weapon attacks, has been filmed in at least two instances in the hands of government forces. The second type of rocket, the Soviet-produced 140mm rocket, which can carry Sarin, is listed as a weapon known to be in Syrian government weapons stock. Both rockets have never been reported to be in the possession of the opposition. Nor is there any footage or other evidence that the armed opposition has the vehicle-mounted launchers needed to fire these rockets.

The August 21 attacks were a sophisticated military attack, requiring large amounts of nerve agent (each 330mm warhead is estimated to contain between 50 and 60 liters of agent), specialized procedures to load the warheads with the nerve agent, and specialized launchers to launch the rockets.
Bodies of victims of a suspected chemical attack on Ghouta, Syria on Wednesday, August 21, 2013.
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