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REPORT OF THE OPCW FACT-FINDING MISSION IN SYRIA REGARDING THE INCIDENT OF THE ALLEGED USE OF CHEMICALS AS A WEAPON IN KAFR ZEITA, SYRIAN ARAB REPUBLIC 1 OCTOBER 2016

1. SUMMARY

1.1 On 2 October 2016, open sources broadcast information reporting the alleged use of toxic chemicals as a weapon on 1 October 2016. The reported incident involved two "barrels" containing toxic gas near a field hospital in a valley of an agricultural area in Kafr Zeita[1] in the Governorate of Hama in the Syrian Arab Republic. Approximately 20 individuals suffered from suffocation and breathing difficulties.

1.2 Subsequently, the Technical Secretariat (hereinafter "the Secretariat") conducted open-source research in order to assess the credibility of the allegations. Based on the initial assessment, the Fact-Finding Mission (FFM) of the Organisation for the Prohibition of Chemical Weapons (OPCW) was tasked by the Director-General to look further into the incident. An initial interview was conducted remotely on 3 October 2016 to gather additional information regarding the incident.

1.3 The FFM obtained information about the incident that took place in Kafr Zeita on 1 October 2016, through the following:

(a) exchanging notes verbales with the Syrian Arab Republic;

(b) meeting with the Syrian Technical Team of the National Authority of the Syrian Arab Republic;

(c) conducting and analysing interviews with medical staff, casualties, first responders, and witnesses of the alleged chemical incident in Kafr Zeita;

(d) reviewing and analysing photographs, videos, records, and files gathered by the FFM;

[1] Other spellings for Kafr Zeita include: Kfar Zeita, Kafr Zita, Kfar Zita, Kafr Zayta, Keferzita. In this report, Kafr Zeita is used to ensure consistency with the English version of the notes verbales received from the Syrian Arab Republic.

(e) reviewing the report of the mechanical study and digital simulations conducted by qualified experts and obtained by the FFM on the deformation of the cylinder in connection to the alleged chemical incident in Kafr Zeita;

(f) examining chemical analyses of the wipe sample taken from the cylinder conducted by OPCW designated laboratories; and

(g) reviewing open-source material.

1.4 Between October 2016 and October 2021, the FFM conducted 29 interviews with 25 witnesses and was able to corroborate their location in relation to the location of the incident at the time of the alleged incident. Witness narratives of events were consistent and in line with the described medical signs and symptoms.

1.5 While this information was being collected, the FFM obtained an industrial chlorine cylinder retrieved from the location of the incident and was able to link it to the incident on 1 October 2016. Off-site chemical laboratory analyses, as well as a mechanical study and digital simulations, were conducted to assess the damage visible on the cylinder.

1.6 Through the chemical analysis performed on the wipe sample taken from the cylinder, the FFM confirmed the absence of explosive traces on the cylinder. Moreover, given the shape of the top of the cylinder and the properties of the material it is made of, the damage observed in the top part of the cylinder is not likely the result of the cylinder exploding or being exposed to a blast wave.

1.7 Considering all the damage sustained by the cylinder, and taking into account the chemical and physical analyses of samples taken from the cylinder, the FFM concludes that the damage observed on the cylinder resulted from a mechanical force exerted on the top part of the cylinder. This type of force could be generated by an impact at the top of the cylinder.

1.8 The FFM requested a mechanical study and digital simulations of the damage observed on the cylinder from independent experts in mechanical engineering, ballistics, and metallurgy in order to obtain further accurate information on the possible causes of the observed damage. In addition, the study included an examination of whether there is a link between the damage on the cylinder and the crater observed at the site of impact.

1.9 Experts conducted digital simulations in order to identify the mechanical forces and the circumstances that could have caused the deformation visible on the cylinder and the crater.

1.10 The study showed that under specific conditions, the deformation obtained through digital simulation on the cylinder, considering its physical properties and the nature of the ground at the site of impact, is consistent with the deformation observed on the actual cylinder and the shape of the crater.

1.11 Regarding the alleged use of toxic chemicals as a weapon on 1 October 2016 in Kafr Zeita, in the Syrian Arab Republic, all information obtained and analysed by the FFM provides reasonable grounds to believe that the chlorine cylinder was used as a weapon. The cylinder ruptured as a result of mechanical force and released a toxic irritant substance that affects the respiratory system and mucous membranes.

1.12 The FFM is grateful to all States Parties, individuals, witnesses, and other organisations that supported its activities.

2. INTRODUCTION

2.1 This document contains the findings and conclusions of the FFM concerning the alleged use of toxic chemicals as a weapon in Kafr Zeita, in the Syrian Arab Republic, on 1 October 2016. The FFM's activities were conducted in accordance with decisions of the OPCW Executive Council (hereinafter "the Council") EC-M-48/DEC.1 (dated 4 February 2015) and EC-M-50/DEC.1 (dated 23 November 2015), as well as other relevant Council decisions and the Director-General's authority to seek to uphold at all times the object and purpose of the Chemical Weapons Convention (hereinafter "the Convention") as reinforced by United Nations Security Council resolutions 2118 (2013) and 2209 (2015), as applicable to this investigation.

2.2 The terms of reference of the FFM were mutually agreed upon by the OPCW and the Syrian Arab Republic through the exchange of letters between the Director-General of the OPCW Secretariat and the Government of the Syrian Arab Republic, dated 1 and 10 May 2014, respectively (Annex to the Note by the Secretariat S/1255/2015[*], dated 10 March 2015). The terms of reference of the FFM were endorsed by States Parties in Council decisions EC-M-48/DEC.1 and EC-M-50/DEC.1, with express support for the continuation of the work of the FFM to study all available information relating to allegations of the use of chemical weapons in Syria.

2.3 Both the Council and the United Nations Security Council have called upon the FFM to study all available information relating to allegations of the use of chemical weapons in the Syrian Arab Republic, including information provided by the Syrian Arab Republic and others.

3. BACKGROUND

3.1 Between February and October 2016, several operations and incidents took place in the Hama Governorate, particularly in Kafr Zeita and neighbouring towns and villages. Several events are presented in this section to provide an overview of the situational context in the region for the period before, during, and after the incident subject of the report. This sequence of events was reported in public sources and was not subject to analysis by the FFM.

3.2 In this section, several towns and villages in the northern countryside of Hama are mentioned. Figure 1 provides an overview of these locations on the map.

FIGURE 1: AERIAL VIEW OF TOWNS AND VILLAGES IN NORTHERN HAMA

3.3 From mid-2012 to 23 August 2019, Kafr Zeita, like most towns and villages in the northern countryside of Hama, was not under the control of the Syrian Government. Armed groups present in the region included Jaysh Al Fath, Ahrar Al Sham, Jund Al-Aqsa, Al Murabeton, and the Abna' Al Sham Movement.

3.4 On 22 February 2016, a joint statement was issued by the United States and the Russian Federation on the Cessation of Hostilities in Syria.[2] Resolution 2268 (2016) of the United Nations Security Council endorsed this joint statement unanimously on 26 February 2016.[3] At 00:00 hours (Damascus time) on 27 February 2016, the resolution entered into effect, and "the Cessation of Hostilities was to be applied to those parties to the Syrian conflict that have indicated their commitment to and acceptance of its terms". The northern countryside of Hama is among the areas covered by this Agreement.[4] The Cessation of Hostilities Agreement excludes Daesh (also known as the Islamic State in Iraq and the Levant (ISIL)), Jabhat Al Nusra, and other terrorist organisations designated by the United Nations Security Council. Violations of the Cessation of Hostilities Agreement were reported during the months following its implementation.

3.5 On 13 April 2016, a military source reported that the Syrian Air Force conducted sorties targeting gatherings of armed groups in the villages of Kafr Nabouda and Atshan in the northern countryside of Hama, killing many of their members and destroying their equipment and vehicles.[5]

2 Joint statement of the United States and the Russian Federation, as co-chairs of the ISSG, ousembassy.gov.

3 http://unscr.com/files/2016/02268.pdf.

4 https://www.dw.com/ar/.

5 https://syrianfreepress.wordpress.com/2016/04/13/saa-v-nusra-daraa/.

3.6 On the same day, Dr Mohamad Hassan Al Araj, Head of the Hama Healthcare Directorate, was killed in a strike targeting his car as he was departing from Al Maghara Hospital.[6] Moreover, several air strikes targeted the town of Kafr Zeita, and artillery shelling was reported in the neighbourhoods of Mourek. Fifteen members of the Syrian Government Forces were killed in an operation conducted by the armed groups on the axis of Hama Salameyah and the Al Qesareen checkpoint that was under the control of the Syrian Government.[7]

3.7 Due to concerns about the deterioration of the Cessation of Hostilities Agreement in parts of the Syrian Arab Republic, the United States and the Russian Federation issued a statement on 9 May 2016 reaffirming the Agreement.[8] Despite this reaffirmation, violations of the Agreement continued during the following months in the Hama Governorate.

3.8 In June 2016, a situation of security chaos was reported in the northern and western countrysides of Hama, in areas outside the control of the Syrian Government, during which munitions and weapons were stolen from the headquarters of armed groups. Several kidnappings, assassinations, and assassination attempts targeting commanders of the Free Syrian Army (FSA) took place. On 12 June 2016, Kafr Zeita witnessed similar attacks by unknown persons on the Medical Bureau Emergency Center. Equipment was stolen, medical personnel were assaulted, and the Chief of Al Firqa Al Ousta (the Middle Division) of the FSA, Abdel Ghani Assouid, was kidnapped.[9]

3.9 In June 2016, armed groups located in the village of Zakah in the district of Kafr Zeita were reported to be continuously violating the Cessation of Hostilities Agreement. A source from the Syrian Police Command indicated that the armed groups targeted a vehicle transporting drinking water to civilians on the Tell Malah route in Mahardeh in the northern countryside of Hama.[10]

3.10 On 5 July 2016, a woman and a child were killed, and several civilians were injured in Kafr Zeita and Ltamenah in an attack launched by a helicopter involving exploding barrels.[11]

3.11 By the end of July 2016, the Al-Nusra Front announced its separation from Al Qaeda and changed its name to Jabhat Fath Al Sham (the Front of the Conquest of the Levant).[12] This change notwithstanding, Jabhat Fath Al Sham remained on the United Nations' sanctions list.[13]

3.12 Between 28 August 2016 and 5 September 2016, a mass displacement of about 100,000 people took place from the northern and northwestern countrysides of Hama towards neighbouring villages and the city of Hama itself as a result of the armed conflict between the Syrian Armed Forces and non-State armed groups.[14]

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6 https://baladi-news.com/ar/articles/4844/.

7 https://baladi-news.com/ar/articles/4869/.

8 http://www.rbs0.com/CF20160222.html.

9 https://www.alsouria.net/archive/content/.

10 http://alikhbaria.net/.

11 https://baladi-news.com/ar/articles/7789/.

12 Al-Nusra Uncovers its Face Following Split from Qaeda - ASHARQ AL-AWSAT English Archive (aawsat.com).

13 https://syrianfreepress.wordpress.com/2016/07/30/alnusrats-terrorists/.

14 https://www.un.org/sg/en/content/highlight/2016-09-07.html.

3.13 On 29 August 2016, factions of the FSA, together with the armed group Jund Al-Aqsa, launched an offensive[15] in the northern countryside of Hama and took control over the villages of Halfaya in the Mahardeh district, and Masasnah in the Souran district—both located in southern Kafr Zeita—in addition to other positions under the control of the Syrian Government at the time.[16, 17]

3.14 As reported by two commanders from Jaysh Al Izza and Jaysh al Nasr, "this offensive is about more than Hama; it is conducted to relieve pressure on Aleppo". In four days, the armed groups took control of territories including Maardes, which is located 10 kilometres north of the city of Hama, near Hama Military Airport.[18] As the armed groups advanced, additional armed groups, including Faylaq Al-Sham and Ahrar Al Sham, joined the battle.

3.15 On 31 August 2016, according to a military source in the Hama Governorate, military personnel from the Syrian National Defence Forces and the Eleventh Tank Division arrived at the city of Mahardeh ahead of a counter-offensive that would take place under the command of the Tiger Forces.[19]

3.16 On 1 September 2016, four air strikes targeted Kafr Zeita Specialised Hospital, causing injuries among hospital staff. The hospital was evacuated due to the damage to its structure and equipment.[20]

3.17 On 9 September 2016, the United States of America and the Russian Federation reached a new agreement on the Cessation of Hostilities in the Syrian Arab Republic, effective as at 12 September 2016. This new agreement was violated several times and came to an end on 18 September 2016.[21, 22]

3.18 On 11 September 2016, Jund Al-Aqsa took control of the town of Kawkab near Souran, in the northern countryside of Hama, considered one of the easiest access points to pro-Government areas, such as the town of Ma'an.[23, 24]

3.19 On 12 September 2016, Jund Al-Aqsa shelled the town of Qomhane in the northern countryside of Hama on the start date of the new Cessation of Hostilities Agreement,[25] advancing further towards the city of Hama and seizing weapons and munitions after confrontations with the Syrian Armed Forces.

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15 The offensive was called "Fi Sabeeli Allahi Namdhee" (For God's Sake We Go) by Jaysh Al Izza, whereas Jund Al-Aqsa called it "Skeikh Marouane Hadeed Ghazoua" (the Skeikh Marouane Hadeed Invasion), and Jaysh al Nasr referred to it as "Hemam Al Ghadhab Li Nosrati Halab" (Lava of Anger in Support of Aleppo).

16 http://www.shaam.org/news/syria-news/.

17 https://baladi-news.com/ar/articles/9498/.

18 https://syriadirect.org/rebel-commanders-hama-offensive-to-relieve-pressure-on-aleppo/.

19 https://www.almasdarnews.com/article/massive-convoy-reinforcements-arrive-northern-hama/.

20 https://baladi-news.com/ar/articles/9614/.

21 See footnote 7.

22 https://arabic.rt.com/news/840268.

23 https://baladi-news.com/ar/articles/9962/.

24 https://arabic.rt.com/news/840601.

25 https://arabic.rt.com/news/840601.

3.20 On 15 September 2016, an uneasy calm was reported in the countryside of Hama as violations of the Cessation of Hostilities occurred in areas such as the outskirts of Kafr Zeita, Ltamenah, and Souran. A few days before, the latter had been taken under control by armed groups.[26]

3.21 On 20 September 2016, the Syrian Arab Air Force conducted air strikes targeting towns and villages in the northern countryside of Hama, such as Ltamenah, Kafr Zeita, Taibet al-Imam, Souran, Mourek, and Latmeen. The towns of Maardes and Kawkab were also subjected to artillery shelling and explosive barrels launched by the Syrian Armed Forces. In response, armed groups shelled positions held by the Syrian Armed Forces with Grad[27] rockets in the mountains of Jabal Zayn al-Abidin, near the town of Qomhane, as well as other Syrian Armed Forces positions in the Jourin military camp, located in the western countryside of Hama.[28]

3.22 On 21 September 2016, the Syrian Arab Air Force targeted gatherings and fortifications of Jaish al-Fateh in Taibet al-Imam in the surroundings of Maardes, Tal Bazam, Zour al-Taibeh, Zour Abu Zaid, and Souran, located approximately 18 kilometres to the north of the city of Hama. The Syrian Arab Air Force carried out sorties against positions and infiltration axes of armed groups in the village of Al-Zakah, in Ltamenah, and in the north of Kafr Zeita. Further, the Syrian Arab Air Force targeted fortifications belonging to armed groups in the village of Hurr Benafseh in the southern countryside of Hama.[29]

3.23 On the same day, armed groups took control over the village of Iskandariya near the mills of Maardes after confrontations with the Syrian Armed Forces. One officer and 20 members of the Syrian Armed Forces were captured, 40 others were killed, and their bodies were sent to the National Hama hospital. Over 50 strikes were reported in the towns of Souran, Ltamenah, Kafr Zeita, Maardes, Iskandariya, and Kura Zuwar on that same day.[30]

3.24 On 24 September 2016, factions of the FSA and other armed groups[31] announced that they had taken control over the town of Ma'an after a large-scale battle with the Eighty-Seventh Brigade and the Eleventh Tank Division of the Syrian Armed Forces by targeting Ma'an along the M-5 Idlib-Hama highway.[32, 33]

3.25 On 27 September 2016, Jund Al-Aqsa, along with factions of FSA, took control of the villages of Shouaatha, Al Qahera, and Tell Aswad and targeted Hama Military Airport with Grad rockets.[34]

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26 https://baladi-news.com/ar/articles/10098/.

27 Grad is a local term used for multiple rocket launcher munition in general.

28 https://baladi-news.com/ar/articles/10253/.

29 https://syrianfreepress.wordpress.com/2016/09/22/3-battlefield-days/.

30 https://www.b-sy.net/ar/articles/10279/.

31 Armed groups included Jund Al-Aqsa, Jund Al Sham, and Al Mourabitin Islamic group.

32 https://twitter.com/FSA_Lens/status/779686002034081792.

33 https://www.almasdarnews.com/article/jihadist-rebels-capture-alawite-village-northern-hama.

34 https://baladi-news.com/ar/articles/10491/.

3.26 On 29 September 2016, reports stated that the FSA obtained Grad rockets with ranges between 22 and 40 kilometres.[35] On the same day, the Syrian Armed Forces reported military operations in the Hama Governorate, including the destruction of a number of tanks and armoured vehicles belonging to armed groups in the surroundings of Atshan, Taibet al-Imam, Maardes, al-Kabbaryieh, Tal al-Zaater, Shouaatha, Al-Telisiyieh, Skeikh, Mourek, and Kawkab in the countryside of Hama[36].

3.27 On 30 September 2016, over 10 air strikes were reported on Kafr Zeita, in addition to explosive barrels and artillery shelling. Ltamenah (south of Kafr Zeita) was subjected to six air strikes on that same day.[37]

3.28 On 1 October 2016, the Chief of General Staff, Brigadier General Ali Abdullah Ayyoub, inspected the military units operating at the frontlines in the northern countryside of Hama after significant losses were incurred during confrontations with armed groups on the previous days.[38, 39]

3.29 Also on 1 October 2016, around 19:30 local time, an alleged chemical attack with two barrels containing toxic gas in an agricultural field in Kafr Zeita was reported in the media.[40, 41, 42] Approximately 20 individuals suffered from suffocation and breathing difficulties.

3.30 In the afternoon of 2 October 2016, an air strike targeted Al Maghara Hospital in Kafr Zeita, causing several injuries among medical personnel and significant damage to the structure of the cave hospital. Later the same day, the hospital was targeted with cluster and vacuum bombs during evacuation operations following the first air strike.[43]

3.31 On 3 October 2016, the Syrian Armed Forces advanced on frontlines in the countryside of northeast Hama.[44] On the same day, the United States of America suspended talks with the Russian Federation on the ceasefire in the Syrian Arab Republic.[45]

3.32 On 12 October 2016, over 30 air strikes were reported in areas in the northern countryside of Hama that were not under the control of the Syrian Government. About seven vacuum bombs and exploding barrels were reported in Kafr Zeita, causing injuries among civilians. Twenty air strikes were reported in Ltamenah, Taibet al-Imam, Maardes, Souran, and Ma'an.[46]

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35 https://www.facebook.com/rtarabic.ru/videos/1233948259992819/.

36 https://syrianfreepress.wordpress.com/2016/09/29/4-war-days/.

37 https://www.b-sy.net/ar/articles/10637/.

38 http://sana.sy/en/?p=89398.

39 https://24.ae/article/283680/.

40 https://assabeel.net/news/2016/10/09/.

41 https://baladi-news.com/ar/articles/10967/.

42 https://baladi-news.com/ar/articles/10677/.

43 https://baladi-news.com/ar/articles/10710/.

44 https://twitter.com/LaSyrianNews/status/782946445947203584.

45 https://www.reuters.com/article/us-mideast-crisis-usa-russia-idUSKCN1231X3.

46 https://baladi-news.com/ar/articles/11070/.

3.33 On 16 October 2016, Jaysh Al Izza and the FSA faction, Abna' Al Sham, thwarted an advance attempt of the Syrian Armed Forces in Maardes, supported by their allies. Additionally, Jaysh Al Izza targeted positions of the Syrian Armed Forces in the mountain of Jabal Zayn al-Abidin with Grad rockets, destroying an ammunition warehouse and killing members of the Syrian Forces. On the same day, the countryside of Hama was subject to dozens of air strikes aimed at preventing supplies and reinforcements from reaching the armed groups at the frontlines.[47]

3.34 On 17 October 2016, the Syrian Government took control of the town of Maardes and advanced until the town of Ma'an after fierce confrontations with FSA factions in the area.[48]

4. PRE-DEPLOYMENT ACTIVITIES AND MISSION TIMELINE

4.1 Based on media coverage of the alleged incident of 1 October 2016, the Secretariat conducted research using open-source information to assess the credibility of the allegations. The primary sources comprised news outlets, blogs, and websites (Annex 2). Subsequently, the FFM conducted its first remote interview on 3 October 2016 to gather additional information on the alleged incident.

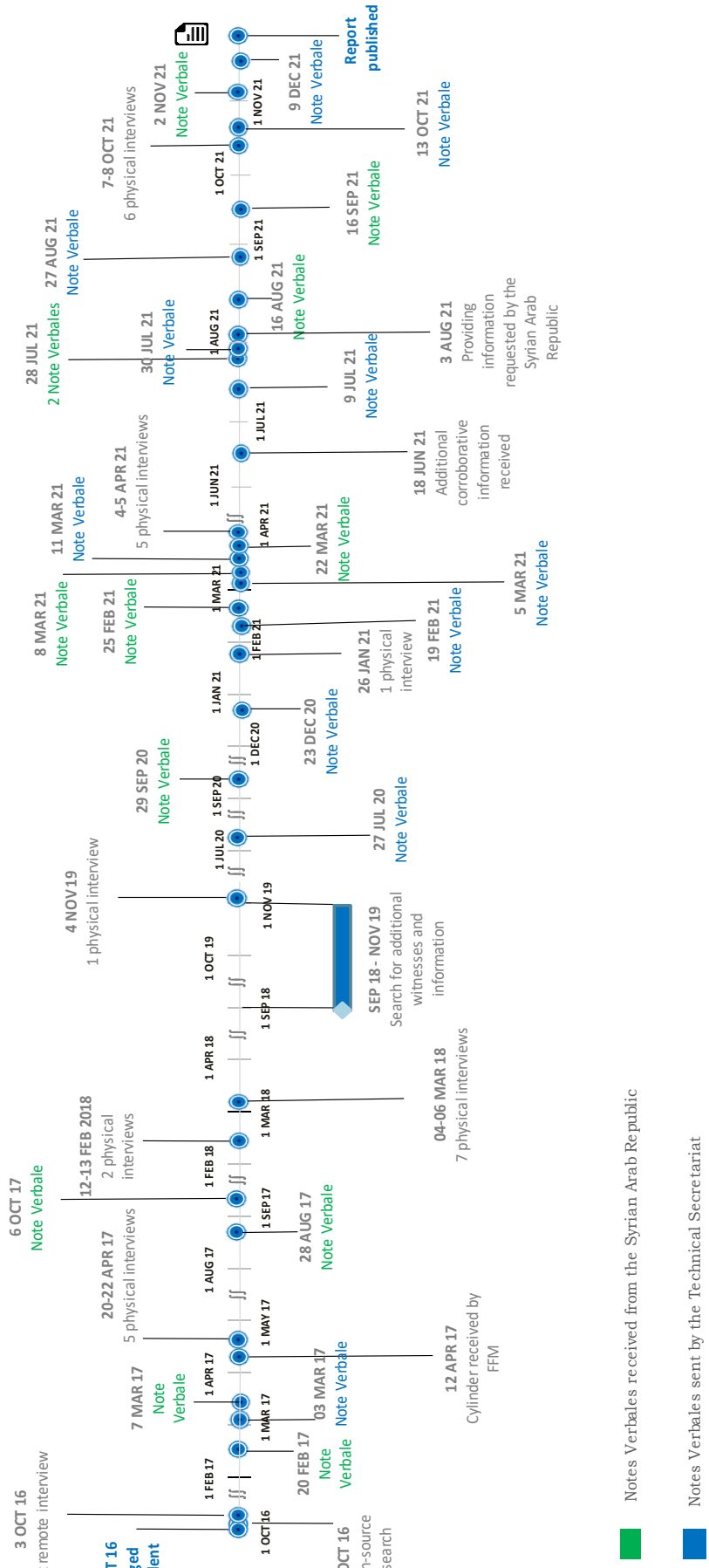
4.2 Based on the initial assessment and in accordance with its mandate, the FFM was tasked with collecting information related to the alleged incident. The activities carried out by the FFM in relation to the alleged use of toxic chemicals as a weapon in Kafr Zeita on 1 October 2016 are shown in the mission timeline (Figure 2 and Annex 3).

4.3 Figure 2 reflects the period of time over which the mission activities took place. The activities started with open-source research on 2 October 2016, included several rounds of witness interviews, and several deployments to the Syrian Arab Republic and other locations. The drafting of this report began in July 2021.

47 https://baladi-news.com/ar/articles/11242/.

48 https://baladi-news.com/ar/articles/11286/.

FIGURE 2: MISSION TIMELINE



5. MISSION ACTIVITIES

Methodological considerations

5.1 The FFM followed the same general methodological approach outlined in previous FFM reports, adhering to the most stringent protocols throughout its activities.

5.2 The FFM collected information related to the alleged incident in Kafr Zeita using its own equipment, ensuring the chain of custody and witness identity protection throughout each deployment in accordance with OPCW standard operating procedures, work instructions, and guidelines.

5.3 Interviews were conducted by inspectors proficient and trained in interviewing techniques, following the procedures set out in OPCW work instructions. Prior to commencing the interviews, the process was explained to the interviewees, with emphasis on the fact that with the consent of the interviewee, the interviews would be recorded using audio, video, or both. After confirming that the process had been understood, interviewees were requested to sign a consent form. The interview process used the free-recall approach, with follow-up questions to elicit information of potential evidentiary value and to clarify aspects of the testimony.

5.4 Available open-source materials were used primarily for planning activities and for comparative purposes with material directly collected by the FFM during the course of the investigation, but not as part of the final analysis and conclusion process.

5.5 The FFM examined all the data obtained, both individually and combined. The conclusions of this report are based on the analysis of all evidence taken as a whole: interviews; a mechanical study, digital simulations, and laboratory analysis of an industrial chlorine cylinder obtained by the FFM; supporting material gathered during the interview process; and subsequent cross-reference and corroboration of the evidence.

Activities

5.6 The activities of the FFM were conducted in accordance with OPCW guidelines as well as standard operating procedures and work instructions as set out in Annex 1.[49] These included:

(a) exchanging notes verbales with the Syrian Arab Republic;

(b) meeting with the Syrian Technical Team of the National Authority of the Syrian Arab Republic;

(c) conducting and analysing interviews with medical staff, casualties, first responders, and witnesses of the alleged chemical incident in Kafr Zeita;

(d) reviewing and analysing photographs, videos, records, and files gathered by the FFM;

[49] Details are set out in Annex 1.

(e) reviewing the report of the mechanical study and digital simulations conducted by qualified experts on the deformation of the cylinder;

(f) conducting chemical analyses by OPCW designated laboratories of the sample taken from the cylinder; and

(g) reviewing open-source material.

5.7 The FFM has actively pursued further available information in possession of: the Syrian Arab Republic; OPCW States Parties; non-governmental organisations, including the Chemical Violations Documentation Center of Syria (CVDCS) and Syria Civil Defence (SCD, also known as "the White Helmets"); potential witnesses; and in-depth research into public information.

5.8 On 20 February 2017, the Syrian Arab Republic informed the Secretariat via Note Verbale No. 10 of witnesses of a number of alleged incidents, including the alleged incident in Kafr Zeita on 1 October 2016.

5.9 On 3 March 2017, the Secretariat requested via a note verbale that the Syrian Arab Republic provide any information and material it may possess related to the alleged incident in Kafr Zeita on 1 October 2016 and other allegations.

5.10 On 7 March 2017, the Syrian Arab Republic informed the Secretariat via Note Verbale No. 15 of an approximate number of witnesses related to a number of allegations, including the alleged incident in Kafr Zeita on 1 October 2016.

5.11 On 28 August 2017 and 6 October 2017, the Syrian Arab Republic provided the Secretariat with information on a number of allegations via Notes Verbales No. 83 and No. 96, respectively. Both of these notes verbales included attachments of, inter alia, classified documents containing information on the alleged incident.

5.12 While no notes verbales were exchanged between August 2017 and July 2020, the FFM continued its activities related to the incident that is the subject of this report, i.e., conducting interviews, collecting information, recovering the chlorine industrial cylinder, and conducting chemical analyses.

5.13 On 27 July 2020, the Secretariat requested that the Syrian Arab Republic provide any further information and material it may have in its possession regarding the alleged incidents in Kafr Zeita of 1 October 2016, and in Saraqib on 1 August 2016.

5.14 On 29 September 2020, the Syrian Arab Republic informed the Secretariat via Note Verbale No. 69 that all the information available was already shared with the Secretariat in 2017.

5.15 On 23 December 2020, the Secretariat informed the Syrian Arab Republic of its intention to deploy to the Syrian Arab Republic in the first quarter of 2021 in order to conduct witness interviews.

5.16 Through an exchange of notes verbales during the period from January to March 2021, the Syrian Arab Republic and the Secretariat agreed on deployment dates and FFM activities.

5.17 From 29 March 2021 to 13 April 2021, the FFM deployed to the Syrian Arab Republic, held meetings with the Technical Team of the National Authority, and conducted interviews with witnesses identified by the Syrian Arab Republic.

5.18 On 9 July 2021, the Secretariat asked the National Authority of the Syrian Arab Republic whether it was in a position to provide the FFM with any additional information relevant to the alleged incident and specifically relating to the industrial chlorine cylinder.

5.19 On 28 July 2021, the Syrian Arab Republic replied in two notes verbales. In its Note Verbale No. 72, the Syrian Arab Republic requested clearer images of the cylinder. The second—Note Verbale No. 74—comprised questions about the alleged incident and the cylinder. Neither of these notes verbales answered the questions set out by the Secretariat in its 9 July 2021 request.

5.20 On 30 July 2021, the Secretariat informed the Permanent Representation of the Syrian Arab Republic to the OPCW through a note verbale that the Secretariat would provide the information requested in Note Verbale No. 72 via its command post in Damascus. The Secretariat sent the requested information on 3 August 2021. The Syrian National Authority collected the information on 9 August 2021.

5.21 On 16 August 2021, the Syrian Arab Republic sent a third note verbale as a reply to the note verbale of the Secretariat dated 9 July 2021. In its Note Verbale No. 84, the Syrian Arab Republic requested that experts of the Syrian National Authority conduct an extensive technical examination of the cylinder.

5.22 On 27 August 2021, the Secretariat sent a note verbale to the Syrian Arab Republic responding to Notes Verbales No. 74 and No. 84 received from the Syrian Arab Republic and reiterated its request for additional information on the incident or the cylinder.

5.23 Between September 2021 and December 2021, the Secretariat and the Syrian Arab Republic exchanged a number of notes verbales regarding the cylinder, but no additional information was made available.

6. ACCESS TO THE SITE AND RELATED CONSIDERATIONS

6.1 The safety and security of individuals involved in an FFM deployment are of the utmost importance.

6.2 Taking into consideration the military activities and the volatile situation in the region of the Hama Governorate at the time of the alleged incident (as described above in section 3), which lasted until the first quarter of 2020, the deployment of the FFM to the incident location without crossing confrontation lines was deemed not possible.

6.3 By the end of August 2019, the Syrian Government regained control over Kafr Zeita following a large offensive launched by the Syrian Armed Forces with the support of the Russian Aerospace Forces, which lasted several months.

6.4 During the FFM's deployment to the Syrian Arab Republic from 29 March to 13 April 2021, the Technical Team of the National Authority mentioned that a site visit was possible and could be supported by the Syrian Arab Republic.

6.5 When visiting the site of an alleged incident, FFM activities should be conducted in accordance with OPCW guidelines as well as standard operating procedures and work instructions (Annex 1). These activities include:

(a) collecting and documenting environmental and biomedical samples at sites relevant to the incident;

(b) taking photographs and collecting data and remnants found at the site and its surroundings;

(c) taking photographs and collecting data from the impact point(s) and surrounding areas;

(d) collecting copies of hospital records, including patient registers, treatment records, and any other relevant records; and

(e) visiting hospitals and other locations relevant to the alleged incident.

6.6 Given the military activities in the area, which lasted over two years after the alleged incident, the identification of the impact point(s) with the high level of confidence required by the exacting standards used by the FFM was considered no longer possible.

6.7 Moreover, the possibility of finding chemical indicators of soil and vegetation exposure to chlorine in the area was deemed low, considering the instability of the indicators and the time elapsed between the date of the incident and the FFM deployment to the Syrian Arab Republic. Therefore, collecting environmental samples from the site would not provide reliable information and would not allow for establishing any link with the alleged incident that is the subject of this report.

6.8 Furthermore, Kafr Zeita Specialised Hospital, where several casualties were treated, was damaged at the end of April 2017, and later destroyed in May 2018 by air strikes.

6.9 Remnants of industrial chlorine cylinders, suspected to be used as a delivery method, were collected from the site.[50]

6.10 In March 2021, the Russian Armed Forces announced the destruction of the tunnels at the site of the alleged incident, including the Al Maghara Hospital. A video of the destruction by detonation was made public.[51]

6.11 The destruction of the tunnels at the site of the alleged incident, including Al Maghara Hospital, considerably reduced the probability of finding other sampling point(s) and potential documentation that would be of use for further inquiries into this specific alleged incident.

6.12 Taking into consideration all the aforementioned circumstances and information, the FFM considered that a deployment to the site of the alleged incident in 2021—with the additional constraints in place due to the COVID-19 pandemic—would add limited or no value to the findings, especially when weighed against the amount of effort and resources that the Secretariat and the Syrian Arab Republic would need to deploy.

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50 Annex 6.

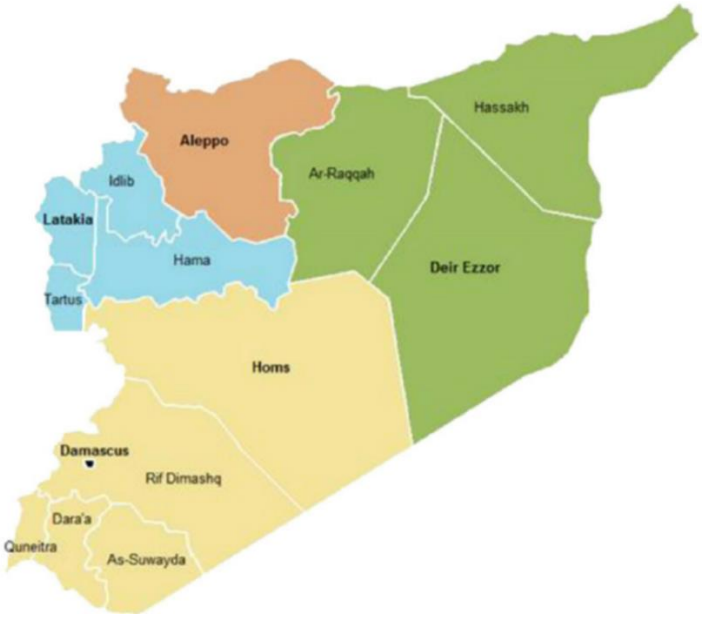
51 https://www.youtube.com/watch?v=RDGEzWuUDUw.

7. FACTUAL FINDINGS

Incident site: Kafr Zeita

7.1 The Hama Governorate is situated in western-central Syria, bordering the Governorates of Idlib and Aleppo to the north, Homs to the south, Tartus and Latakia to the west, and Al-Raqqa to the east.

FIGURE 3: LOCATION OF THE HAMA GOVERNORATE IN SYRIA



7.2 Kafr Zeita is a town in the north of the Hama Governorate, located 30 kilometres to the north of the city of Hama. Nearby towns include Tall Sayyad and Khan Shaykhun to the northeast, Morek to the east, Ltamenah to the southeast, Kernaz to the west, and Hobait to the northwest.

7.3 According to the Syrian Central Bureau of Statistics, Kafr Zeita had a population of 17,052 in the 2004 census.

7.4 From December 2012 until August 2019, the town of Kafr Zeita was not under the control of the Government of the Syrian Arab Republic.

FIGURE 4: LOCATION OF KAFR ZEITA IN THE HAMA GOVERNORATE

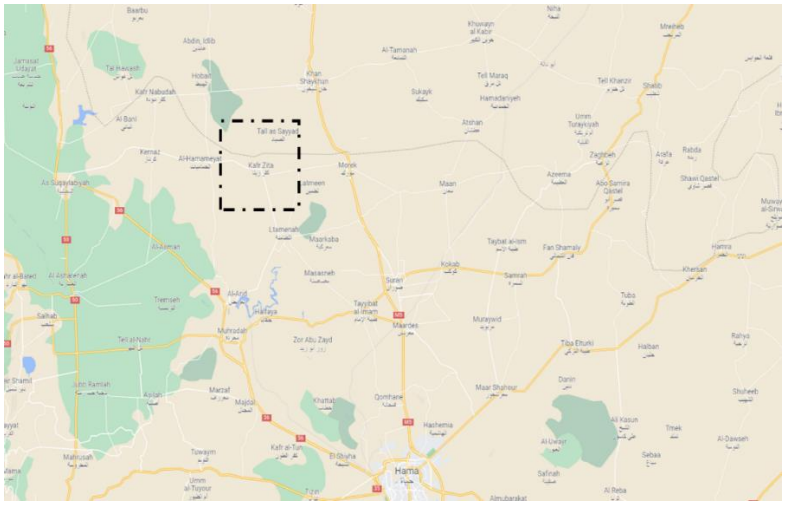
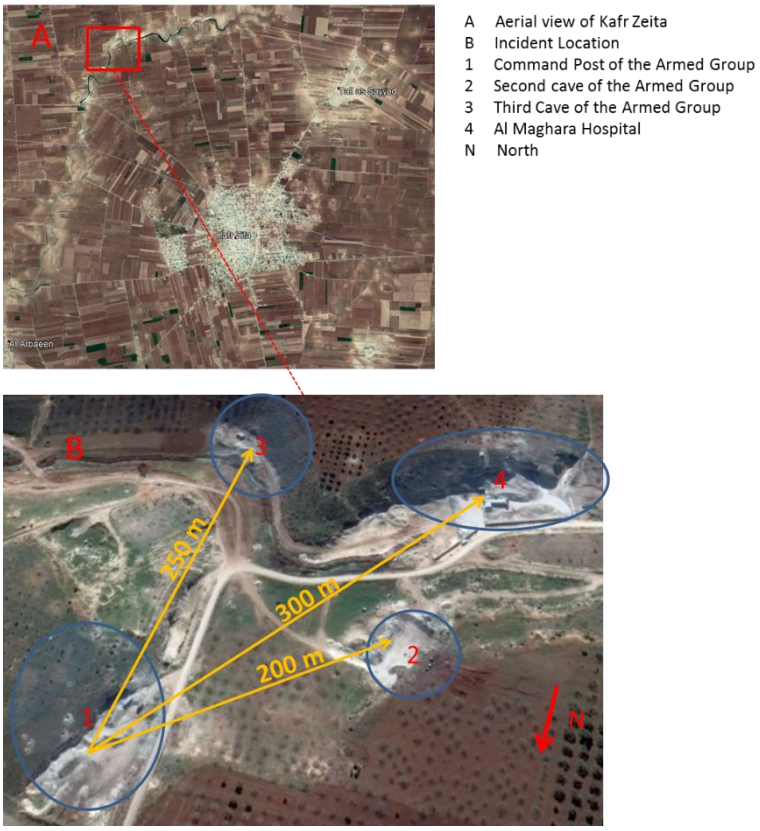


FIGURE 5: LOCATION OF THE INCIDENT



A Aerial view of Kafr Zeita
B Incident Location
1 Command Post of the Armed Group
2 Second cave of the Armed Group
3 Third Cave of the Armed Group
4 Al Maghara Hospital
N North

7.5 The incident is reported to have taken place in an agricultural area, four kilometres in a straight line northwest from the centre of Kafr Zeita, on the border of the Hama and Idlib Governorates.

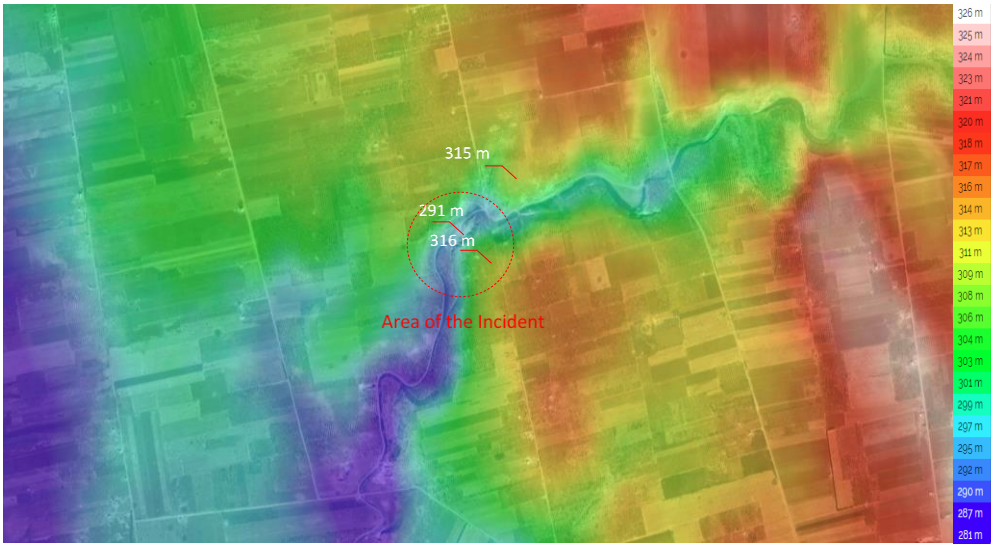
7.6 The location is in an agricultural area; the land surrounding the incident location is planted with fruit trees, through which a stream of water passes in a valley referred to as Wadi al Aanz.

7.7 The impact locations are situated in Wadi al Aanz, near Al Maghara Hospital, which was built inside a natural cave in the valley (Figure 5-B).

7.8 Armed groups were positioned in the valley in three caves close to Al Maghara Hospital; one of these caves was the dedicated command post of an armed group.

7.9 Figure 6 is a presentation of the topography of the site of the incident and its surroundings.[52] Specific points are marked to indicate the elevation at different points in the landscape. The site of the alleged incident, as shown in Figure 6, is in one of the locations in the area at a lower elevation.

FIGURE 6: TOPOGRAPHY OF THE AREA



7.10 The FFM reviewed the meteorological conditions of 1 October 2016 in Kafr Zeita based on available public sources. The meteorological conditions are displayed in Table 1.[53] The FFM is aware that this meteorological data may vary slightly from one public source to another. Most sources refer to the main city in a Governorate—Hama City in this case. Therefore, this data is more indicative of a general forecast in the area than a precise account of exact weather conditions at the time of the incident.

7.11 The site of the alleged incident in Kafr Zeita is within a valley where conditions of a microclimate may generate.

7.12 According to witnesses, the area was populated at the time of the incident by farmers, internally displaced persons from Kafr Zeita and other areas due to the ongoing confrontations, and approximately 80 fighters from the armed groups active in the region.

52 https://en-gb.topographic-map.com/maps/lplu/Syria/.

53 https://www.worldweatheronline.com/mare-weather-history/halab/sy.aspx.

TABLE 1: METEOROLOGICAL CONDITIONS

Saturday, 1 October 2016 Max: 31°C Min: 18°C Sunrise: 06:28 AM Sunset: 06:17 PM Moonrise: 06:38 AM Moonset: 06:43 PM Phase: Waning Crescent Illumination: 21 %								
Time	**Temperature (°C)**	**Wind (km/h)**	**Gust (km/h)**	**Rain (mm)**	**Humidity %**	**Cloud %**	**Pressure (mb)**	**Visibility**
00:00	20	7 from NE	9	0.0	38	0	1014	Excellent
03:00	18	5 from ENE	6	0.0	44	0	1015	Excellent
06:00	23	9 from ENE	11	0.0	29	0	1015	Excellent
09:00	28	14 from NE	16	0.0	17	0	1015	Excellent
12:00	31	13 from NE	15	0.0	13	0	1014	Excellent
15:00	30	8 from NE	9	0.0	16	0	1013	Excellent
18:00	24	6 from NE	11	0.0	21	0	1014	Excellent
21:00	23	5 from ESE	10	0.0	24	0	1014	Excellent

Collected information

Interviews

7.13 Fulfilling its mandate to examine all available information relating to an alleged incident of use of chemical weapons, the FFM conducted interviews with witnesses who consented to be interviewed in the Syrian Arab Republic and elsewhere.

7.14 Interviews were conducted by inspectors proficient in interviewing techniques, following the strict procedures set out in OPCW work instructions. To guarantee the independence of the interview process, only the witness and relevant FFM team members were present in the room during an interview.

7.15 Between 3 October 2016 and 8 October 2021, the FFM conducted 29 interviews. The total number of interviewees was 25; four witnesses were interviewed twice, and two interviews were conducted via video link software. A breakdown of the profiles of the interviewees is provided in Table 2.

7.16 Video link software-based interviews are conducted for informative and assessment purposes rather than for their evidentiary value. At a later stage, the FFM conducted physical interviews with the same witnesses who had originally been interviewed remotely. The witnesses confirmed that they had remote interviews with the FFM in the aftermath of the incident. For analysis and reporting purposes, only in-person interviews and their content were considered.

TABLE 2: PROFILES OF INTERVIEWEES

	Interviewees	Male	Female	Primary Casualties	Secondary Casualties
Treating physicians	3	3	0	0	3
Medical support staff	1	1	0	0	1
Witness	20	17	3	11	0
Sampler	1	1	0	0	0
Total	**25**	**22**	**3**	**11**	**4**

7.17 Of the 25 interviewees three were treating physicians, one was medical support staff, one was involved in the process of collecting the chlorine industrial cylinder found at the incident location, 15 were casualties who reported being exposed to a toxic chemical, and five were witnesses.

7.18 The identity of every witness was verified before a consent form was signed prior to the interview.

7.19 The following is a composite summary of the statements given by witnesses interviewed by the FFM.

7.20 According to witness testimonies, on Saturday 1 October 2016, the city of Kafr Zeita was subjected to continuous shelling. Several locals evacuated the town in the direction of the agricultural lands (referred to as Wadi al Aanz), in the north-western outskirts of Kafr Zeita. The area is located in a valley approximately five kilometres from the centre of Kafr Zeita and was inhabited by internally displaced persons, farmers who live in single-level houses, and fighters positioned in the three aforementioned "caves", one of which was used as a command post by one faction.

7.21 At approximately 19:00, witnesses heard radio reports from a spotter about a helicopter flying northwest in the direction of Kafr Zeita. The spotter indicated that the helicopter took off from Hama Airport.

7.22 Witnesses located in the indicated area, but outside of the caves, heard the helicopter flying above at approximately 19:30. Shortly afterwards, the helicopter dropped two barrels,[54] according to a number of witnesses, while others reported being aware of one barrel only.

7.23 The description of the sound generated by the barrels upon impact varied between weaker than the usual (i.e., a conventional explosion), to no explosion, and a sound generated only by a physical impact. Individuals who were in Al Maghara Hospital (located inside a cave) reported not hearing any sound at that time, when they were interviewed by the FFM.

54 Witnesses refer to the industrial chlorine cylinder as "barrel" in their own language.

7.24 However, witnesses who reportedly took shelter in houses of relatives—who are farmers in these lands—stated that they heard the sounds generated by the impact of the cylinders. These witnesses recounted that just a few minutes after the impact sounds were heard, they perceived a strong odour comparable to chlorine-based household cleaning products and bleach, commercially known as Flash, but much stronger.

7.25 At this time, individuals located in the cave used as a command post for the armed group reported hearing the impact sound of the cylinders and described the same odour.

7.26 Witnesses who participated in the cylinder recovery on 2 October 2016 reported that the ruptured cylinder was located near the command post of the armed group operating at the site of the incident.

7.27 Witnesses described the night as warm with a light breeze and no precipitation. The direction of the wind was from north to south. Visibility was poor due to low ambient light and restricted use of artificial light to avoid being targeted from the air.

7.28 First responders who were interviewed indicated that the SCD centre was five to six kilometres away from the site of impact. The first group of first responders reached the site of the incident within approximately five minutes, and the second group within fifteen minutes.

7.29 First responders started smelling the odour described in previous paragraphs when they were at a distance of one to two kilometres to the south of the site of the incident. At that point, the SCD teams stopped the vehicle and donned their protective gear as they began to manifest symptoms such as shortness of breath, lacrimation, and pruritus.

7.30 Upon their arrival at the incident location, the SCD teams—equipped with Dräger masks and helmets with torchlights—reported the significant presence of a yellowish dust or smoke in the air. Two of the SCD witnesses stated that when they arrived at the site, they could see a greenish or yellowish gas being released from the cylinder. The witness who came to a closer proximity to the cylinder recalled seeing a green gas being released from the barrel, with no associated noise perceived.

7.31 According to witness testimonies, the number of casualties varied from 20 to 25, mostly males. The majority of the casualties were in the aforementioned caves. Other casualties were in the agricultural area near the site at the time of the incident. They were evacuated by the SCD from their houses to Al Maghara Hospital and stayed there for several hours before they were discharged.

7.32 According to the medical personnel working at Al Maghara Hospital on the evening of 1 October 2016, casualties started arriving progressively, in a state of panic, in the five minutes to the first hour following the incident. A number of casualties arrived on foot, while others arrived in SCD rescue cars and ambulances dispatched from Kafr Zeita Specialised Hospital.

7.33 Casualties presented with symptoms including nausea, eye irritation, excessive frothy secretions from the mouth, cough, and difficulty breathing, including the sensation of constricted upper airways. Medical personnel and first responders reported the absence of any signs of external trauma.

7.34 Upon arrival Al Maghara Hospital, casualties were undressed and washed with water by medical personnel before entering. A number of casualties required assistance to enter the facility.

7.35 Several witnesses recalled that Al Maghara Hospital was evacuated on the same day due to contamination and patients were transferred to Kafr Zeita Specialised Hospital. According to the medical personnel present on 1 October 2016 in Kafr Zeita Specialised Hospital, patients started arriving approximately one hour following the incident. A small number of casualties went for follow-up treatment at Kafr Zeita Specialised Hospital in the two to three days following the incident, and one went back to Al Maghara Hospital.

7.36 Three witnesses recounted that Al Maghara Hospital was used to treat "fighters" only and that civilians were not allowed in the area where the hospital was located. Reportedly, several caves were dug by armed groups during that period.

7.37 No fatalities were reported as a result of this incident.

7.38 Witnesses who were not in close proximity to the site of the incident stated that no incident took place on 1 October 2016 in the city of Kafr Zeita, nor did any shelling occur. They described the overall situation in the area as normal.

Samples and cylinder

7.39 The FFM obtained the cylinder shown in Figure 7 on 12 April 2017. Additional information received indicated that the cylinder was collected from Kafr Zeita and was related to the incident that occurred on 1 October 2016. Subsequently, the FFM requested additional documentation and pursued various lines of inquiry, including through interviews, to ensure that this cylinder could be linked to the alleged incident.

7.40 In February 2018, the FFM collected additional information that made it possible to consider the cylinder as evidence pertaining to the aforementioned alleged incident. The metadata of the cylinder photographs obtained by the FFM, confirmed by interviews, indicates that the cylinder was indeed retrieved on 2 October 2016.

7.41 These same photographs allowed the FFM team to firmly establish the geolocation of the activities. The individuals who participated in the retrieval of the cylinder and who were identified in the photographs obtained by the FFM were interviewed by the team at a later stage.

7.42 Based on the above, and although several witnesses reported that the incident involved two cylinders (or "barrels"), the FFM has focused its investigation on the cylinder described below.

7.43 The FFM has not collected environmental samples from the site of the incident, nor biomedical samples from casualties. A wipe sample was taken from the cylinder in line with the relevant standards.

Cylinder description

7.44 For the purposes of physical description, the part of the cylinder comprising the valve is referred to as the "top of the cylinder", while the base is referred to as the "bottom of the cylinder".

7.45 The shape, construction, and markings relevant to the collected cylinder are consistent with those of an industrial gas cylinder.

FIGURE 7: CYLINDER COLLECTED FROM KAFR ZEITA

7.46 The cylinder is metallic, originally painted yellow, and has sustained discoloration. The top of the cylinder displays significant damage and deformation, ruptures, indentations, and protrusions.

7.47 The length of the cylinder as measured by the FFM is approximately 1,370 mm. The diameter at the base is approximately 350 mm. However, due to the deformation in the top of the cylinder, the original dimensions may have been slightly different (Figure 8).

FIGURE 8: DIMENSIONS OF THE CYLINDER

7.48 In the area surrounding the rupture at the top of the cylinder, a significant amount of rust is visible; the paint is no longer present (Figures 7 and 8-A). The level of corrosion on other parts of the cylinder is observed to be substantially lower (Figure 7).

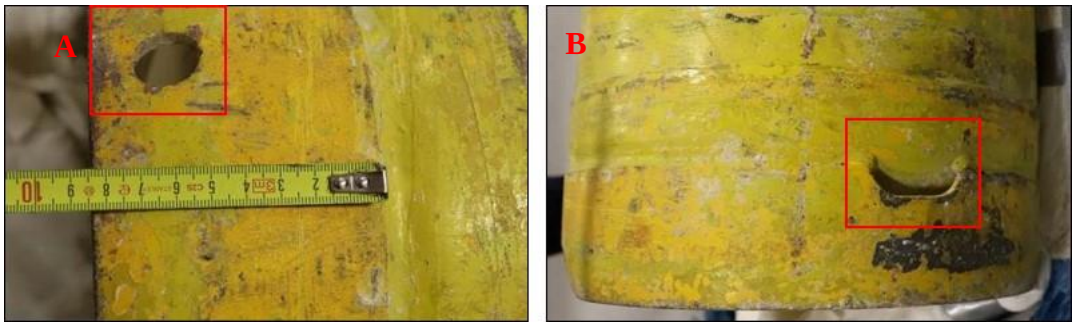
7.49 The main body of the cylinder consists of three parts welded into the final vessel. The middle part is a rectangular sheet of metal welded longitudinally into a tubular shape, with two caps welded circumferentially at both ends of the tube, as observed in Figures 9-A and 9-B.

7.50 The top cap of the cylinder appears standardly hemispherical, though this could not be confirmed with complete accuracy by visual examination due to the level of deformation (Figure 9-A). The bottom cap is concave (Figure 9-B). The thickness of the metal sheet measured at the ruptured part of the cylinder is 6 mm (Figures 9-C and 9-D).

FIGURE 9: CYLINDER PARTS

7.51 At the bottom of the cylinder, a metal ring is welded to provide support and to facilitate the handling of the cylinder. The width of the base ring is 85 mm (Figure 10-A).

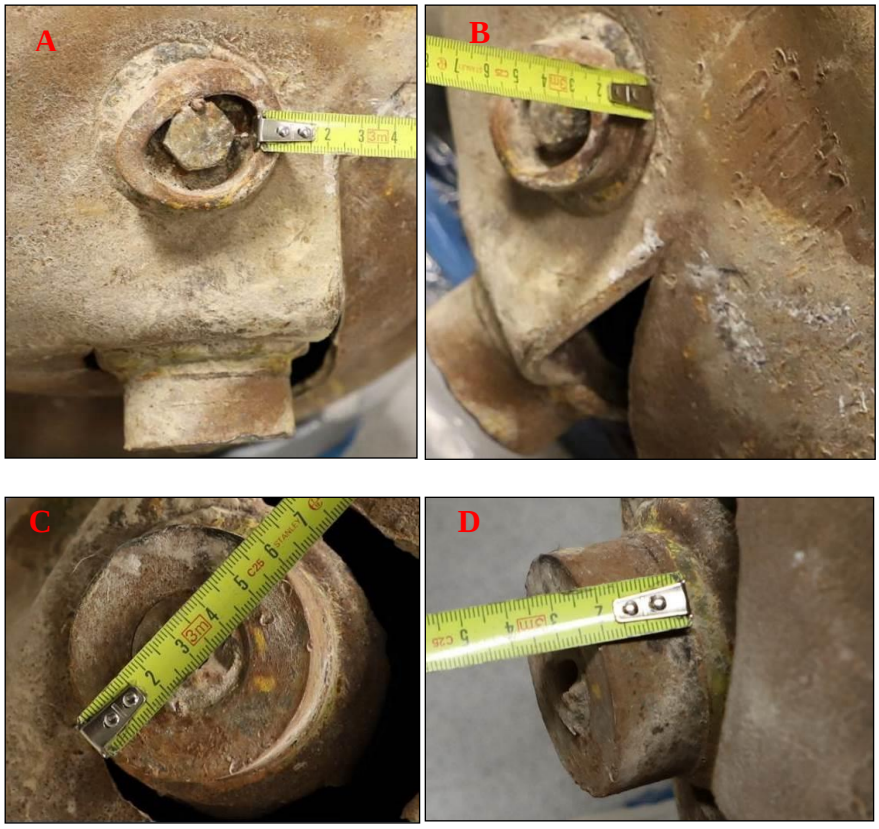
FIGURE 10: THE BASE RING OF THE CYLINDER



7.52 Two diametrically opposed holes measuring 20 mm are present in the base ring (Figure 10-A), along with two larger asymmetrical openings for handling the cylinder (Figure 10-B).

7.53 The photographs in Figure 11-B show the neck of the cylinder at the top, consisting of a cylindrical piece with a hole in the centre. The neck has a diameter of 60 mm and a visible height of 20 mm as seen in Figures 11-A and 11-B. The neck of the cylinder is the part that would normally connect the valve to the cylinder. In these photographs, the top part of the valve is visibly missing.

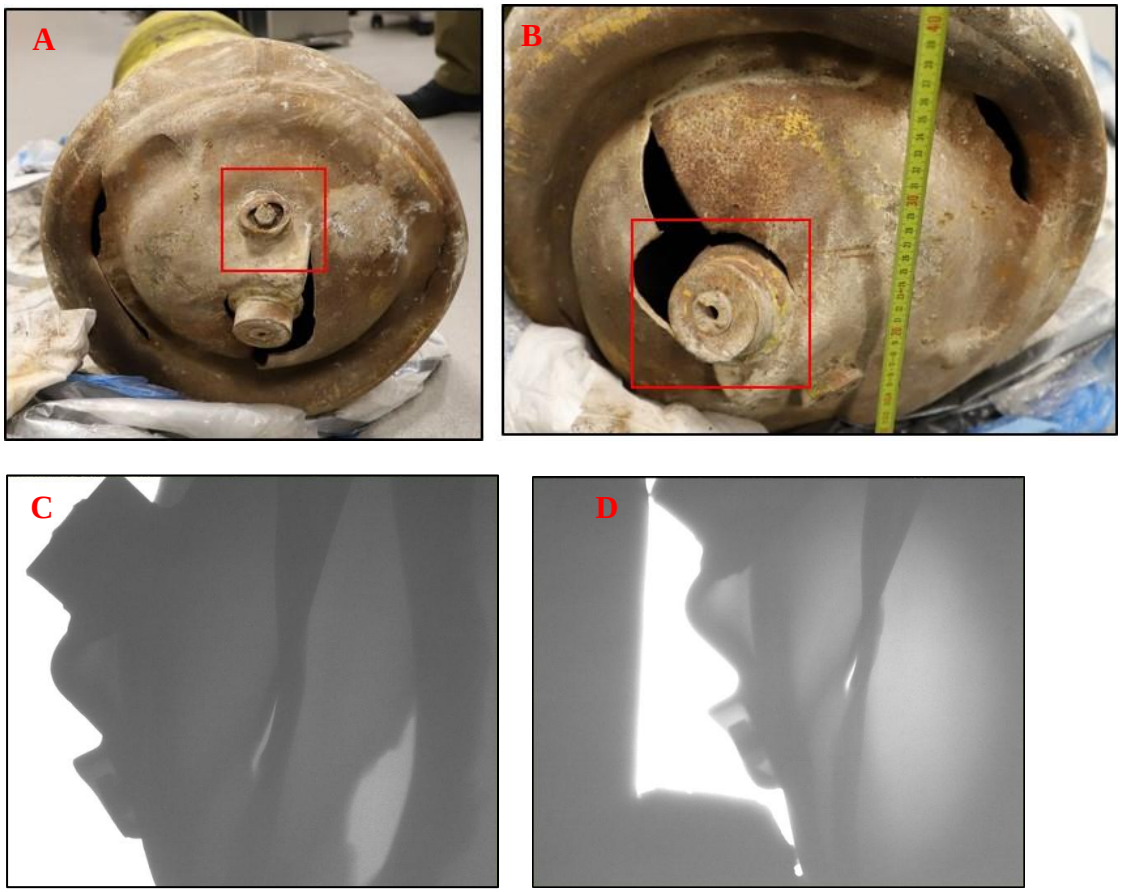
FIGURE 11: CYLINDER ALLEGEDLY USED IN KAFR ZEITA



7.54 Figure 11-C shows another opening to the side, partially damaged. This part is the top of the valve with a thickness of 6 mm and a 40-mm diameter (Figures 11-C and 11-D), and a hexagonal screw in the middle.

7.55 The FFM performed a non-destructive evaluation of the cylinder. The X-ray photos of the cylindrical piece on the neck with a hexagonal screw can be seen in Figures 12-C and 12-D.

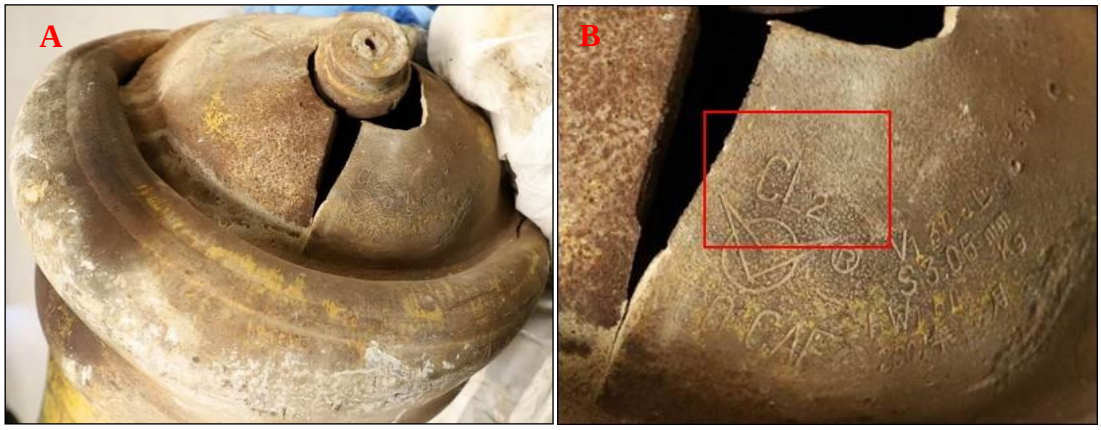
FIGURE 12: THE TOP OF THE CYLINDER



7.56 At the top of the cylinder in Figure 13-B, different markings are engraved, one of which reads "CL_2". Details on the markings on the cylinder are presented in Annex 7.

7.57 Based on the dimensions and the industrial standards of the cylinder, the maximum filling capacity is 160 kilogrammes of liquefied chlorine (see Annex 7). While vaporising to gas, 160 kilogrammes of liquefied chlorine would expand to approximately 50 cubic metres.

FIGURE 13: MARKINGS ON THE CYLINDER



Site of impact and remnants

7.58 According to witness accounts, the cylinder made impact next to two ventilation openings on the top of a cave serving as the aforementioned command post, approximately 300 metres from the Al Maghara Hospital. It then came to rest close to one of the cave entrances. For reporting purposes, this location is referred to as Location 1.

7.59 Witnesses also spoke of a small circular crater at the impact point, approximately one metre wide and 0.5 metres deep, with dark discoloration around the crater.

7.60 Additionally, witnesses described a yellow cylinder measuring approximately 1.5 metres in length, as seen at the site.

7.61 Witnesses reported that the cylinder was the source of a pungent smell, similar to commercial cleaning products, but stronger. The odour was still present one day after the incident at a distance of approximately two metres from the cylinder, albeit milder than the previous night.

FIGURE 14: THE CRATER

7.62 The photograph above (Figure 14) shows the point of impact and the crater generated by the impact of the cylinder. The impact point is located on a valley flank above the cave structure.

FIGURE 15: LOCATION OF THE CYLINDER AT THE TIME OF COLLECTION

7.63 Figure 15 shows the location where the cylinder was found and collected on 2 October 2016 in the valley flank, below the level of the crater. This date can be corroborated by the metadata of the pictures.

7.64 In the photographs in Figure 15, one can clearly see that the ground at Location 1 is dry and composed of soil and rocks. The vegetation observed at Location 1 is dry and sparse.

FIGURE 16: CLOSE-UP OF THE TOP OF THE CYLINDER

7.65 At the moment the cylinder was collected on 2 October 2016, dark discoloration and corrosion in the ruptured area were visible, in addition to white abrasion marks (Figures 16-A and 16-B).

FIGURE 17: METAL REMNANTS

7.66 In the red frame of Figure 17-A, a metallic structure is visible. Figure 17-B is a close-up of the metallic structure comparable to harnesses previously observed in other alleged incidents.[55]

7.67 During its analysis of the photographs, the FFM observed various remnants pertaining to the operations that took place around that location; in Figure 18, photographs A and B show a cartridge, and photographs C and D show an improvised stand.

55 As described in Figure A.7.5 of the Note by the Secretariat S/1731/2019 (dated 1 March 2019).

FIGURE 18: EVIDENCE OF WARFARE ACTIVITIES AT LOCATION 1

Physical and chemical analyses

7.68 A wipe sample was taken from the cylinder obtained by the FFM. Following OPCW standard operating procedures, splits of the sample were sent to OPCW designated laboratories for analysis.

7.69 The OPCW designated laboratories performed chemical analyses of the sample for organic and inorganic chemical identification.

7.70 The results of the analysis of organic compounds performed on the sample show an absence of scheduled compounds and explosives.

7.71 The results of the inorganic analysis did not show levels of concentration outside expected ranges for this type of cylinder, nor did it indicate the use of explosives.

7.72 Based on both organic and inorganic analyses, the FFM has concluded that it is unlikely that the cylinder was exposed to explosives.

7.73 In order to obtain more information about the damage observed on the cylinder, the FFM requested a study of the cylinder.

7.74 The two samples taken for tensile testing[56] were machined from cuts taken from the cylinder as shown in Figure 19.

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56 Tensile testing is done by applying controlled tension to a sample until that sample breaks or otherwise fails.

FIGURE 19: CUTS TAKEN FROM THE CYLINDER

7.75 The average elongation at break obtained from the tensile tests was situated at approximately 35%. Data obtained through mechanical tests was used in a digital study of the plastic deformation of the cylinder when exposed to external forces. The results of the study can be found in Annex 8.

7.76 Experts conducted digital simulations in order to identify the mechanical forces and circumstances that could have caused the deformation visible on the cylinder and the crater. The study showed that, under specific conditions, the deformation obtained through digital simulation on the cylinder—considering its physical properties and the nature of the ground at the site of impact—is consistent with the deformation observed on the actual cylinder and the shape of the crater.

Epidemiology and toxicology

Number of casualties and severity of the cases

7.77 The recollections of rescuers who responded to the site of the incident location vary in terms of the number of casualties they encountered, but generally agree that 15 to 25 casualties were complaining of "suffocation" or dyspnoea (difficulty breathing). As not every responder would see each patient in such a large and chaotic scene after dusk, this variation in recollection is unavoidable.

7.78 The recollections of physicians and hospital staff also vary in terms of the number and gender of casualties and acuity distribution, but generally agree that the number was between 20 and 25.

7.79 Hospital records from Dr Hasan Alaraj (Al Maghara) show 23 casualties admitted on 1 October 2016, all from this incident and listed as "Chlorine Gas Casualties". Of these, one is listed as female, 16 as male, two as children, and four are listed as male, but the gender could not be confirmed by the FFM (Figure 20). The hospital administrator at Al Maghara Hospital stated that the admission of 23 casualties was documented. Many of these cases were described as mild; the patients received nebulizer therapy and were released immediately without any documentation. Information obtained by the FFM suggests that several casualties went to a separate medical point and were not documented on Al Maghara Hospital records.

7.80 Of the 23 admitted casualties, there were approximately ten mild cases, five moderate, and five to eight severe cases reported. Some estimates placed severe casualties at three to four, with the rest noted as mostly moderate (Figure 21).

7.81 In addition to the 23 primary casualties transported from the site of the incident, four of the rescuers interviewed were primary casualties at the site of the incident. The rescuers who responded to the incident had different levels of protection, and the protection they did have was not adequate.

7.82 Secondary casualties were reported as well and included three physicians and one nurse at Al Maghara Hospital.

FIGURE 20: CASUALTY DISTRIBUTION

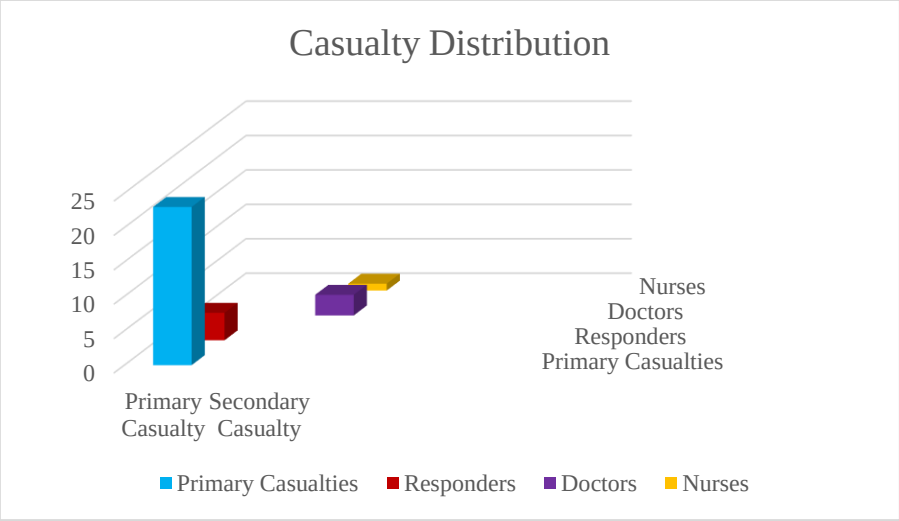
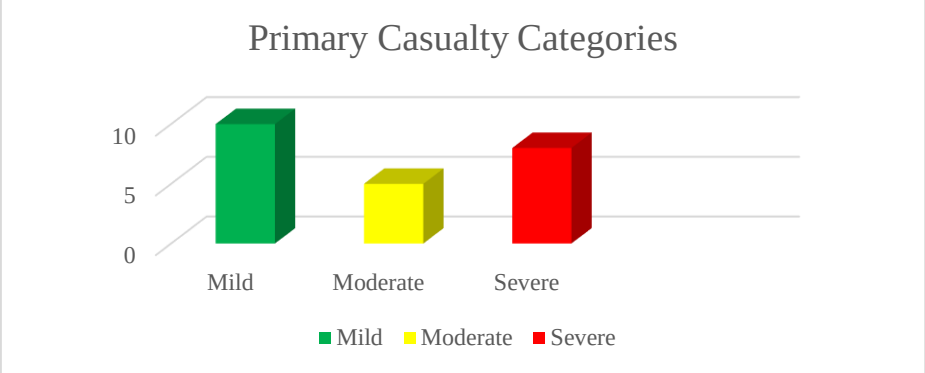


FIGURE 21: PRIMARY CASUALTY CATEGORIES



Signs, symptoms, and classification

7.83 Upon arrival at the site of the incident, responders reported a strong smell of chlorine and experienced "choking", dyspnoea, coughing, conjunctivitis (redness of the eyes), lacrimation (tearing), a burning sensation on the face, and nausea. At that point, responders donned respiratory protection. Responders recalled encountering approximately 20 to 25 persons that required rescue. Some casualties were described as vomiting, others as fainting and gasping for air. Other symptoms described were "foaming at the mouth" (secretions), and conjunctivitis.

7.84 Casualties were taken to Al Maghara Hospital and Kafr Zeita Medical Point via SCD rescue vehicles. No improvement was noted in the condition of casualties during transportation. Some casualties also arrived on foot. Several casualties who were reported to have been further from the point of impact or indoors were conscious, while those who were reported to be closer to the point of impact were unconscious.

7.85 Casualties were initially transported from the site of the incident to Al Maghara Hospital and then transferred to Kafr Zeita Specialised Hospital, with the exception of one patient, who was transferred to Ma'arat al Numan Central Hospital.

7.86 Physicians reported that casualties arrived at the hospital in poor condition, presenting with dyspnoea "as if they were dying," agonal respirations, rashes and erythema (redness of the skin), and conjunctivitis. Auscultation of the chest revealed "wheezing and crackles". Chest X-rays were initially described as abnormal, showing airways with "white lines" in a presentation similar to asthma. Airway inflammation was also indicated by coughing and a change in voice. After approximately 72 hours, chest X-rays were still described as abnormal. The physicians' diagnosis of the casualties was "chemical pneumobronchitis".

7.87 Physicians triaged and categorised casualties as mild, moderate, or severe according to their signs and symptoms. The following criteria were used:

(a) MILD (10): conjunctivitis, rhinorrhoea (runny nose), increased mucus production, mild coughing;

(b) MODERATE (5): dyspnoea without wheezing or dryness of throat, mild erythema, agitation, oxygen saturation above 90%; and

(c) SEVERE (5 – 8): increased or severe dyspnoea, severe cough, mucous membrane irritation, vomiting, hypotension, severe erythema, severe conjunctivitis, lacrimation, increased mucus production and rhinorrhoea, cyanosis (blue coloured skin), extreme agitation, abnormal breathing sounds, and oxygen saturation below 85%.

7.88 The details of symptoms experienced by the various categories of casualties—mild (10), moderate (5), and severe (5 – 8)—are shown in Table 3.

TABLE 1: SYMPTOMS AND CLASSIFICATION

SYMPTOMS	MILD (10)	MODERATE (5)	SEVERE (5-8)
Red eyes	X	X	
Oxygen saturation >90%	X	X	
Mild coughing	X	X	
Mild rash		X	
Agitation		X	
Rhinorrhoea		X	X
Difficulty breathing		X	X
Severe rash			X
Cyanosis			X
Abnormal breath sounds			X
Lacrimation			X
Extremely red eyes			X
Extreme agitation			X
Oxygen saturation <85%			X

7.89 Frothing from the mouth was noted in a single casualty, who was later transferred to Ma'arat al Numan Central Hospital and then to Bab Al Hawa Hospital. The secretion was described as saliva, without any other colour.

7.90 No signs of traumatic injury were noted by either first responders or hospital staff.

Treatment

7.91 Upon arrival at the hospital, all casualties were disrobed and decontaminated with water. When clothes were removed, some casualties had an obvious and strong chlorine smell. The intensity of the smell varied from one casualty to another.

7.92 After initial decontamination, all casualties were treated with a nebulizer, bronchodilators,[57] oxygen, and cortisone (described as first line of treatment for suspected chlorine exposure as per hospital protocol) before triage. Antihistamines were administered for rash, antipyretics in cases of fever, and antibiotics to prevent infection of irritated tissue.

[57] Bronchodilators are medications that open (dilate) the airways (bronchi and bronchioles) by relaxing bronchial muscles and allowing better and easier respiration.

7.93 Details of the treatments administered to the various categories of casualties—mild (10), moderate (5), and severe (5 – 8)—are shown in Table 4.

TABLE 4: TREATMENTS PROVIDED BY CATEGORIES OF CASUALTIES

TREATMENT	MILD (10)	MODERATE (5)	SEVERE (5-8)
Wash	X	X	X
Nebulizer	X	X	X
Chest X-ray	X	X	X
Oxygen cannula	X	X	X
Cortisone + Salbutamol[58]		X	X
Antihistamine		X	X
Antipyretics		X	X
Benzodiazepines		X	X
IV		X	X
ICU			X

7.94 Mild casualties received inhaled corticosteroids and oxygen. They generally improved and were released within one to four hours.

7.95 Moderate casualties received inhaled corticosteroids[59] and oxygen, bronchodilators mixed with cortisone via nebulizer, antihistamine treatment for rash, and benzodiazepines[60] for agitation. Some moderate cases required placement of oropharyngeal airways, an airway adjunct used to maintain an open airway by preventing the tongue from blocking the back of the throat. They were kept at least two to four hours in the emergency room and were discharged on the same day.

7.96 Severe casualties received cortisone and oxygen, bronchodilators mixed with cortisone via nebulizer, antihistamines for rashes, and benzodiazepines for agitation. Additionally, patients in the 'severe' category were monitored in the intensive care unit (ICU) an additional 24 hours. An unspecified number of patients were intubated and placed on ventilators. Severe cases stayed in the ICU for up to three days.

7.97 Most cases improved within one hour. After that time, approximately five individuals were still suffering from severe symptoms and were admitted to the ICU (two improved within two hours and were discharged).

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58 Salbutamol is a β2 agonist used to treat shortness of breath caused by constriction of smooth airway muscle. Beta 2 selective agonists improve gas exchange in the lungs by directly acting on the smooth muscle receptors responsible for dilation of the airways.

59 Corticosteroids relieve bronchospasm and reduce mucus production in the lungs.

60 Benzodiazepines are a class of psychoactive drugs prescribed as depressants or sedatives to treat conditions such as anxiety, agitation, insomnia, and seizures.

7.98 Medical personnel took blood samples from approximately 17 casualties, and chest X-ray imaging was performed for an undetermined number.

7.99 The next day, X-ray chest imaging was performed and oxygen saturations were monitored. Two casualties continued to improve and were later discharged.

7.100 A third casualty, reported to be the last rescued from the site of the incident, remained in critical condition. The treating physician described fluids in the lungs, or pulmonary oedema, represented by high density in the chest X-ray images. The casualty was transferred to Ma'arat al Numan Central Hospital with low oxygen saturation, and was reportedly later transferred to Bab Al Hawa Hospital for more advanced care due to persistent low oxygen saturation.

7.101 The following day, two casualties returned to the hospital complaining of shortness of breath and were subsequently treated and released.

7.102 The majority of administered treatment was oxygen, which provided relief to casualties within minutes. Oxygen relieves hypoxia in exposed patients and calms those who are in a state of panic.

Discharge time

7.103 All casualties were eventually discharged. Hospital admission durations varied between the different categories of casualties. Mild casualties stayed between one and four hours, and then were discharged. Moderate casualties had a non-specific admission duration. Severe casualties were admitted to the ICU and stayed 24 to 72 hours.

7.104 Casualties with previous respiratory histories or a more acute presentation, and those suspected of having been exposed for a longer duration or reported to have been in closer proximity to the point of impact, were discharged after up to 72 hours and were advised to continue treatment at home.

7.105 The moderate and severe casualties were reported presenting with respiratory complications such as bronchitis three months later, and returned to the hospital for follow-up treatment during that time period.

Analysis of digital files collected by the FFM

7.106 The FFM obtained video and still photography files relevant to the alleged incident from various witnesses.

7.107 The FFM analysed the videos and photographs to ascertain their authenticity and assess their validity as corroborative information. The analysis involved, inter alia, metadata, geolocation, witness accounts, and the signs and symptoms of possible chemical exposure in photos, videos, and witness statements.

7.108 The team collected a total of 122 photographs with metadata. The metadata of 65 of these photographs indicated a date and a location consistent with witness accounts.

7.109 The remaining 57 photographs included repetitions and inaccurate times and dates, but had content that could be corroborated by other photographs with accurate metadata. Additionally, the content of the photographs corroborated witness accounts, which was also consistent with geolocation of the images.

7.110 The team received two videos with metadata consistent with witness accounts and five videos without metadata, but that corroborated witness accounts.

8. CONCLUSIONS

8.1 The conclusions drawn by the FFM are the result of the combination, consistency, and corroboration of evidence gathered as a whole throughout the mission and are not based on isolated evidentiary elements. This report sets out the findings of the FFM's work in the period between October 2016 and October 2021 concerning the incident in Kafr Zeita, the Syrian Arab Republic, on 1 October 2016.

8.2 On 1 October 2016, an incident involving two industrial chlorine cylinders took place near Al Maghara Hospital in the valley of Wadi al Aanz in an agricultural land in Kafr Zeita in the Governorate of Hama in the Syrian Arab Republic. Approximately 20 to 30 persons suffered from suffocation and breathing difficulties. Armed groups were positioned in the valley in three caves close to Al Maghara Hospital, one of which served as the command post for one of the armed groups present in the area.

8.3 The FFM obtained information regarding the incident that took place in Kafr Zeita on 1 October 2016, through the following:

(a) exchanging notes verbales with the Syrian Arab Republic;

(b) meeting with the Syrian Technical Team of the National Authority of the Syrian Arab Republic;

(c) conducting and analysing interviews with medical staff, casualties, first responders, and witnesses of the alleged chemical incident in Kafr Zeita;

(d) reviewing and analysing photographs, videos, records, and files gathered by the FFM;

(e) reviewing the report of the mechanical study and digital simulations conducted by qualified experts on the deformation of the cylinder;

(f) having OPCW designated laboratories conduct analyses of the sample taken from the cylinder; and

(g) reviewing open-source material.

8.4 Regarding the incident of Kafr Zeita on 1 October 2016, the conclusion of the FFM on the use of a toxic chemical as a weapon is based on information provided by the Syrian Arab Republic, the analyses of interviews, supporting materials, hospital records received during the interview process, physical and chemical sample analysis performed on the cylinder, the mechanical study and digital simulations of the damage observed on the cylinder, and subsequent cross-reference and corroboration of all evidence.

8.5 Through the exchange of notes verbales and meetings with the Syrian Technical Team in the National Authority of the Syrian Arab Republic (see section 6), the FFM received additional information regarding the incident.

8.6 The cylinder collected from the site of the incident is an industrial chlorine cylinder. Based on still and video photography and the metadata of the media files, the FFM was able to confirm the geolocation of the cylinder in its custody. Further on, the FFM was able to confirm that the cylinder was indeed retrieved from the site of the incident on 2 October 2016.

8.7 Through the chemical analysis performed on the wipe sample taken from the cylinder, the FFM confirmed the absence of explosive traces on the cylinder. Moreover, given the shape of the top of the cylinder and the properties of the material it is made of, the damage observed in the top part of the cylinder is not likely to be from the result of a blast wave.

8.8 Considering all the damages sustained by the cylinder, and taking into account the chemical and physical analyses of samples taken from the cylinder, the FFM concludes that the damage observed on the cylinder resulted from a mechanical force exerted on the top part of the cylinder. Such force could be generated by an impact at the top of the cylinder.

8.9 The FFM requested a mechanical study and digital simulations of the damage observed on the cylinder from independent experts in mechanical engineering, ballistics, and metallurgy to obtain further accurate information on the possible causes of the observed damage. In addition, the study included an examination of whether there is a link between the damage on the cylinder and the crater observed at the point of impact.

8.10 Experts conducted digital simulations in order to identify the mechanical forces and circumstances that could have caused the deformation visible on the cylinder and the crater. The study showed that under specific conditions, the deformation obtained through digital simulation on the cylinder, considering its physical properties and the nature of the ground at the impact location, is consistent with the deformation observed on the actual cylinder and the shape of the crater.

8.11 Based on witness accounts and supporting material submitted during the interview process, the FFM was able to geolocate witnesses. At the time of the incident, one witness was at an approximate distance of 30 kilometres, nine others were at approximately two to three kilometres away, four were located approximately one kilometre away, and 11 were at the site of the incident.

8.12 Among the 25 individuals interviewed by the FFM, 20 were directly related to the incident scene by being physically present or participating in rescue operations or medical treatment. The remaining five witnesses were in the proximity, but not present at the site of the incident, nor did they participate in rescue operations or the administration of medical treatment.

8.13 Consistent testimonies provided by medical staff, casualties, and witnesses, and the acute onset of similar signs and symptoms in a large number of people in the same time frame and location are suggestive of a toxidrome characteristic of exposure to an irritant substance affecting the respiratory system and mucous membranes.

8.14 Witnesses and first responders, present at the site of the incident provided a description of the dispersed irritant substance. Its appearance and its physical state, as well as the colour and the odour they described, are consistent with chlorine.

8.15 Regarding the alleged use of toxic chemicals as a weapon on 1 October 2016 in Kafr Zeita, the Syrian Arab Republic, all information obtained and analysed by the FFM provide reasonable grounds to believe that the chlorine cylinder was used as a weapon. The cylinder ruptured as a result of mechanical force and released a toxic irritant substance that affects the respiratory system and mucous membranes.

8.16 According to operating paragraphs 10 and 12 of the decision of the Conference of the States Parties entitled "Addressing the Threat from Chemical Weapons Use" (C-SS-4/DEC.3, dated 27 June 2018), "[t]he Secretariat shall preserve and provide information to the investigation mechanism established by the United Nations General Assembly in resolution 71/248 (2016), as well as to any relevant investigatory entities established under the auspices of the United Nations".

Annexes (English only):

Annex 1: Reference Documentation

Annex 2: Open Sources

Annex 3: Mission Timeline

Annex 4: Information Collected by the FFM

Annex 5: Documents Received from the Syrian Arab Republic

Annex 6: Comparison of the Photographs of the Cylinder Taken by the FFM with Photos and Videos Received by the FFM and Taken at the Incident Location

Annex 7: Markings on the Cylinder

Annex 8: Mechanical Study and Digital Simulations of the Damage Observed on the Cylinder

Annex 1

REFERENCE DOCUMENTATION

	Document Reference[61]	Full Title of Document
1	QDOC/INS/SOP/IAU01	Standard Operating Procedure for Evidence Collection, Documentation, Chain-of-Custody and Preservation During an Investigation of Alleged Use of Chemical Weapons
2	QDOC/INS/WI/IAU05	Work Instruction for Conducting Interviews During an Investigation of Alleged Use
3	QDOC/INS/SOP/IAU02	Standard Operating Procedure Investigation of Alleged Use (IAU) Operations
4	QDOC/INS/SOP/GG011	Standard Operating Procedure for Managing Inspection Laptops and Other Confidentiality Support Materials
5	QDOC/LAB/SOP/OSA2	Standard Operating Procedure for Off-Site Analysis of Authentic Samples
6	QDOC/LAB/WI/CS01	Work Instruction for Handling of Authentic Samples from Inspection Sites and Packing Off-Site Samples at the OPCW Laboratory
7	QDOC/LAB/WI/OSA3	Work Instruction for Chain of Custody and Documentation for OPCW Samples On-Site
8	QDOC/LAB/WI/OSA4	Work Instruction for Packing of Off-Site Samples
9	GB 5100-1994	Chinese Standard Welded Steel Gas Cylinders
10	ISO 4706:1989	Refillable Welded Steel Gas Cylinders
11	GB 5100-2011	Chinese Standard Welded Steel Gas Cylinders

[61] The OPCW QDOCs referred to in the present report are the most recent versions.

Annex 2

OPEN SOURCES[62]

Open-Source Internet Links Related to the Incident in Kafr Zeita on 1 October 2016
1. Online article regarding an alleged chemical attack: http://reliefweb.int/sites/reliefweb.int/files/resources/Syrian_regime_used_chemical_weapons_again_in_Hama_en.pdf.
2. http://syria.liveuamap.com/en/2016/1-october-syaf-helicopters-drop-chlorine-gas-barrel-bombs.
3. Tweet of alleged attack: https://twitter.com/reportedly/status/760233110835335169.
4. Online article regarding an alleged chemical attack: http://www.syriahr.com/en/?p=51675.
5. Tweet with video of the alleged attack: https://twitter.com/DannyNis/status/782287202650820608.
6. Video from hospital: https://www.youtube.com/watch?v=e85s0DXYGVs.
7. Video from hospital: https://www.youtube.com/watch?v=xRG1qHuFNqI.
8. Video from hospital: https://www.youtube.com/watch?v=Kbs0bNNVEnw.
9. FB article: https://www.facebook.com/RadioFreeSyria/posts/1144647355620470.
10. Video from hospital: https://www.youtube.com/watch?v=_0L-nlkvQe0.
11. Video from hospital: https://www.youtube.com/watch?v=-5k4vsBDfd0.
12. Tweet: https://twitter.com/JulianRoepcke/status/782541734073040896.
13. Tweet: https://twitter.com/DannyNis/status/782269835346636801.
14. Tweet: https://twitter.com/baladinetwork/status/782286379116101636.
15. Tweet: https://twitter.com/SyriaCivilDef/status/782586004322586624.
16. Online article regarding alleged chemical attack: http://baladi-news.com/en/news/details/10929/Dozens_of_cases_of_suffocation_with_Toxic_gas_in_Hama.
17. Video on Facebook: https://m.facebook.com/story.php?story_fbid=1086000994782484&id=593027507413171.
18. Online article: https://www.bellingcat.com/news/mena/2016/10/13/examining-chlorine-attack-kafarzita-hama-october-1st-2016/.

[62] Links were available in October 2016.

Annex 3

MISSION TIMELINE

Date	Activities
2 October 2016	Reports of an alleged chemical attack in Kafr Zeita, the Syrian Arab Republic. The team begins the collection of open-source material to assess the credibility of the allegation.
3–4 October 2016	First interviews conducted remotely to gather further information on the incident, in addition to the information found on the open sources.
20 February 2017	Note verbale with additional information regarding the incident received from the Syrian Arab Republic
3 March 2017	Note verbale from OPCW Technical Secretariat
7 March 2017	Note verbale with additional information regarding the incident received from the Syrian Arab Republic
12 April 2017	Cylinder obtained by the FFM
20–22 April 2017	Five physical interviews conducted
28 August 2017	Note verbale with additional information regarding the incident received from the Syrian Arab Republic
6 October 2017	Note verbale with additional information received from the Syrian Arab Republic
12–13 February 2018	Two physical interviews conducted
4 – 6 March 2018	Seven physical interviews conducted
4 November 2019	One physical interview conducted
27 July 2020	Note verbale from OPCW Technical Secretariat
29 September 2020	Note verbale with additional information received from the Syrian Arab Republic
23 December 2020	Note verbale from OPCW Technical Secretariat
26 January 2021	One physical interview conducted
19 February 2021	Note verbale from OPCW Technical Secretariat
25 February 2021	Note verbale received from the Syrian Arab Republic
5 March 2021	Note verbale from OPCW Technical Secretariat
8 March 2021	Note verbale received from the Syrian Arab Republic
11 March 2021	Note verbale from OPCW Technical Secretariat

Date	Activities
22 March 2021	Note verbale received from the Syrian Arab Republic
4 – 5 April 2021	Five physical interviews conducted
18 June 2021	Additional corroborative information received
1 July 2021	Beginning of the report drafting
9 July 2021	Note verbale from OPCW Technical Secretariat
28 July 2021	Two notes verbales received from the Syrian Arab Republic
30 July 2021	Note verbale from OPCW Technical Secretariat
3 August 2021	Information requested by the Syrian Arab Republic provided via command post in Damascus
16 August 2021	Note verbale received from the Syrian Arab Republic
27 August 2021	Note verbale from OPCW Technical Secretariat
16 September 2021	Note verbale received from the Syrian Arab Republic
7–8 October 2021	Six physical interviews conducted
13 October 2021	Note verbale from OPCW Technical Secretariat
2 November 2021	Note verbale received from the Syrian Arab Republic
9 December 2021	Note verbale from OPCW Technical Secretariat

Annex 4

INFORMATION COLLECTED BY THE FFM

The tables below summarise the list of physical evidence collected from various sources by the FFM. It is split into electronic evidence stored in electronic media storage devices such as USB evidence, and samples. Electronic files include audio-visual captions, still images, and documents and records.

TABLE A4.1: ELECTRONIC DATA COLLECTED BY THE FACT-FINDING MISSION

Entry Number	Assigned Code		
1	1083		
File names			
1.jpg	٢٠١٦١٠٠١_٢١٥٣٣٤.jpg	img-20161001-wa0162	img_0755.jpg
2.jpg	٢٠١٦١٠٠١_٢١٥٣٤٣.jpg	img-20161001-wa0163	img_0756.jpg
3.jpg	img_0820.jpg	mvi_2359.mov	img_0757.jpg
4.jpg	img_0827.jpg	mvi_2364.mov	img_0758.jpg
5.jpg	img_2345.jpg	img_0741.jpg	img_0759.jpg
6.jpg	img_2346.jpg	img_0742.jpg	
7.jpg	img_2347.jpg	img_0743.jpg	
٢٠١٦١٠٠١_٢٠٢٣٠٩.jpg	img_2348.jpg	img_0744.jpg	
٢٠١٦١٠٠١_٢٠٢٣١٧.jpg	img_2349.jpg	img_0745.jpg	
٢٠١٦١٠٠١_٢٠٢٣٢٩.jpg	img_2350.jpg	img_0746.jpg	
٢٠١٦١٠٠١_٢٠٢٣٣٦.jpg	img_2351.jpg	img_0747.jpg	
٢٠١٦١٠٠١_٢٠٢٤٠٠.jpg	img_2352.jpg	img_0748.jpg	
٢٠١٦١٠٠١_٢٠٢٥٥٢.jpg	img_2353.jpg	img_0749.jpg	
٢٠١٦١٠٠١_٢٠٢٥٥٨.jpg	img_2354.jpg	img_0750.jpg	
٢٠١٦١٠٠١_٢٠٢٦٢٦.jpg	img_2355.jpg	img_0751.jpg	
٢٠١٦١٠٠١_٢٠٢٧٢٠.jpg	img_2356.jpg	img_0752.jpg	
٢٠١٦١٠٠١_٢١٥٢٢٢.mp4	img_2357.jpg	img_0753.jpg	
٢٠١٦١٠٠١_٢١٥٣٢٥.jpg	img_2358.jpg	img_0754.jpg	

Entry Number	Assigned Code	
2	1507	
File names		
1.jpg	62fb834a-e823-48b8-a481-8c88c0dafb13.jpg	links to videos.docx
2.jpg	11646c80-ec71-4114-87bb-22b865cb3e5e.jpg	صادر عن مديرية صحة حماه حول ضربة الكيماوي بتاريخ1-10-2016.docx

3.jpg	85644a38-190b-470b-b32a-2eee70c9fbc9.jpg	كليشة.pptx
4.jpg	2682950f-c5c9-44e3-97ef-7da59a3f6aff.jpg	مصابين نتيجة أستهداف كفرزيتا بغاز الكلور.mp4
5.jpg	14502873_775234375913193_5144605649018276017_n.jpg	2016-10-1.pdf
6.jpg	d4ca195d-81b2-4ef9-bc10-173f11f28d0e.jpg	2016-10-1_ENG.docx
7.jpg	dce1b210-b9c5-4ffd-82a3-fafc19b77a28.jpg	WhatsApp Image 2019-11-04 at 3.10.39 PM (1).jpg
8.jpg	de212b95-3fc1-4ad5-97ef-dddee6744b36.jpg	WhatsApp Image 2019-11-04 at 3.10.39 PM (2).jpg
8da4582e-5a00-40b6-8729-97b3e727570f.jpg	e9128aa6-6ae7-4e2b-aec2-b319c61d0f33.jpg	WhatsApp Image 2019-11-04 at 3.10.39 PM.jpg
WhatsApp Image 2019-11-04 at 3.10.40 PM.jpg		

Entry Number	**Assigned Code**		
3	1760		
File names			
Facebook 2086016308090254.mp4	IMG_0196.jpg	IMG_0204.jpg	IMG_0212.jpg
IMG_0188.jpg	IMG_0197.jpg	IMG_0205.jpg	IMG_0213.jpg
IMG_0189.jpg	IMG_0198.jpg	IMG_0206.jpg	IMG-20180302-WA0060.jpg
IMG_0190.jpg	IMG_0199.jpg	IMG_0207.jpg	IMG-20180302-WA0061.jpg
IMG_0191.jpg	IMG_0200.jpg	IMG_0208.jpg	IMG-20180302-WA0062.jpg
IMG_0192.jpg	IMG_0201.jpg	IMG_0209.jpg	IMG-20180302-WA0063.jpg
IMG_0193.jpg	IMG_0202.jpg	IMG_0210.jpg	IMG-20180302-WA0064.jpg
IMG_0194.jpg	IMG_0203.jpg	IMG_0211.jpg	MVI_0195.mov

Entry Number	**Assigned Code**		
4	1947		
File names			
IMG-20210124-WA0090.jpg	IMG-20210124-WA0095.jpg	IMG-20210124-WA0100.jpg	IMG-20210124-WA0105.jpg
IMG-20210124-WA0091.jpg	IMG-20210124-WA0096.jpg	IMG-20210124-WA0101.jpg	IMG-20210124-WA0106.jpg

IMG-20210124-WA0092.jpg	IMG-20210124-WA0097.jpg	IMG-20210124-WA0102.jpg	IMG-20210124-WA0107.jpg
IMG-20210124-WA0093.jpg	IMG-20210124-WA0098.jpg	IMG-20210124-WA0103.jpg	قرير صادر عن مديرية صحة حماه حول ضربة الكيماوي بتاريخ 1-10-2016.docx
IMG-20210124-WA0094.jpg	IMG-20210124-WA0099.jpg	IMG-20210124-WA0104.jpg	
Entry Number	**Assigned Code**		
5	1071		
File names			
IMG-20211007-WA0003	IMG-20211007-WA0006	VID-20211007-WA0007	
Entry Number	**Assigned Code**		
6	1089		
File names			
WhatsApp Image 2021-10-07 at 14.33.11 (1)	WhatsApp Image 2021-10-07 at 14.33.12	WhatsApp Video 2021-10-07 at 14.33.11 (1)	

TABLE A4.2 HARD COPY OF DATA COLLECTED BY THE FACT-FINDING MISSION

Entry Number	Assigned Package Code	Evidence Reference Number	Description
1.	1352	20170421135203	Drawing
2.	1367	20170420136703	Drawing
3.	1725	20180214172504	Drawing
4.	1369	20170420136903	Drawing
5.	1407	20180212140703	Drawing
6.	1733	20180306173303	Drawing
7.	1071	20211007107103	Drawing

Annex 5

DOCUMENTS RECEIVED FROM THE SYRIAN ARAB REPUBLIC

1. On 20 February and 7 March 2017, the Syrian Arab Republic informed the Secretariat through **Notes Verbales No. 10 and No. 15** of potential witnesses regarding a number of allegations including the alleged incident in Kafr Zeita on 1 October 2016.

2. **Note Verbale No. 83, dated 28 August 2017,** from the Syrian Arab Republic to the Director-General of the OPCW replying to the Notes Verbales of the Secretariat NV/INS/OPB/208241/17, dated 2 February 2017, and NV/INS/208801/17, dated 3 March 2017.

3. **Note Verbale No. 96, dated 6 October 2017,** from the Syrian Arab Republic to the Director-General of the OPCW replying to the Notes Verbales of the Secretariat NV/INS/OPB/208241/17, dated 2 February 2017, and NV/INS/208801/17, dated 3 March 2017.

4. **Note Verbale No. 69, dated 29 September 2020**, from the Permanent Representation of the Syrian Arab Republic to the Secretariat regarding the information sent in 2017.

5. **Note Verbale No. 20, dated 25 February 2021**, from the Permanent Representation of the Syrian Arab Republic informing the Secretariat about the available witnesses and welcoming the FFM visit to Damascus in relation to the Kafr Zeita incident in 2016.

6. **Note Verbale No. 24, dated 8 March 2021**, from the Permanent Representation of the Syrian Arab Republic to the Secretariat replying to the Note Verbale of the Secretariat NV/ODG-39/21, dated 5 March 2021.

7. **Note Verbale No. 30, dated 22 March 2021**, from the Permanent Representation of the Syrian Arab Republic to the Secretariat regarding the issuance of visas to the members of the FFM with reference to the Note Verbale of the Technical Secretariat NV/ODG/SSS-32/21, dated 12 March 2021.

8. On **28 July 2021**, the Syrian Arab Republic sent **Notes Verbales No 72. and No. 74** as a reply to the Note Verbale of the Secretariat dated 9 July 2021 in relation to the incident and the cylinder.

9. On **16 August 2021**, the Syrian Arab Republic sent **Note Verbale No. 84** as a reply to Note Verbale of the Secretariat dated 9 July 2021, requesting that experts from the Syrian National Authority conduct an extensive technical examination of the cylinder.

10. On **16 September 2021**, the Syrian Arab Republic sent **Note Verbale No. 101** as a reply to the Note Verbale of the Secretariat dated 27 August 2021.

11. On **2 November 2021**, the Syrian Arab Republic sent **Note Verbale No. 158** as a reply to the Note Verbale of the Secretariat dated 14 October 2021.

Annex 6

COMPARISON OF THE PHOTOGRAPHS OF THE CYLINDER TAKEN BY THE FFM WITH PHOTOS AND VIDEOS RECEIVED BY THE FFM AND TAKEN AT THE INCIDENT LOCATION

The photographs below show a comparison of the photographic evidence received by the FFM taken on 2 October 2016 (left) at the site of the incident, and the cylinder examined by the FFM (right). The purpose of the comparison is to confirm that the cylinder visible in the photographs gathered as evidence is the same as the one in the custody of the FFM.

Photographs received by the FFM	Photographs taken by the FFM
	
	






Annex 7

MARKINGS ON THE CYLINDER

Industrial gas cylinders, or pressurised vessels for the storage and containment of gas, are intended for multiple uses. Thus, the FFM draws attention to the fact that the markings detailed in this Annex are only for the purposes of description and do not aim to indicate the origin or the content of the cylinder in the incident that is the subject of this report.

Markings visible in the top part of the cylinder:

- N0167572 (Item number)
- TP 45 bar (Tested pressure)
- WP 30 bar (Working pressure)
- W 90.0 Kg (Weight)
- CL_2 (Content)
- V 130 L (Volume)
- S3.05 mm (Could not be verified by the FFM)
- FW160 Kg (Chlorine capacity)
- 2001 年 (Manufacturing year)
- 4 月 (Manufacturing month)
- NORINCO CAF (Refers to China North Industries Corporation)

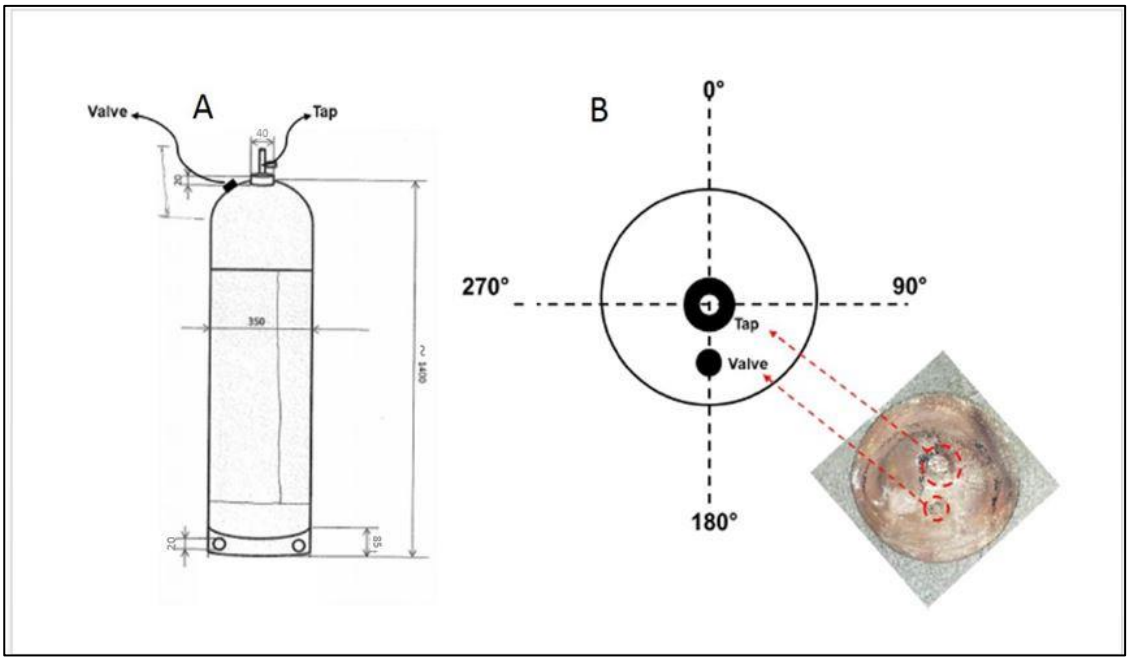
Annex 8

MECHANICAL STUDY AND DIGITAL SIMULATIONS OF THE DAMAGE OBSERVED ON THE CYLINDER

1. The FFM could not establish a link between the damage observed on the cylinder found in Kafr Zeita and the use of an explosive. The damage appears to be caused by a mechanical force. In order to obtain more accurate information on the causes of the damage, the FFM requested a mechanical study and digital simulations.

2. The dimensions, geometry, and material of the cylinder—which has a wall thickness of 6 mm—are documented and compatible with the commercially available standard GB5100 for welded steel gas cylinders, which is the Chinese standard compliant with ISO 4706:1989 standard.[63]

FIGURE A8.1: GEOMETRY OF THE STEEL CYLINDER: (A) LATERAL VIEW AND (B) TOP VIEW



3. The experts conducted digital simulations in order to identify the mechanical force and circumstances that could have caused the damage visible on the cylinder. Therefore, it was necessary to determine the mechanical properties of the steel from which the cylinder is made. The steel samples were cut from the cylinder as marked in Figure A8.2, and the properties of the steel were calculated in terms of yield and ultimate tensile stresses.

4. The simulations included the different cylinder parts in order to produce the most realistic configuration compared with the deformation visible on the cylinder.

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63 The technical contents of welded steel gas cylinders with water capacity not greater than 150L in this standard correspond to the international standard "Refillable Welded Steel Gas Cylinders" (ISO 4706:1989).

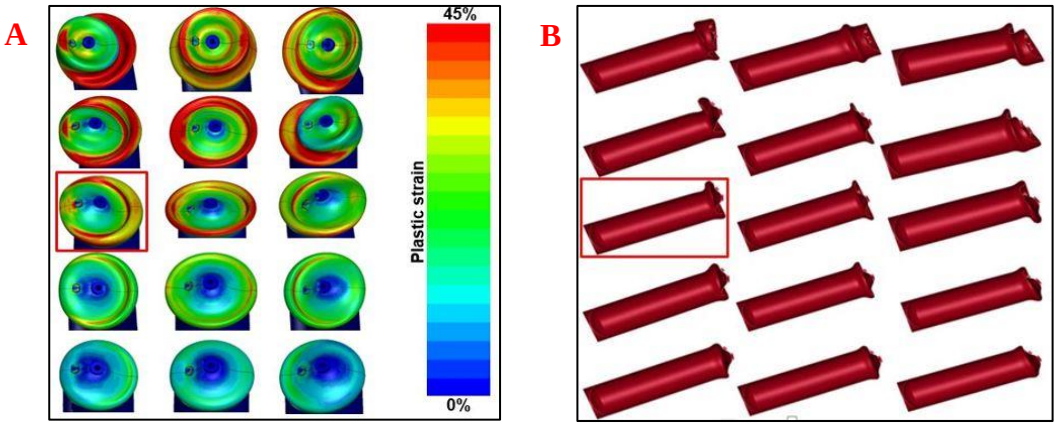
FIGURE A8.2: STEEL CUTS USED FOR THE TENSILE TEST

5. The results of the yield and tensile stresses calculations, together with production standards, were used to model the cylinder for the simulations. Based on that model, the study of the plastic deformation of a steel cylinder was done. This non-linear study is performed by a finite element analysis using specialised software based on explicit numerical methods widely used to analyse problems associated with large deformations, structural response to high velocity impact, and blast loads, taking into account strain and the high strain rate behaviour of the materials involved.

6. Due to the limited information on the location of the impact and the crater shown in Figure A8.4, the study was done both on rigid and deformable soil digital models.

7. The results of the different deformation simulations are shown in Figure A8.3. The results that are marked by a red frame are the closest to the condition of the cylinder examined. Photograph A is a top view of the cylinder, and photograph B is a side view.

FIGURE A8.3: RESULTS OF VARIOUS IMPACT CONFIGURATIONS



8. The study determined that the deformation observed as a result of the digital simulation on the cylinder and the soil, under specific conditions,[64] is consistent with the deformation observed on the actual cylinder and the shape of the crater.

9. Figure A8.4-A shows the crater generated as a result of the simulation. Photograph B shows the crater produced at the site of the incident.

FIGURE A8.4: THE CRATER AT THE ALLEGED IMPACT LOCATION (A) AND THE SIMULATED CRATER (B)

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64 The simulation conditions will be made available to any relevant investigative body, in accordance with C-SS-4/DEC.3.