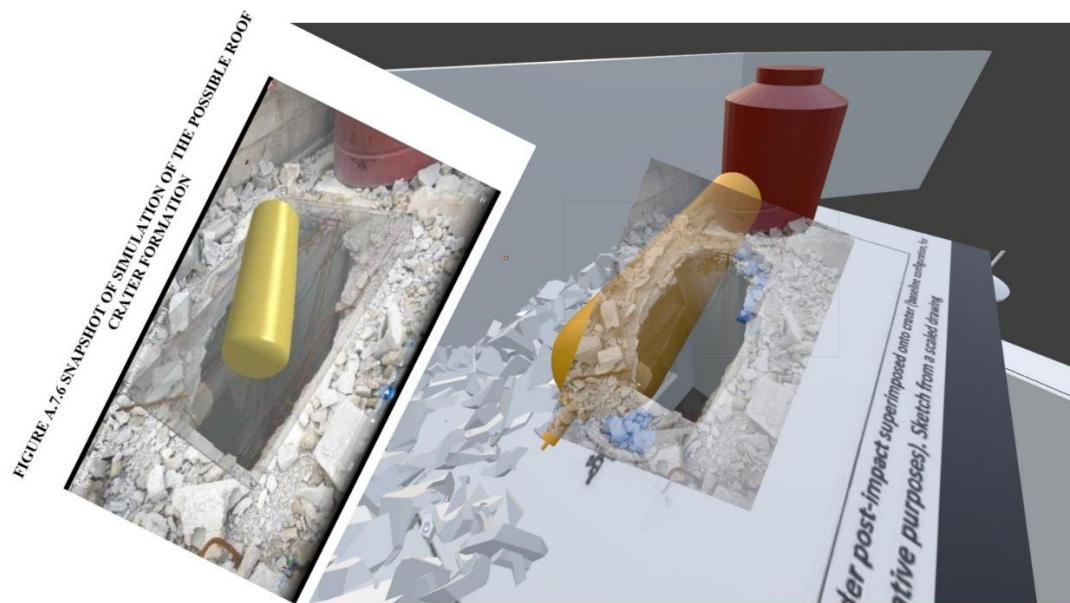


The Fall and Jump of the

Douma Bed Cylinder



An emblematic case study in 9 steps

by Michael Kobs

The alleged chlorine attack on Douma on April 7, 2018 has already caused endless discussions on every detail. The frustrating thing is not a vague possibility that this attack could have taken place, but that every single detail in the OPCW FFM and IIT reports turns out to be implausible at best, but usually outright manipulation or falsification. At the same time, these reports omit any detail that contradicts the predefined conclusion. To demonstrate this grievance, I want to concentrate here exclusively on "Location 4" – the cylinder that landed on the bed according to FFM/IIT.

According to FFM and IIT, this cylinder was dropped from a low altitude by a helicopter, smashed through the roof (33.572143°, 36.400921°) in a horizontal position, hit the floor below and then bounced through the room due to the residual energy until it finally came to rest on the bed, where it emitted gas for a month.

Each of these details is defended tooth and nail by self-proclaimed experts, even if each detail on its own carries only a tiny probability. In sum, however, it results in a chain of highly improbable events that multiply into an impossible case.

Let's go through it step by step:

Step 1: Fall from a low height

To explain the low penetration of the gas cylinder, a flight altitude of about 150m is assumed from a purely technical point of view. There is no proof of this. The altitude itself is not impossible, but it is very unusual for the Syrian war. As early as 2012, so-called rebels had captured air defense systems and began shooting down helicopters of the Syrian Air Force. Although there is no source for a direct order, numerous sources have documented that the Syrian Air Force, which had only 50 helicopters in 2012,¹ adapted to the situation and henceforth operated at altitudes above 3000m. As early as 2013, HRW rightly criticized the fact that barrel bombs from high-flying helicopters can only hit random targets.^{2 3 4}



In order to explain the low deformation and kinetic energy of the cylinders, a flight altitude of only 150m was assumed as a fact.

Step 2: Horizontal impact

The cylinder that landed on the bed was conspicuously deformed laterally. However, the lateral deformation after a helicopter drop can only be explained if the cylinder hit the roof horizontally. This is also highly unlikely, because this cylinder was found in a forged armour with large fins. It is easy to imagine the air resistance these fins generate when falling at 50m/s, and that consequently the cylinder quickly aligns vertically. As unlikely as a horizontal impact

¹ <https://www.washingtoninstitute.org/policy-analysis/responding-assads-use-airpower-syria>

² <https://www.hrw.org/report/2013/04/10/death-skies/deliberate-and-indiscriminate-air-strikes-civilians>

³ <https://chemicalweapons.gppi.net/analysis/assads-long-reach-syaaf-pt-2>

⁴ <https://www.bellingcat.com/news/mena/2016/06/09/9585/>

may seem, even from a height of only 150m (about 6 seconds fall time), it has become the inevitable working hypothesis of the FFM / IIT. But the problem continues.



As can be seen in the picture, this armour was bent with the fins around the rear end of the cylinder, while the fin was still reasonably upright. In the FFM scenario, the armour must therefore have already slipped before the (hypothetical impact). This is not impossible either, but it is still unlikely. What is impossible, however, is that the steel of the cylinder has been significantly flattened, while the sheet metal of the fin above it is only slightly bent. How should the force of the concrete act on the cylinder over a large area if a sheet of metal is upright in between? Physically, there is only one possible explanation: this armor was bent around the already flattened cylinder. The reports have no answer to this question. It was simply passed over by FFM/IIT so as not to jeopardize the preconceived conclusion.

However, there is another problem associated with the slipped armour. The valve protruded unprotected from the armour, while this cylinder was to cut horizontally through the reinforced concrete of the roof a microsecond later. The valve remained completely undamaged.



There have been a number of explanations, but they are just as fantastic. One theory claims that the cylinder hit the back side first and then rotated through the crater. In this theory, the cylinder with the fins fell forward, which is explained by wobbling during the fall. However, rotating through the concrete ceiling would also shear off the valve. Another theory claims that the concrete immediately broke over a large area, allowing the valve to rotate freely through the open hole or fall. However, this would mean that the crater would have to have at least the length of the cylinder of 1.4m plus the length of the valve. In addition, the rear end would have to be completely stopped by the roof, while the same roof at the front end would break so quickly and widely that the valve could rotate through unhindered. It also assumes that the chunks of the broken roof are accelerated fast enough to get out of the way in time.

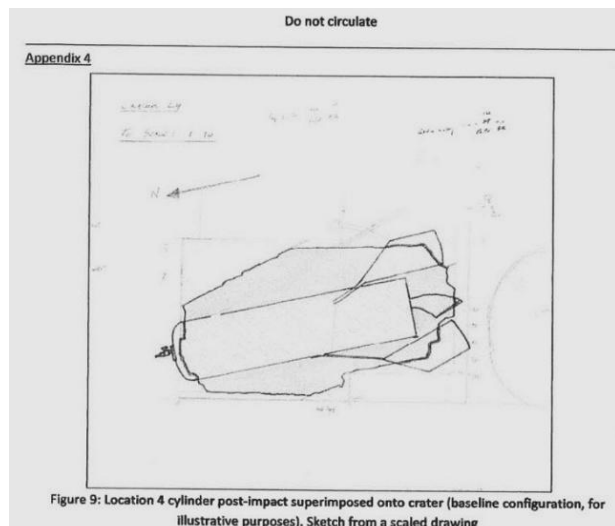
Step 3: The size of the crater

As can already be seen from the rotation theory, the actual size of the crater plays a significant role in assessing the plausibility of the entire process. The FFM report gives the size of the crater as 166 x 105 cm, presents an extremely distorted photo with a transparent cuboid that is supposed to represent this measurement. Above it floats a yellow cylinder without armour and valve.

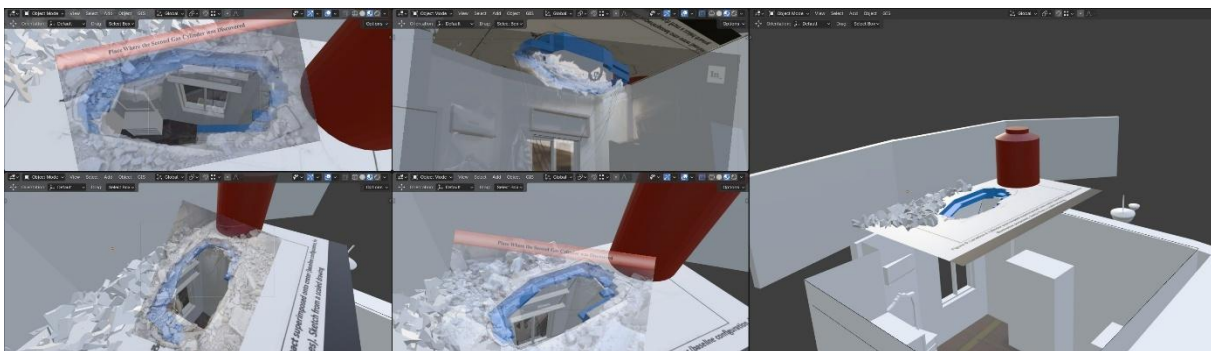
FIGURE A.7.6 SNAPSHOT OF SIMULATION OF THE POSSIBLE ROOF CRATER FORMATION



Considering the proximity of the water tank, the neighbouring buildings, and the surrounding wall adjacent to the hole in the roof, it was concluded that the cylinder impacted the roof as shown in Figure A.7.6. From the shape of the crater and damage on the cylinder, it is likely that the cylinder landed parallel to the ground creating a crater with dimensions of approximately 166 x 105 cm, which is in keeping with the dimensions of cylinder of 140 x 35 cm. It should be noted that the cylinder had an additional structure attached to the body, which is still in line with the dimensions of the crater. The damage observed on site by the FFM team and the possible trajectory of the cylinder based on observed damage and numerical calculations are represented in Figure A.7.7.

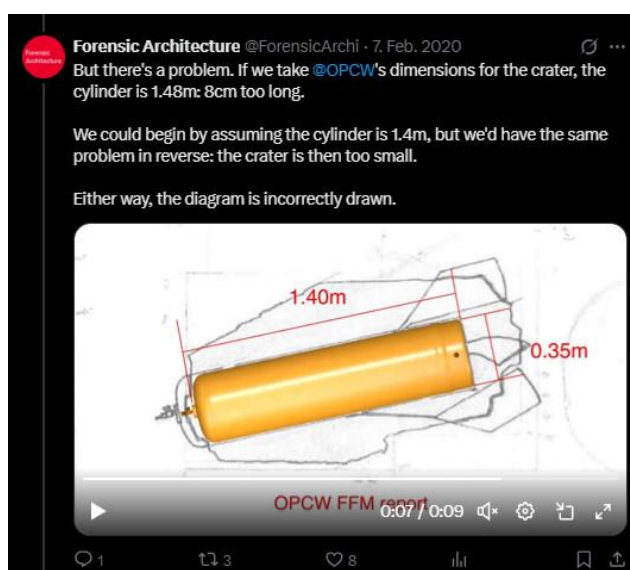
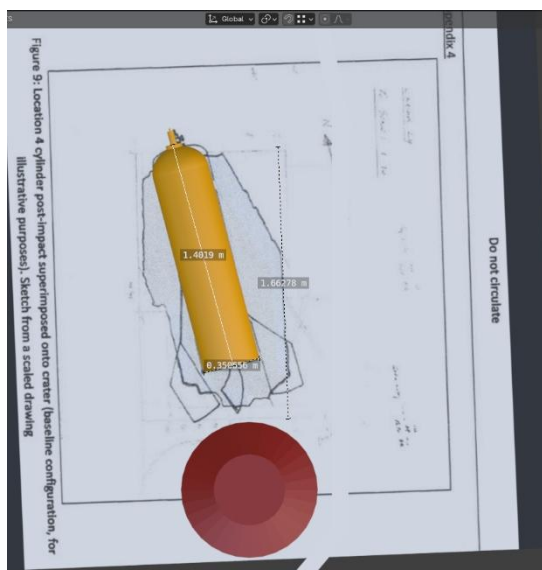


Presumably, these measurements come from the sketch of OPCW Inspector Ian Henderson, even if the ratio of 166:105 cannot be found in the sketch. In a scaled model, the sketch nevertheless proves to be accurate with regard to the upper edge of the crater, but neglecting deeper layers, some of which protrude quite far into the crater – i.e. reduce the actual breakthrough.



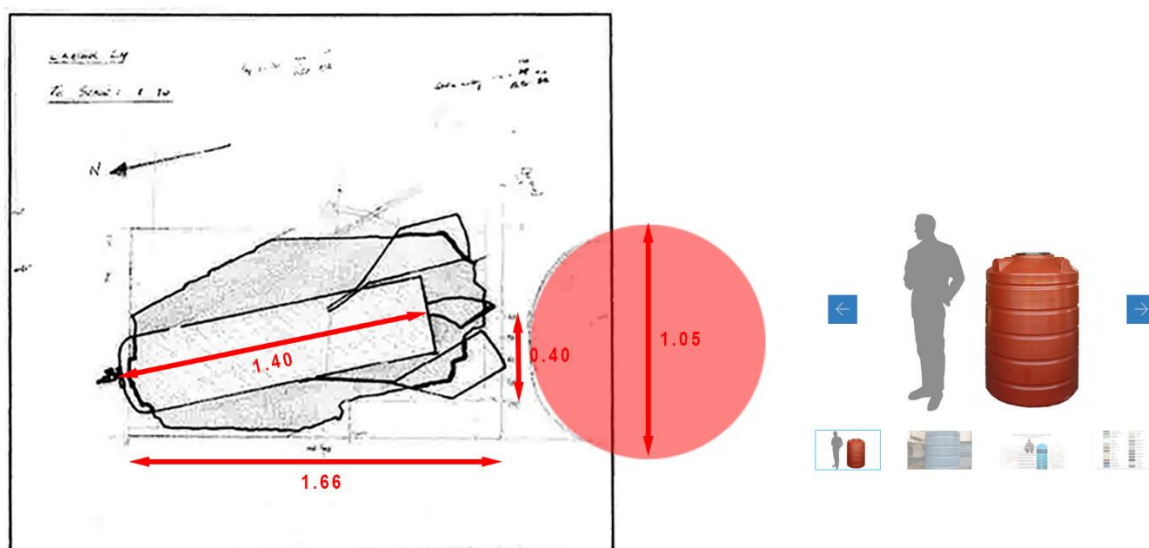
In this scale, which is in good agreement with the photographic evidence, it can be seen that the 166cm given in the FFM report obviously does not refer to the crater, but to the width of a box with measurements, which unfortunately cannot be read in the leaked "Engineering Assessment of Two Cylinders Observed at the Douma

Incident" due to the poor image quality. In the correct scale, this box is then 1.66 meters long and the cylinder corresponds to its standard size of 1.40m with a diameter of 0.35m.



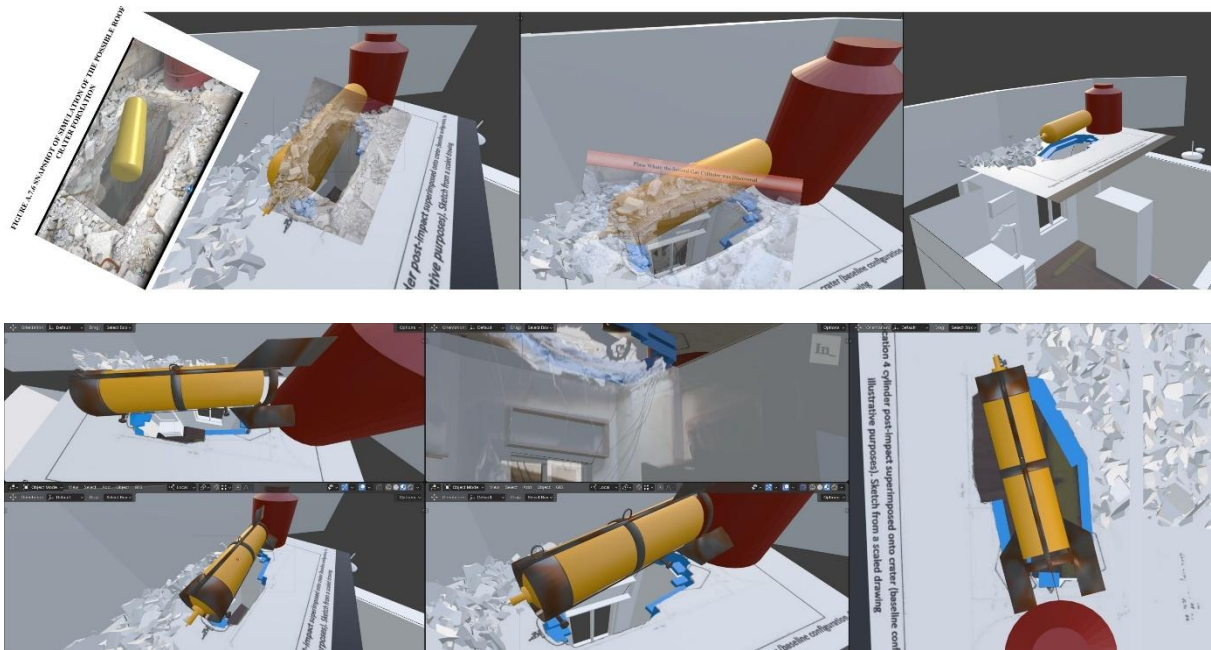
Absurdly, Ian Henderson was sharply attacked by groups such as Bellingcat and Forensic Architecture because of the ratio stated in the FFM report. They decided for themselves that the 1.66m width for the crater was the decisive size and claimed that Henderson had consequently drawn the cylinder 8cm too long. The fact that even under this assumption the 1.05m measure did not make any recognizable sense did not bother much.

Ian Henderson's hand-drawn illustration is titled "Figure 9: Location 4 cylinder post-impact superimposed onto crater (baseline configuration, for illustrative purposes). Sketch from a scaled drawing." Anyone who has ever worked with pencil and paper should understand the extra effort involved in converting the scale of a drawing to an odd measurement. This extra effort would require a great deal of malice in the forgery.



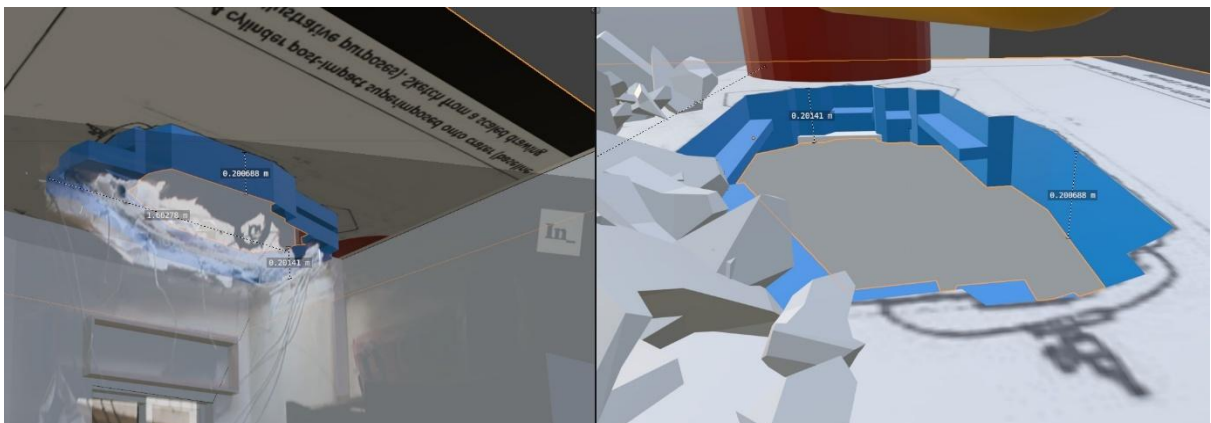
However, the Henderson sketch makes perfect sense if the cylinder is 1.40m long, the dimensioned box is labeled 1.66m at the bottom, the regular dimensions on the right side of that box represent a 10cm grid, and 1.05m is nothing but the standard diameter of a red 1200L water barrel, which is only hinted at in the sketch. The hardened OSINT investigators simply didn't want to entertain such an innocent interpretation. In essence, that entire effort only served to 1) interpret the crater as much larger than it obviously was and 2) then shrink the cylinder in relation to that hole.

The FFM report went even further in the free interpretation of the dimensions. A photograph, which was already very distorted in perspective, was additionally stretched to about 150% of its width and a dwarf-like yellow cylinder without valve and armour was depicted above it. The undistorted photo can be found in the IIT report.



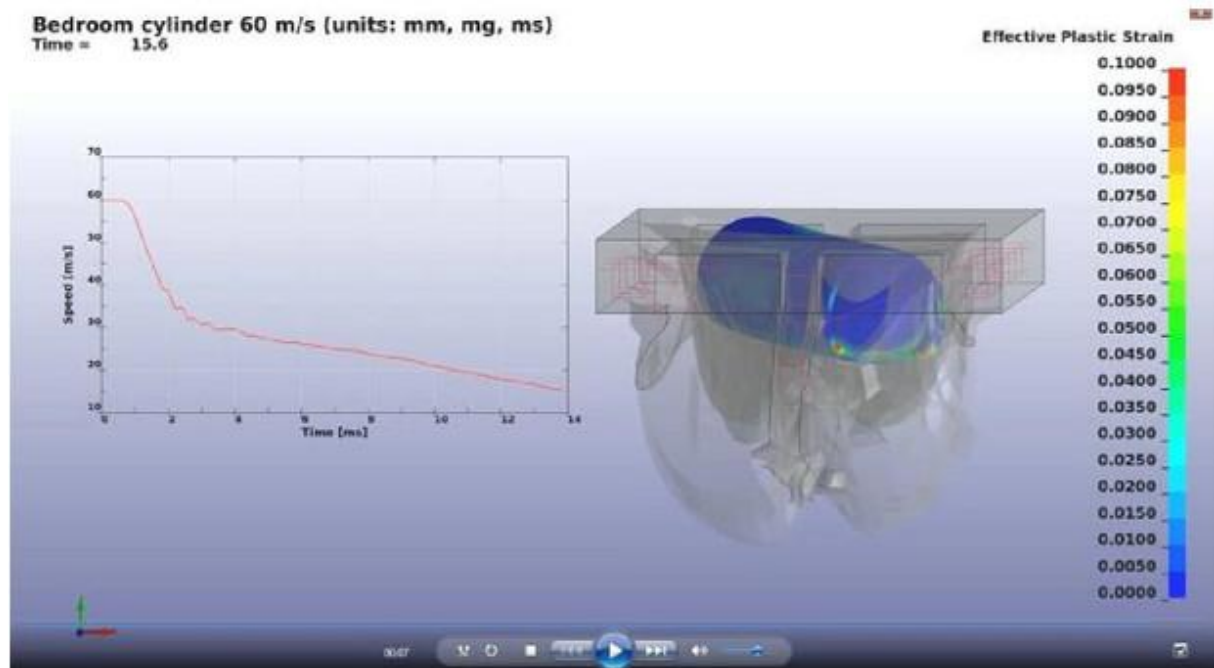
The true relation of the cylinder to the armour naturally raises the question once again as to how the cylinder could have hit the roof horizontally and fallen or rotated through the actual hole, especially with the armour displaced and the valve exposed.

From the scaled model, the thickness of the roof can be read from about 20cm, which is essential for further consideration.



Step 4: FFM's FEA of Deformation

To illustrate the deformation of the horizontal cylinder, the FFM report shows a screenshot of a finite element analysis, but without further explanation. According to this illustration, the cylinder falls to the roof at 60m/s, is decelerated to about 30m/s in 3 milliseconds and then falls another 11ms with constant deceleration. The speed decreases linearly until it reaches 15m/s. At this point, the timeline is cut off. The picture to the right of the speed graph shows the cylinder after 15.6ms supposedly in a comparable deformation.



Without going into too much detail, the graph means the following: A 280kg cylinder with a kinetic energy of 504kJ is decelerated to only 15m/s in a total of 14 milliseconds. The force required for this is **900kN**.

We are talking about a 20cm thick roof and a roof shape, which is called a "fragile ceiling" in Europe. These are pre-formed roof elements with embedded reinforcing steel, which are brought into position and poured with concrete.



Furthermore, it is noticeable that the Syrian concrete is almost white and at the fractures is more reminiscent of gypsum or chalk than of super-solid concrete.



Above this layer of about 15cm thick white concrete with steel reinforcement lies a porous layer that has almost dissolved between the concrete and the floor tiles above. This layer is most likely polystyrene sheets for thermal

insulation. Chunks and flakes of polystyrene lay on and around the bed. An amazingly large piece even leaned against the fin of the cylinder.



According to numerous sources and studies (see tables below), such a roof can absorb about 30kJ of energy, including the steel, before it is completely penetrated. This means that this roof does not even come close to offering the necessary braking power to do justice to the deformation according to the FEA. In addition, the cylinder shown in the picture has about 45cm of braking distance behind it when the timeline of linear deceleration breaks off.

In other words, this cylinder has long since passed the 20cm thick roof. Since then, all interaction has taken place exclusively with the reinforcing steel, but neither the cylinder nor the armour shows the slightest trace of this tremendous interaction. It is not even clear whether the steel struts actually had to crack or whether the exposed ends lost all grip without the concrete and simply hang down.



Realistically, the Syrian flat roof with an optimistic 30kN energy absorption would have cost this 900kN floor about 7% of energy. After that, the cylinder would have fallen further at 57-58m/s, to the next floor.

Conclusion: A 20 cm thick concrete roof (whether reinforced concrete, filigree ceiling or gypsum concrete) cannot absorb 470 kJ. Even high-strength reinforced concrete (C60/75) would dissipate at most 50–100 kJ at 0.5 m indentation path before it breaks completely. The FEA must therefore have assumed an unrealistically high ductile-plastic energy absorption — i.e. the roof behaves like a thick metal buffer in the simulation, not like real masonry.

Energy absorption of concrete during breakthrough:

Material	Behavior	Energy absorption during breakthrough (~15 cm)
Plain concrete	brittle, breaks immediately	3–5 kJ
Reinforced concrete (single-layer)	ductile, limited residual load capacity	20–30 kJ
Reinforced concrete (two-layer, densely reinforced)	very ductile, high resistance	30–50 kJ
High-performance concrete	brittle, but firmer	similar to RC, 20–40 kJ

Studies on the energy absorption of concrete:

Source / Study	Experimental conditions	Energy Intake / Observation
U.S. Army Corps of Engineers (TM 5-855-1, 1986)	15 cm reinforced concrete wall, 2 layers of rebar	20–40 kJ for localized perforation by ~100 kg projectile
Bangash, T. (1993), "Impact and Explosion: Structural Analysis and Design"	Reinforced concrete slabs 100–200 mm thick	15–35 kJ for low-velocity (20–50 m/s) impacts
Cormie, Mays & Smith (2019), "Blast Effects on Buildings"	Reinforced concrete slabs, 150 mm, rebar spacing 100 mm	25–45 kJ, depending on reinforcement density
USAF tests (Sandia Laboratories, 1984–1992)	150 mm RC panel, 25 MPa concrete, dual rebar mats	35 ± 5 kJ energy absorbed before perforation
Japanese JSCE experiments (2002)	120 mm RC plates with D10 rebar	~30 kJ per 0.1 m ² effective impact area

If one tries to transfer the static compressive strength, documented in countless documents on material classes, into the dynamic energy absorption to the point of total failure, then one must consider the elasticity of concrete.

$$E_{\text{abs}} \approx \sigma_{\text{fracture}} \times V \times \epsilon_{\text{plastic}}$$

Since concrete fails brittly, an effective plastic elongation of ~0.3 % (i.e. 0.003) to 0.5 % (0.005) can be assumed. This results in the following energy intake:

Concrete class	Cube compressive strength (N/mm ²)	Energy intake (kJ) at 0.3 %	Energy Intake (kJ) at 0.5 %
C20/25	25 N/mm ²	5.6 kJ	9.4 kJ
C25/30	30 N/mm ²	6.7 kJ	11.2 kJ
C30/37	37 N/mm ²	8.2 kJ	13.6 kJ
C35/45	45 N/mm ²	10.0 kJ	16.7 kJ
C40/50	50 N/mm ²	11.2 kJ	18.7 kJ
C50/60 (high strength)	60 N/mm ²	13.5 kJ	22.5 kJ

For ordinary Syrian flat roofs (visually light, brittle concrete, low compaction, standard reinforcement), the energy absorption is estimated at 8 – 12 kJ. The steel in the concrete changes the dynamic behavior considerably, as it distributes the load and a brittle fracture does not immediately lead to total failure.

Strong reinforcement (double mesh, 10mm rods, 80mm grid) can triple the ability to absorb energy.

Reinforcement condition	Gain	Total energy consumption
No reinforcement	×1.0	10 kJ
Weakly reinforced (e.g. 6 mm rods, 150 mm pitches)	×1.3 – ×1.5	13–15 kJ
Medium-reinforced (8 mm bars, 100 mm grid)	×1.5 – ×2.0	15–20 kJ
Heavily reinforced (double mesh, 10 mm rods, 80 mm grid)	×2.5 – ×3.5	25–35 kJ
High-strength composite (reinforced concrete slab with structural steel >400 MPa, e.g. bunker-quality ceiling)	×4–×5	40–50 kJ

At the latest now everyone must notice what kind of bunker the FFM FEA must be based on in order to absorb **490kJ** and to decelerate this cylinder to 10m/s in 14ms. It is physically impossible, even if the cylinder hits the roof flat and the roof has an optimal effect.



I apologize for the wrong picture. This is the second cylinder found on that day. The OPCW inspector who examined both cylinders was fired by the OPCW DG for ordering an independent FEA.

Step 5: IIT's alternative theory

The IIT report S/2125/2023 appeared to investigate an alternative possibility, namely the throwing of the cylinder from the roof of a neighboring high-rise building.



"A first set of experiments was conducted to assess the deformation caused to a replica cylinder and cradle when dropped from a height of 16 m (i.e. the estimated height difference between the crater at Location 4 and the highest adjacent building) and impacting a replicated concrete roof structure. ... impact experiments indicated that dropping the cylinder from such a height, where the latter impacts horizontally, would not result in the penetration of the reinforced concrete."⁵

At a drop height of 16m, the 280kg cylinder reaches an impact speed of 17.7m/s. This results in a kinetic energy of 43.9kJ. The same roof with an optimistic energy absorption of 30kJ would allow the cylinder to pass with a residual energy of 13.9kJ. This results in a residual speed of **10m/s**.

Surprisingly, this is exactly the case that the FFM report examined to justify the jump on the bed.

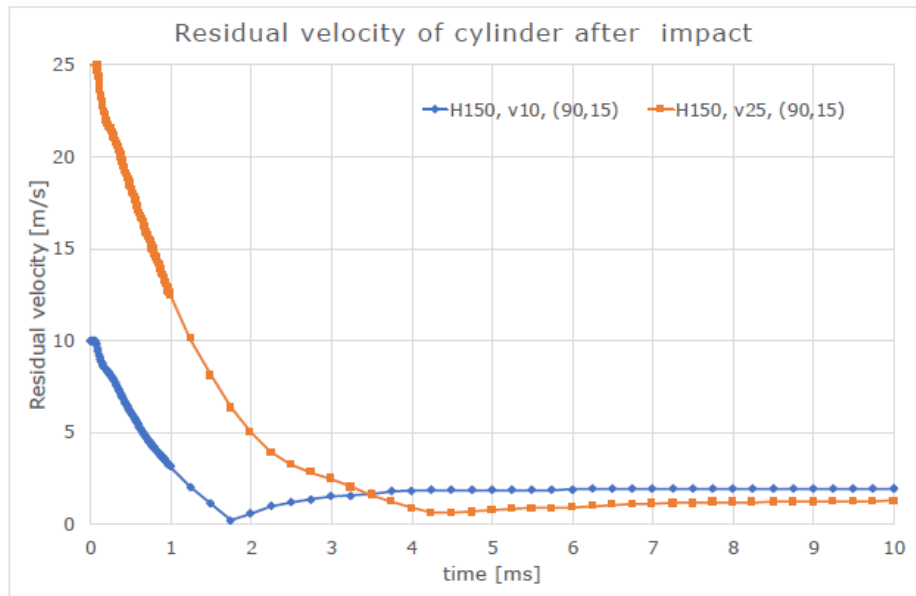
Step 6: The jump on the bed

After claiming an incredibly low helicopter, a highly unlikely horizontal impact, an incredibly small crater and an unlikely deformation when hitting an incredibly resistant roof, the FFM is actually trying to justify the jump of the cylinder onto the bed pseudo-scientifically. The FFM Report writes:

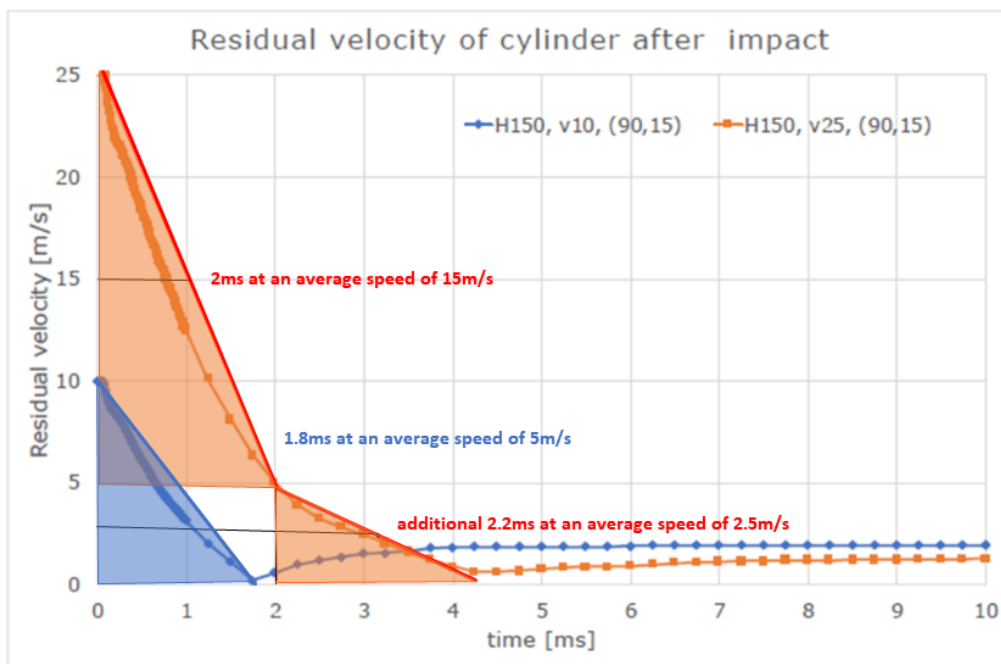
- 8.34 The team consulted experts in mechanical engineering, ballistics and metallurgy to provide qualified, competent assessments of the cylinder trajectory. The results of these assessments indicated that the shape of the aperture produced in the modulation matched the shape and damage observed by the team. The assessments further indicated that, after passing through the ceiling and impacting the floor at lower speed, the cylinder continued altered trajectory, until reaching the position in which it was found.

⁵ <https://www.opcw.org/sites/default/files/documents/2023/01/s-2125-2023%28e%29.pdf>

FIGURE 12: DIAGRAM DEMONSTRATING THE POSSIBLE MOVEMENT OF THE CYLINER AT LOW SPEED

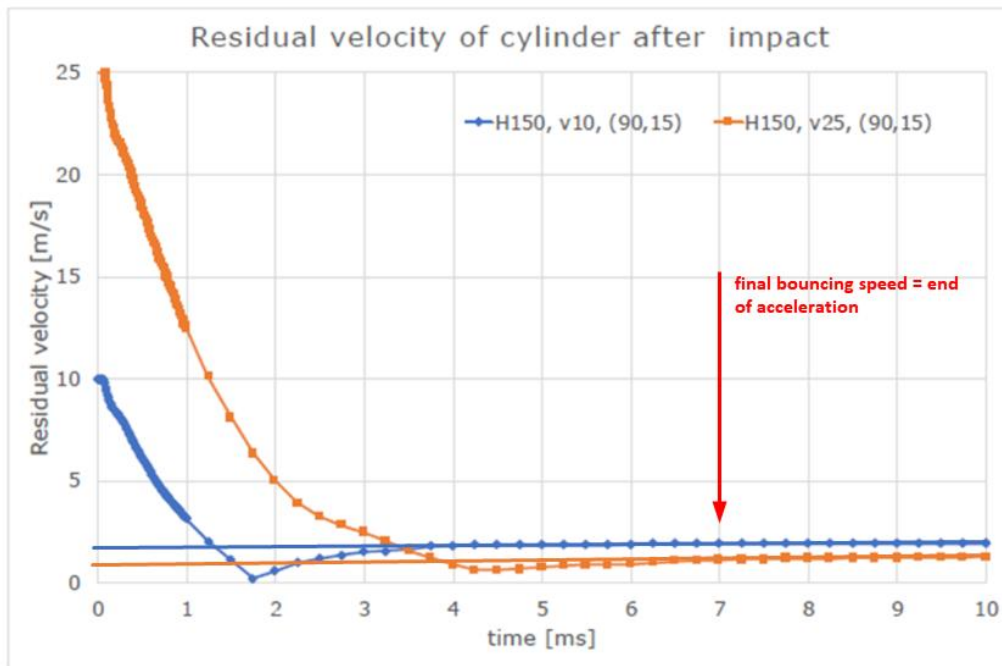


The diagram deals with two cases for the impact of the cylinder on the floor below. The Orange case starts with an impact velocity of 25 m/s, the Blue case begins with an impact velocity of 10 m/s. Case Blue thus describes exactly the scenario of a cylinder being thrown from the neighboring roof.



From the moment of impact to the stop, the cylinder moves for 1.8 ms at an average speed of 5 m/s in the blue case. In the case of Orange, it moves for 2 ms at an average speed of 15 ms, and then another 2.2 ms at an average speed of 2.5 m/s.

This means that in the case of blue, the cylinder penetrates 9mm deep into the ground or is compressed due to its elasticity. In the case of orange, it penetrates 35mm deep into the soil or is compressed. The bend in the curve of orange means that the cylinder reaches the limit of its elasticity and begins to deform.



After the cylinder reaches a standstill, it then springs back due to its elasticity. Since the cylinder has not yet reached its limit of elastic deformation in the blue case, it subsequently jumps a little higher, with a residual velocity of about 2m/s. In the case of orange, the residual velocity is only about 1m/s.

The cylinder in the Orange case could therefore jump 50mm high if it jumps vertically. In order to achieve a maximum distance, it would have to lift off the floor at a 45° angle. In this case, however, it would only reach a height of 25mm, but could jump as far as 102mm.

In the case of blue, the cylinder would reach a height of 100mm and a maximum distance of 400mm. And even with this hop after a plausible fall from a height of 16m, the cylinder should not land on its obstructive fins or on the valve. In the IIT report, the height of the bed is given as 0.385m and it is about 3 meters away.

With an absolute basic knowledge of physics, one can understand that any possibility is excluded that would come close to the promise of the FFM report *"until reaching the position in which it was found"*.



This cylinder could not even have reached the shower cubicle, which is impressively evidenced by the stacked glasses on the cubicle. Instead, a fine layer of snow-white dust has settled on the cylinder, which is completely missing on the bed right next to it. And the fins were initially wrapped in a blanket, as if the jumping cylinder had wrapped itself in the carpet on its way through the room and dragged it with it.



However, the obvious contradictions were completely ignored by FFM and IIT. Instead, they tried to bend physics. The self-proclaimed experts from the Bellingcat circle reacted accordingly:



K Johnson @ASpinOfTheWheel · 21 Min.

Antwort an @MichaKobs @CL4Syr und 10 weitere

No, it bounces & strikes the various points around the room noted by the investigators. It doesn't penetrate "the ground" & it can bounce almost as high as the roof by conservation of energy. It probably bounced at an angle to strike a wall as the next contact.

[Tweet übersetzen](#)



Step 7: The Disc

Instead of devoting itself to the evidence that was there for everyone to see, the IIT turned its attention to an object that was not there. In an early video by the media activists, an object appeared in front of the destroyed shower cubicle, which, according to the incidence of light, is without any doubt cone-shaped. It could be a bent lampshade. However, because the dark cone seems to be open or ending at the bottom and the other end is just hitting the ground, it looks most like a doormat hanging over a cylindrical object.





When Russian television filmed in this place, this object had disappeared. The disappearance gave rise to speculation that this object must be an important piece of evidence that the Russians or Assad made disappear. And so IIT began to identify this object as a "disk" and compare it with other disks of places with other alleged chlorine attacks.

However, if there is one thing that can be said with certainty, it is that this object was not flat. In addition, there is neither a meaningful use for a disc on the harness, nor has there ever been a break on a harness where this disc could have been attached. The conjecture is that this disc was attached to the front of the harness to protect the valve, while the entire design is designed to allow the valve to break off on impact. Aerodynamically, a disc-shaped windshield would also increase the air resistance at the front.

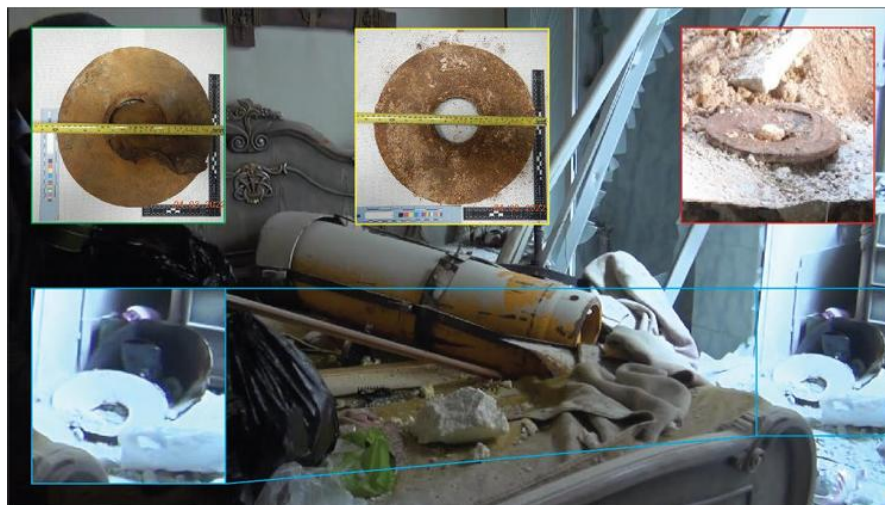
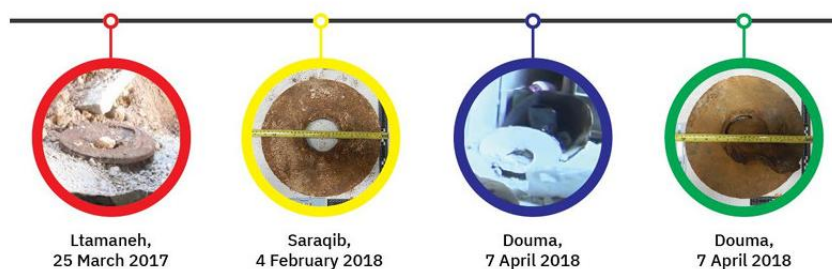


FIGURE 16: COMPARISON OF METAL FRAGMENTS RECOVERED IN LTAMENAH (25 MARCH 2017), SARAQIB (4 FEBRUARY 2018), AND DOUMA (7 APRIL 2018)



Of course, if someone moved this doormat and it then lay flat on the floor somewhere, then the "disc" would have disappeared without a trace.

Step 8: Auto-Refrigeration

The first to report on this cylinder was the media activist Bilal Abu Salah on April 8 during the morning. Here is an excerpt with English subtitles from TNT:



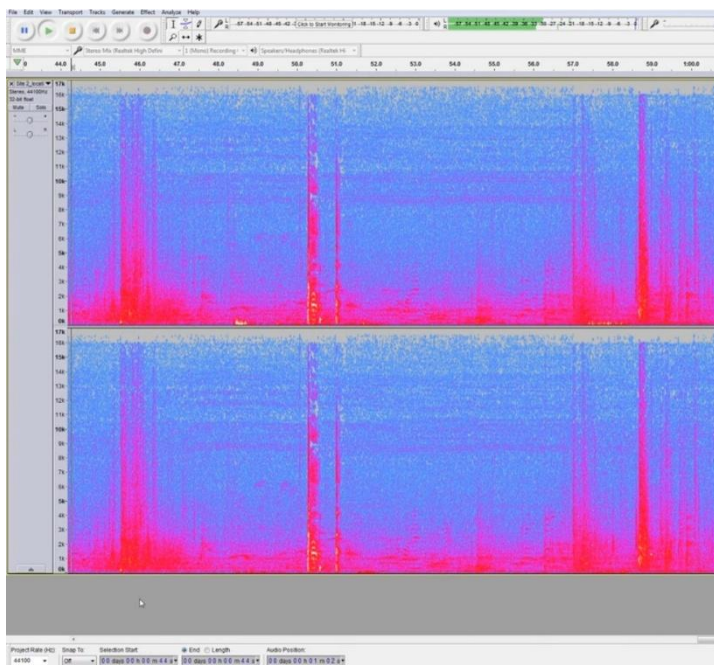


This video is not significant because it already provides all the interpretations, it is especially significant because it clearly shows greenish gas above the bed, as well as a close-up of the valve. The claim is that this cylinder has been constantly losing gas since the previous day at around 4pm (at least 8 hours), i.e. it is leaking, although the valve is clearly visibly closed.

A few hours later, the media activist Al-Doumani visits the place and shoots an almost identical video. The crucial difference is that the greenish gas above the bed has disappeared, just as the duvet no longer appears whitish, but brown.



Another 24 hours later, another video was recorded, which was apparently sent directly to Forensic Architecture. The company used the video in a documentary about their work, explaining that a loud hiss could be heard, which inevitably indicates that gas is escaping.



The fatal thing about this timeline is that it cannot be explained physically. When the first media activist shot his video after 8 hours, the red brass valve was white. This means that it was frozen from the evaporation of the escaping gas.



Despite the high thermal conductivity of brass and gas-tight closure - i.e. good thermal contact - the cap was red, i.e. warm. Despite close-up and original sound with birdsong, there was no hissing of a gas audible.

So if there was a leak, it was tiny, in the order of maybe 0.1 gram per second. In this way, the cylinder would slowly empty over 140 hours. But it would be too little gas to form a visible green lake above the bed or even to freeze the brown duvet.

To achieve this, significantly more gas would have to escape, or more precisely, liquid droplets in a vapor would have to escape, because the already gaseous chlorine absorbs little more heat and therefore couldn't create frost on the bed. It would simply be yellow and clear. The problem is that liquid chlorine only escapes from the cylinder when the liquid level is above the valve or leak. However, if the liquid level is above a leak, it takes little time to force all the liquid out of the cylinder. With an 8mm leak (broken valve) the liquid chlorine would be completely pressed out of the cylinder in maximal 6 minutes.



8 hours after the alleged attack – the creation of the leak - only the red and therefore warm outlet cap could be an indication of how a green chlorine lake could form after 8 hours on a frozen bed and without hissing.

In the afternoon of the same day, Al-Doumani filmed his video. The cylinder was neither iced over nor had condensation settled from the air. The fine lime dust on the cylinder had not run down with water drops. In other words, the cylinder had never gotten cold enough up to this point, no visible gas, no hissing.



Condensate formation begins at a withdrawal of 0.5% per hour in relation to the liquid filling quantity. With this cylinder that would be 600 grams per hour. Over 8 hours, that would be 7.2kg or 2.25m³ of chlorine gas. At this amount, the cylinder would empty completely over 25 hours without condensation and hissing.

It wouldn't start hissing after 48 hours. The amount would be too small to create a visibly yellow concentration, which also piles up above the duvet instead of sinking down to the floor. This amount would be orders of magnitude too small to extract so much heat from the atmosphere above the bed that the brown duvet appears white. Frost would be the only plausible explanation for the magical color change of the duvet (or digital image processing) but would require the short-term release of a large amount of chlorine vapor – short enough that the cylinder does not cool below the dew point and long enough to freeze the bed and valve by evaporating chlorine.



The cause of this mysterious color transformation, as well as the obvious contradictions in the timing of this cylinder emptying, was ignored by FFM and IIT alike, as they only allow the conclusion of some kind of manipulation.

Step 9: Irrelevant chemistry

Bornyl chloride ($C_{10}H_{17}Cl$) is an organic chlorination product that is formed when chlorine gas reacts with terpene-containing organic matter — e.g., resins, terpenes, or essential oils in wood, needles, plants, or furniture.

The discovery of bornyl chloride in samples from the wooden board under the cylinder was celebrated as striking proof of the presence of molecular chlorine Cl_2 , especially by those who dismissed all the contradictions in the physics of the process described up to this point without hesitation. It should therefore be noted as a side note that this board is also not due to the destruction caused by the impact of the cylinder. Even if there is no trace of fine white dust on the board, it must have been on the bed before the cylinder jumped on it.



If you now find bornyl chloride in the samples from that board, you cannot automatically conclude that it can only have been produced by chlorine gas. Just a few years ago, wood preservative formulations with chlorophenols, chlorinated paraffins or chlorinated terpenes were quite common, and the furniture in this room is obviously older.

Strikingly, the FFM report does not provide a quantitative indication of the amount of bornyl chloride found, nor does it mention accompanying substances that one would expect to find in real chlorine gas exposure (e.g. HCl corrosion traces, dichlorine compounds, chlorinated cellulose).

In the "Final Report of the FFM on Douma (S/1731/2019)", the chemical analyses essentially only state that bornyl chloride and some chlorinated organic compounds were found *"in traces"* in wood samples. And these are *"consistent with exposure to a chlorine-containing substance"*, but these are *"not uniquely indicative of molecular chlorine"*.

The FFM avoids any commitment to chlorine gas and it is striking that not a single other product is mentioned by name in this context, i.e. no dichlorine compounds, no chlorinated cellulose or protein products, no metal corrosion, no HCl detection.

The IIT report at least addresses corrosion, but over at least one month:

*"These observations indicate that the liquefied gas contained in the cylinder at Location 4 was corrosive and that it was released slowly enough to allow for the corrosion of both the cylinder and other metal objects in the room over an extended period of time (i.e. at least a month). This is consistent with the fact that the cylinder's valve did not shear off, resulting in a slower release of the cylinder's chemical payload."*⁶

The IIT's proposed depletion would mean 0.07 grams per second over 30 days. And that amount doesn't allow for green clouds, white blankets, or even a clearly audible hiss. The loudly hissing cylinder, on the other hand, would have been empty in just a few hours.

Furthermore, Chlorine oxidizes and hydrolyzes instantly. The subsequent corrosion can at best be traced back to moisture in combination with salt residues (HCl, chlorides). What is conspicuously missing in the reports, however, is any chemical analysis of the rust products. There is no evidence of pH values or salt-induced oxidation, no evidence of chloride ions in the rust layer (e.g. per ion chromatography or EDS), no evidence of clear pitting corrosion and no mention of chemical burns on adjacent materials (wood, varnish, textile fibres).

HCL corrosion causes whitish-crystalline oxidation products with sharply defined edges. The uniform brown rust layer on the armour and cylinder, on the other hand, is completely consistent with normal rust formation due to atmospheric humidity in "at least one month".

Much more important than all this, however, is if the cylinder was placed or thrown from the roof of the neighboring house, if it could not possibly have fallen from a height of 150m or jumped onto the bed by itself, if the destruction at the shower cabin is impossible due to the impact of the cylinder, if the crater is too small and the "disk" is not a disc at all, if the cylinder is flattened where its fin is still upright and if the valve only began to hiss loudly after 48 hours, then all the chemistry is irrelevant.

⁶ <https://www.opcw.org/sites/default/files/documents/2023/01/s-2125-2023%28e%29.pdf>