Incident Assessment

Incident ID	CIV0019
Location	Saltivskyi District, Kharkiv
Coordinates	49.9909, 36.2677[1]
Date	25/02/2022
Time	Approximately at 11:40 EET

Description of the Events

On 25/02/2022, the city of Kharkiv was struck by a rocket cluster munition barrage.

As a part of this barrage, the rocket motor of a 9M55K missile appears to have embedded itself in the pavement of an intersection in a residential area of the city's Saltivskyi District. The rocket motor landed at the intersection likely some time that morning, probably at around 11:40 EET. The immediate vicinity of the intersection included a convenience store and residential apartment buildings.

Key Findings

- The rocket motor of a cluster munition rocket, likely a 9M55K, embedded itself into the pavement of an intersection of a residential street in Kharkiv's Saltivskyi District.
- The area possibly affected by the rocket's submunitions is largely residential, and also contains healthcare, educational, and commercial establishments.
- The rocket's estimated point of origin was calculated to be either inside the territory of the Russian Federation, or in the Ukrainian territory under the control of the Russian Armed Forces.

Description of Searches

The investigator began by looking for the entry for CIV0019 in the Civilian Harm database. The investigator noticed that a peer researcher had added a single source for this event: a link to a Telegram post[2] sent on 25/02/2022 at 11:44 EET. The post contained two images, as well as text indicating that they had been captured in Kharkiv. The post also contained a tag ("@vorposte"),

[1] https://maps.app.goo.gl/1E7wFPJKBgzE3y8J8
[2] https://t.me/vorposte/13723

which suggested to the researcher that the image had appeared on a social media channel by that time.

The investigator then searched for different variations of the term “rocket”, “bomb”, and “missile”, along with the word “Kharkiv”, in both English and Ukrainian on Google, Yandex, and Bing. The investigator conducted these searches with the time parameter set to before 26/02/2022, given that the investigator had a reason to believe that this incident took place on 25/02/2022. The investigator also conducted reverse image searches using both images on these search engines.

The investigator also conducted similar searches on Twitter, and in particular on the @vorposte account’s timeline, since the investigator had a reason to believe that this account may have been the first one to post these two images.

Analysis of Examinable Content

Source 1: Telegram post[3] containing two images showing the munition remnant embedded in the street at a pedestrian crossing, shared on 25/02/2002 at 11:44 EET.

A Telegram post containing Source 1: Image 1 (S1I1) and Image 2 (S1I2) of the munition remnant as it lay embedded in the pavement on 25/02/2022.

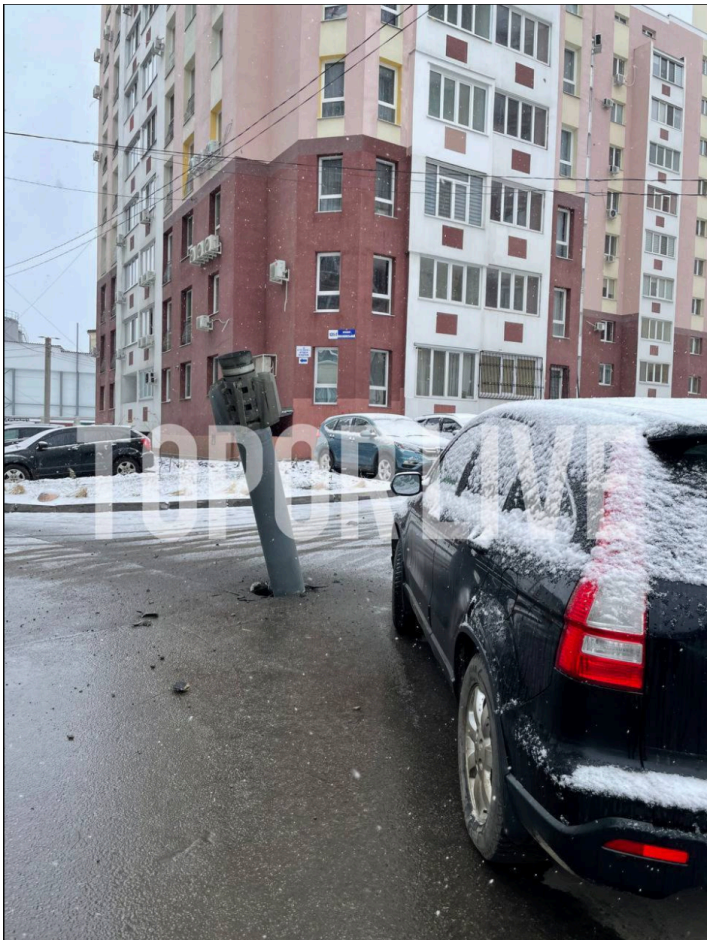
[3] https://t.me/vorposte/13723

Source 2: A Telegram video[4] showing the munition remnant embedded in the street, shared on 25/02/2022 at 11:45 EET.

A still from a Telegram video containing Source 2 Video 1 (S2V1) showing remnants of munition.

Source 3: A Telegram post[5] containing an image showing the munition remnant embedded in the street, shared on 25/02/2022 at 11:41 EET.

[4] https://t.me/c/1754252633/3293
[5] https://t.me/c/1754252633/3292



A Telegram post containing Source 3 Image 1 (S3I1) showing remnants of munition.

Source 4: A Telegram post[6] containing an image showing the munition remnant embedded in the street, shared on 25/02/2022 at 11:40 EET.

[6] https://t.me/c/1754252633/3291

A Telegram post containing Source 4 Image 1 (S4I1) showing remnants of munition.

Source 5: A Twitter video[7] showing the munition remnant embedded in the street, shared on 25/02/2022 at 13:01 EET. This is the same video as Source 2.

[7] https://twitter.com/no_itsmyturn/status/1497149831139242006

A still from a video posted on Twitter containing Source 5 Video 1 (S5V1) showing remnants of munition.

Source 6: A Twitter post[8] containing two images showing the munition remnant embedded in the street at a pedestrian crossing. This is a repeat of Source 1. Shared on 26/02/2002 at 16:52 EET.

[8] https://twitter.com/bellingcat/status/1497570159812390920

A Twitter post containing Source 6: Image 1 (S6I1) and Image 2 (S6I2) of the munition remnants (repost of S1).

Sources 1 through Sources 6 show the same munition remnant. The investigator determined that the incident took place at the following coordinates: 49.9909, 36.2677[9].

A Telegram post[10] (Source 1) shared on 25/02/2022 at 11:44 EET in the "Форпост" channel contained two images (S1I1, S1I2) showing a munition remnant embedded in the pavement of a street at a pedestrian crossing.

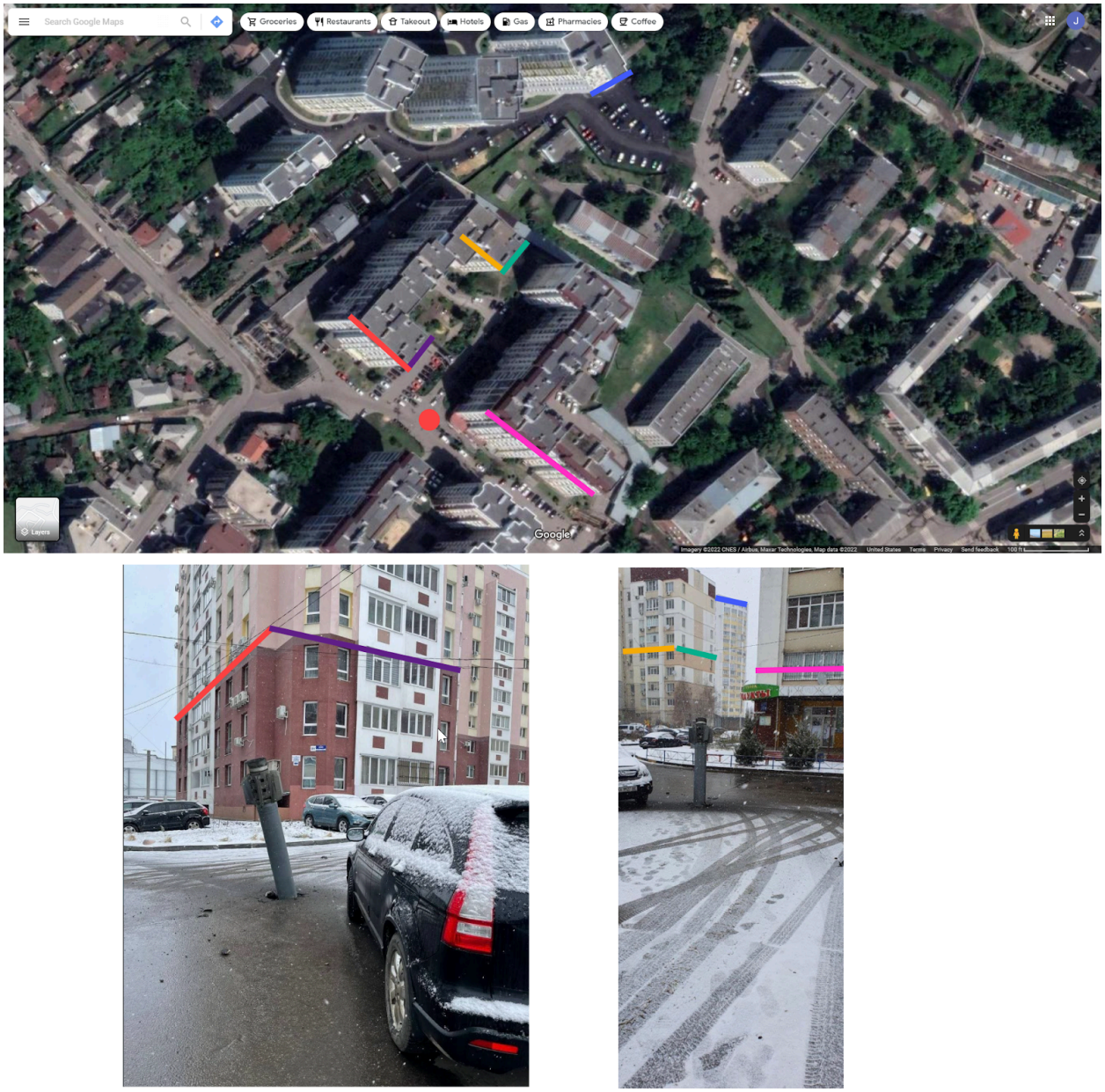
The investigator observed that the two images appear to have been taken at approximately the same time, estimating by the amount of accumulated snow visible on the ground and on the vehicles in the images, as it was snowing at the time that they were captured.

The investigator also observed that the images were taken in a residential area, as evidenced by the presence of apartment buildings and parking lots full of civilian vehicles in the immediate vicinity of the munition remnant. One of the images also showed what appeared to be a commercial establishment, reminiscent of a convenience store.

A reverse image search of one of the images in the post yielded as a result a tweet[11] from the Bellingcat account (@bellingcat) claiming that the image had been geolocated to the following coordinates: 49.9909, 36.2677[12]. The investigator then began the process of verifying that this geolocation was accurate.

[9] https://maps.app.goo.gl/nbePGRLyjfgzSprNA
[10] https://t.me/vorposte/13723
[11] https://twitter.com/bellingcat/status/1497570159812390920
[12] https://maps.app.goo.gl/nbePGRLyjfgzSprNA

The investigator noted that on satellite imagery, the location at these coordinates appeared to match the general outline of the streets and buildings seen in the two images in the Telegram post. In particular, the investigator noted the alignment of the residential apartment buildings in the images and those seen in the satellite imagery:

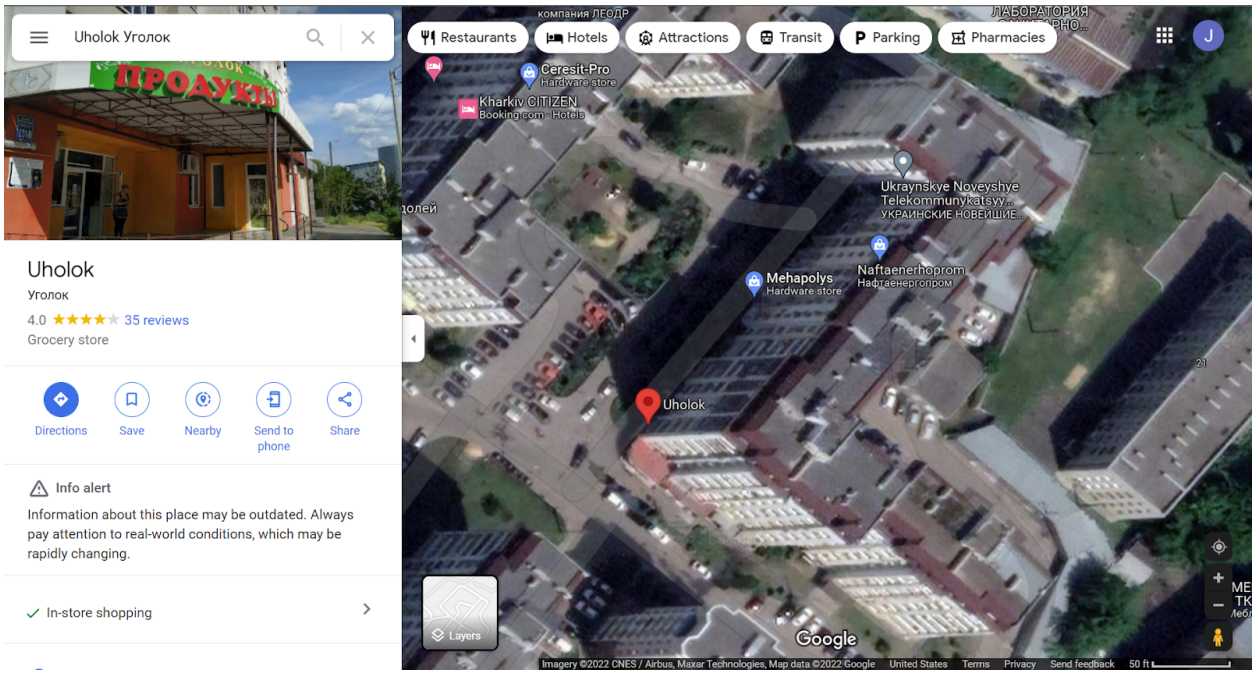


The image composite above shows matching buildings in S1I1 and S1I2, and at the location that the Bellingcat Twitter account claimed was the site of the munition impact (Credit: Telegram[13]/Google Maps).

[13] https://t.me/vorposte/13723

The investigator also found a video[14] (S5V1) of the same munition remnant, likely taken at approximately the same time given the fact that it is also snowing in the video, and that the amount of snow accumulated on the ground and on vehicles. The investigator noted that the details in the video matched those in the images in Source 1, including the position of the munition remnant and the adjacent vehicles.

The investigator also noted that the sign for the commercial establishment that was visible in Source 1 was also visible in the video. The letters on the sign were more readable in Source 2 than in Source 1, allowing the investigator to compare it to Google Maps imagery of the establishment, thereby confirming that the coordinates in the Civilian Harm sheet for the event were correct.



Google Maps shows a commercial establishment called "Uholok" at the intersection where the munition remnant landed. Note that the image associated with the establishment matches the sign that is visible in Source 1 and Source 5 (Credit: Google Maps[15]).

Images uploaded by users to Google Maps of the "Uholok" establishment provide a clear view of its facade, including features that match it definitively to the location shown in Source 1 and Source 5:

[14] https://twitter.com/no_itsmyturn/status/1497149831139242006
[15]https://www.google.com/maps/place/Uholok/@49.9912015,36.267854,131m/data=!3m1!1e3!4m5!3m4!1s0x4127a0979591a747:0x923a3d4530f7030b!8m2!3d49.9910533!4d36.2679094

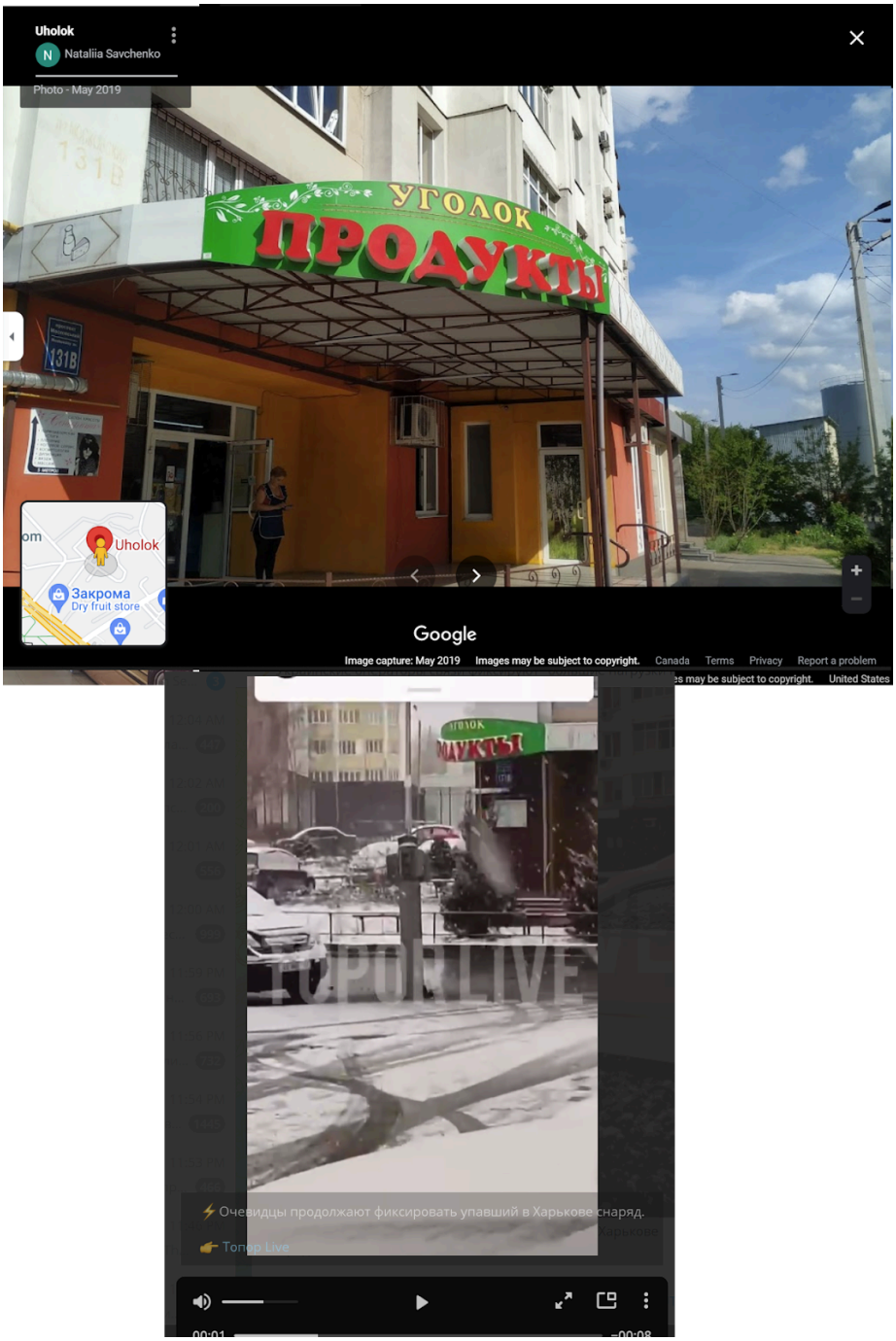


Image composite showing a comparison of the "Uholok" convenience store on Google Street View (Top) and in a tweet containing an image of this incident (Bottom) (Credit: Google Maps[16]/Telegram[17]).

[16] https://maps.app.goo.gl/JEnM2S9ErJRmBtHS6
[17] https://t.me/c/1754252633/3293

Questions to Investigate

What Kind of Munition Was Used?

The investigator determined that the munition remnant in this incident was the rocket motor of a 9M55K 300mm rocket. This is evidenced by the remnant's features, namely the presence of three evenly-spaced holes near the tail section of the rocket motor from which its stabilizing fins deploy.

Image composite comparing an annotated image of a 9m55K rocket motor pointing out the even spacing of the stabilizer fin holes (top) with an image of the munition remnant as shown in S1I1 (Credit: Twitter[18]/Telegram[19]).

[18] https://twitter.com/MarkHiznay/status/562642484938149888/photo/1
[19] https://t.me/vorposte/13723

Where Was the Munition Fired from?

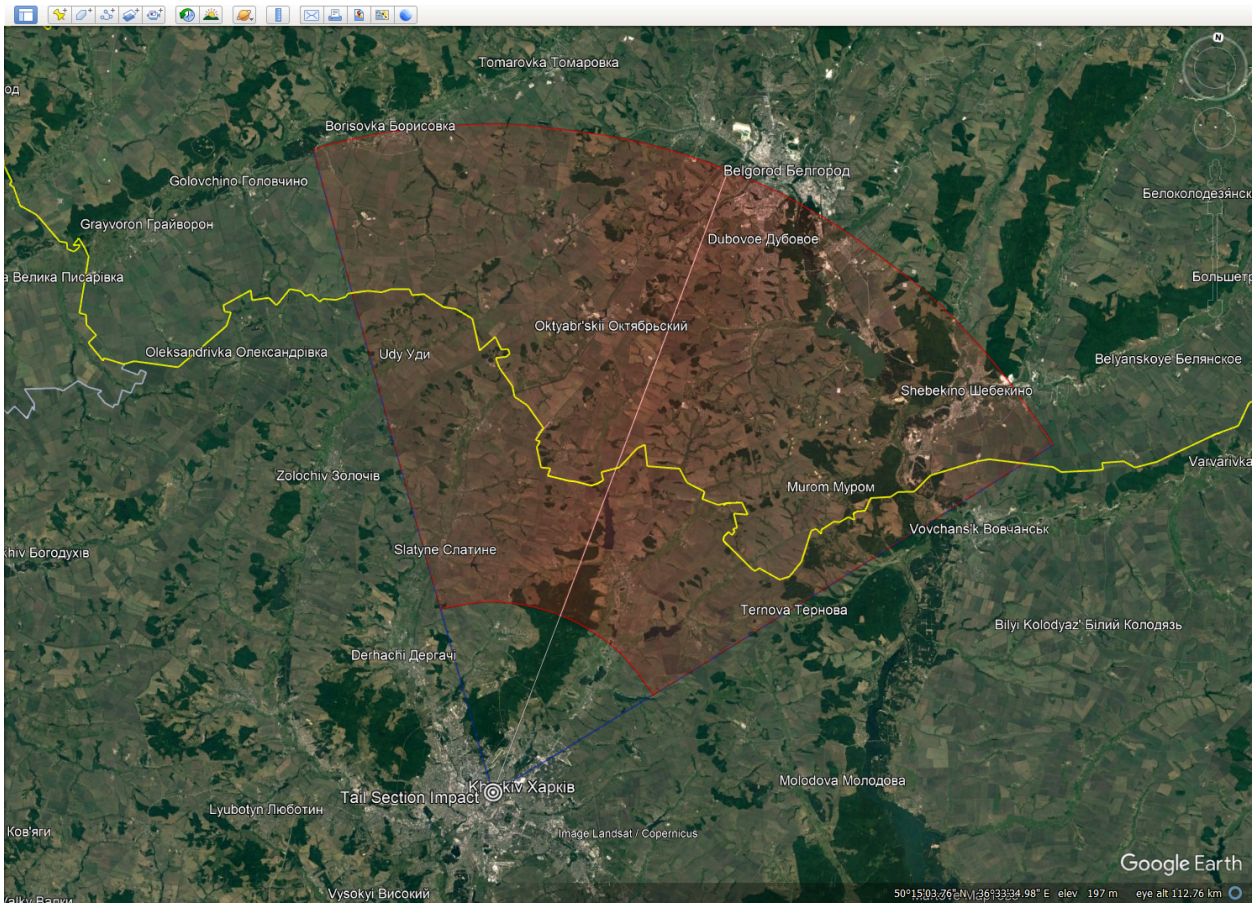
The video[20] in Source 5 provides a clear view of the rocket motor's angle of impact in the pavement, along with its likely flight path.

The composite image below shows the munition remnant as it appears in Source 1 and Source 5, along with projected lines indicating its approximate direction of origin, which is 14 degrees from north.

The image above is a composite of S1I1, a screenshot from S5V1, and a screenshot from Google Earth Pro showing the point of origin of the rocket motor. The blue line represents the assessed direction of origin, with red lines aiding the assessment (Credit: Telegram[21]/Twitter[22]/Google Earth Pro).

[20] https://twitter.com/no_itsmyturn/status/1497149831139242006
[21] https://t.me/vorposte/13723
[22] https://twitter.com/no_itsmyturn/status/1497149831139242006

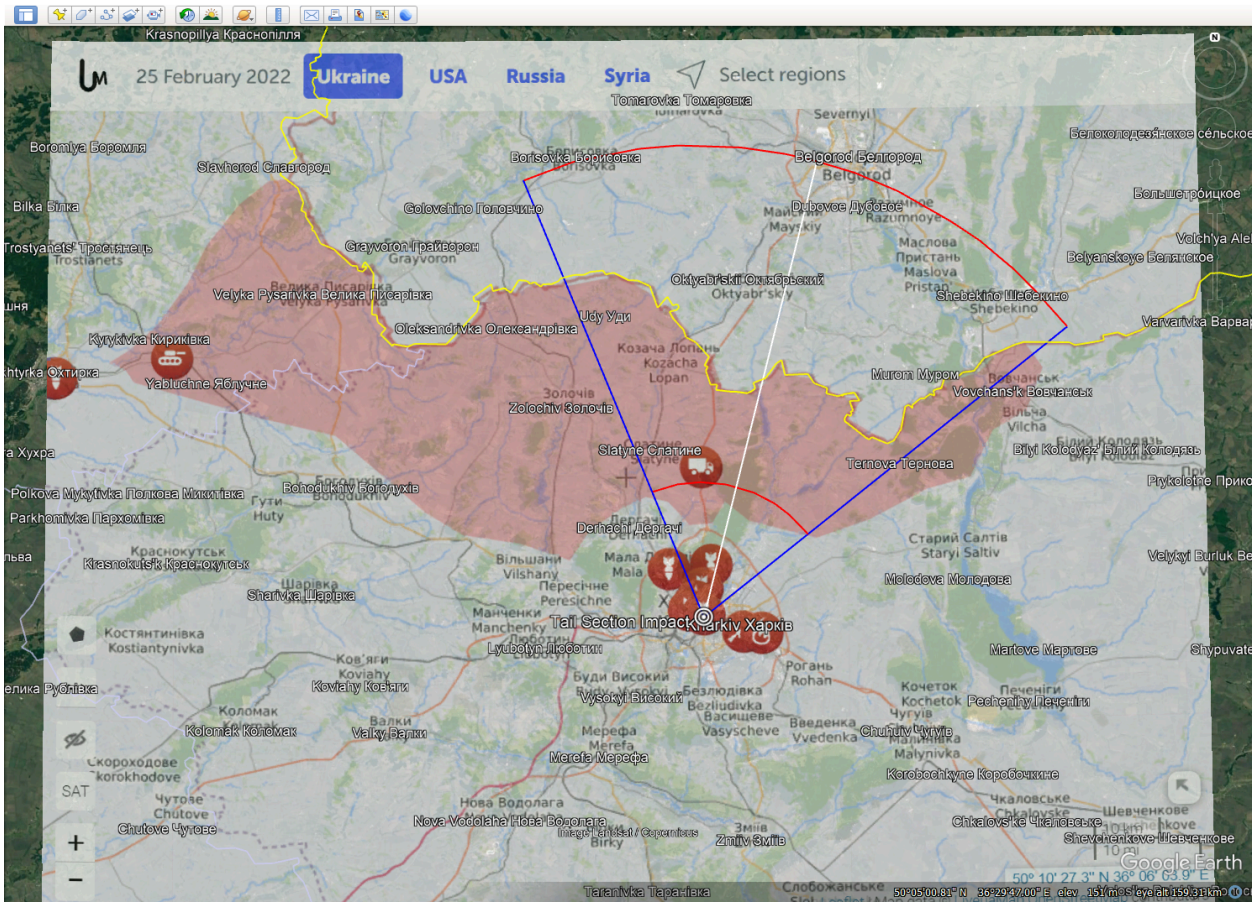
Extending the lines seen in the image above to the range of a 9M55K rocket (20 to 70 kilometers[23]) and an application of a standardized direction of origin template for a BM-30 allows for the visualization of the rocket's estimated area of origin:



The estimated area of origin for the 9M55K rocket whose rocket motor is the focus of this report is seen in the image above. The white lines represent the missile's minimum and maximum ranges: 20 kilometers and 70 kilometers (Credit: Google Earth Pro).

As the image above shows, while the majority of the rocket's estimated area of origin is located inside the Russian Federation, part of it is located inside Ukraine. The investigator checked LiveUAMap[24] to see how far the Russian Armed Forces had advanced into Ukraine north of Kharkiv by 25/02/2022. The image below is an overlay of liveuamaps' assessment of the positions of the Russian Armed Forces on that day, and of the Google Earth Image seen above. Note that the LiveUAMap is rough and should be regarded as an estimate.

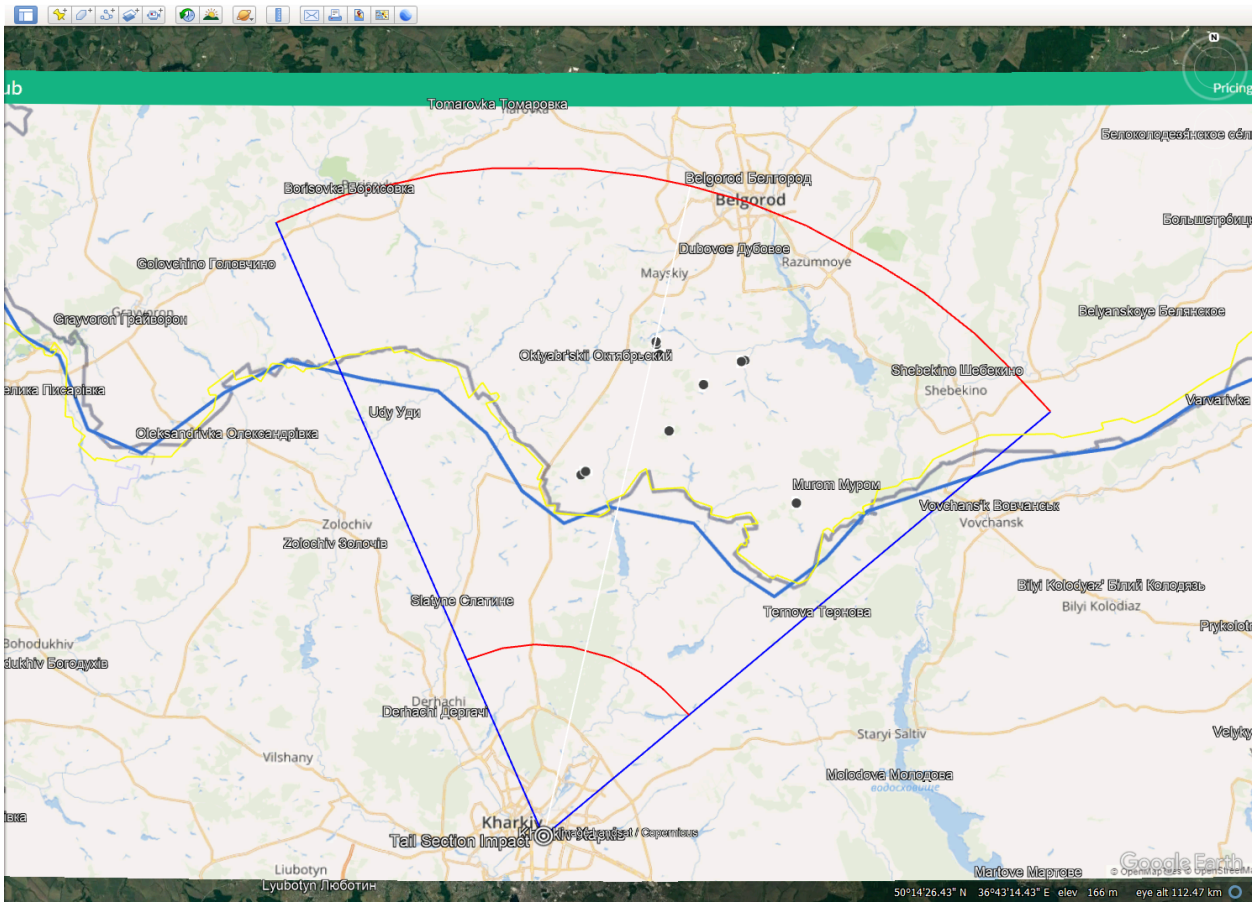
[23]https://www.armyrecognition.com/russia_russian_army_vehicles_system_artillery_uk/bm-30_smerch_9k58_300mm_multiple_rocket_launcher_system_technical_data_sheet_information_description.html
[24] https://www.liveuamap.com



The image above is an overlay of Liveuamap estimate of the Russian Armed Forces' positions in the vicinity of Kharkiv on 25/02/2022 (red), with the investigator's estimated area of origin for the rocket on Google Earth Pro. Note that the entirety of the rocket's estimated area of origin based on the 9M55k rocket's minimum and maximum range is either inside the Russian Federation, or in Ukrainian territory estimated to be under the control of the Russian Armed Forces on 25/02/2022 (Credit: Liveuamap/Google Earth Pro).

A peer investigator pointed out that the Centre for Information Resilience has a map[25] that includes geolocated images of likely firing positions used by the Russian Armed Forces. The investigator saw that there were ten Russian Armed Forces firing locations pinned on this map inside the estimate cone of origin for the rocket that is the subject of this report, as the image overlay below shows:

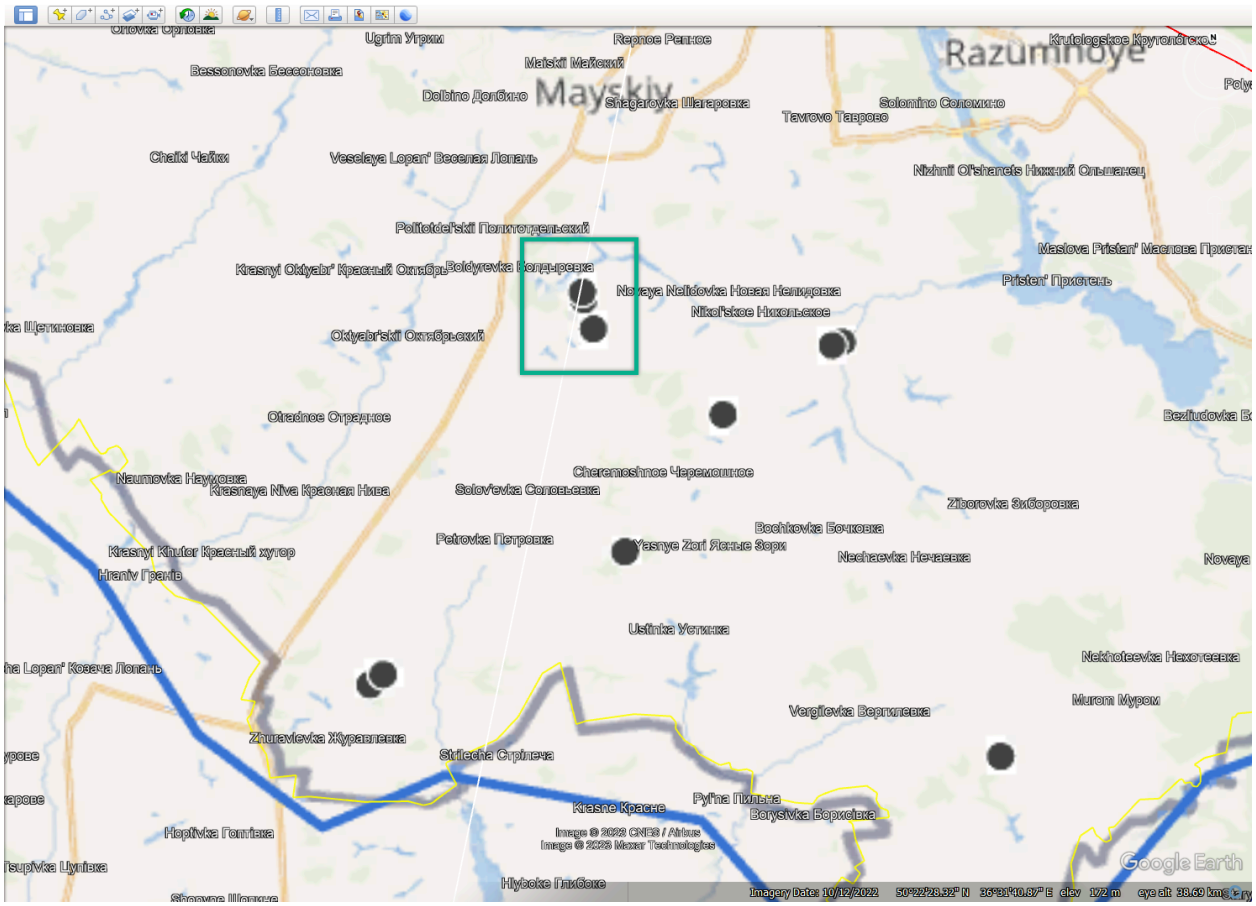
[25] https://maphub.net/Cen4infoRes/russian-ukraine-monitor



The image below is an overlay of a screenshot of the Centre for Information Resilience map, and the approximate area of origin cone estimated by this investigator. The black dots represent verified artillery and rocket artillery firing positions of the Russian Armed Forces (Credit: Centre for Information Resilience/Google Earth Pro)

Out of the ten firing positions marked by the black dots in the image above, nine are located inside the investigator's estimated cone of origin for the rocket in this report. The investigator noted that out of these nine locations, five corresponded to verified satellite or social media images showing multiple launch rocket systems (MLRS) belonging to the Russian Armed Forces firing, or having recently fired their rockets either on 24/05/2022, or 25/02/2022. These types of launchers are the same that would have fired the rocket that is the subject of this report.

In particular, the investigator noted that three of the firing positions marked in the Centre for Information Resilience map closely align with the centre line of the estimated cone of origin. The investigator measured these three sites as being approximately 51-53 kilometers away from the location where the rocket motor embedded itself in the pavement, well within the range of the rocket:



The image overlay above shows three Russian Armed Forces MLRS firing positions (in the green box) as they appear in the Centre for Information Resilience Map (Credit: Centre for Information Resilience/Google Earth Pro).

The investigator further noted the information corresponding to these three locations, which is summarized below:

- Location One: A tweet[26] linking to a TikTok video[27] showing a smoke cloud consistent with the operation of an MLRS. The presence of the cloud suggests that the launch system operated minutes prior to the recording of the video. The TikTok video was uploaded on 24/02/2022.
- Location Two: A tweet[28] containing a satellite image showing a field with burn marks consistent with the operation of MLRS. The image was captured on 24/02/2022.

[26] https://twitter.com/Michael1Sheldon/status/1497190339815383043?s=20&t=7GQNIF_WGJmN5crqrYSqBw

[27] https://www.tiktok.com/@sveta_sa1979/video/7068135985623649537?is_copy_url=1&is_from_webapp=v1

[28] https://twitter.com/Cen4infoRes/status/1504877082970570756?s=20&t=3ZbtXTB7-5sqF2f2urq5kA

- Location Three: A tweet[29] containing a satellite image showing a field with burn marks consistent with the operation of MLRS. The image was captured on 24/02/2022.

While none of these images show MLRS activity in the area on 25/02/2022, they do indicate that the Russian Armed Forces were firing rockets southwards in the direction of Kharkiv from these locations at least a day prior.

Were There Military Structures, Installations or Other Assets in the Area?

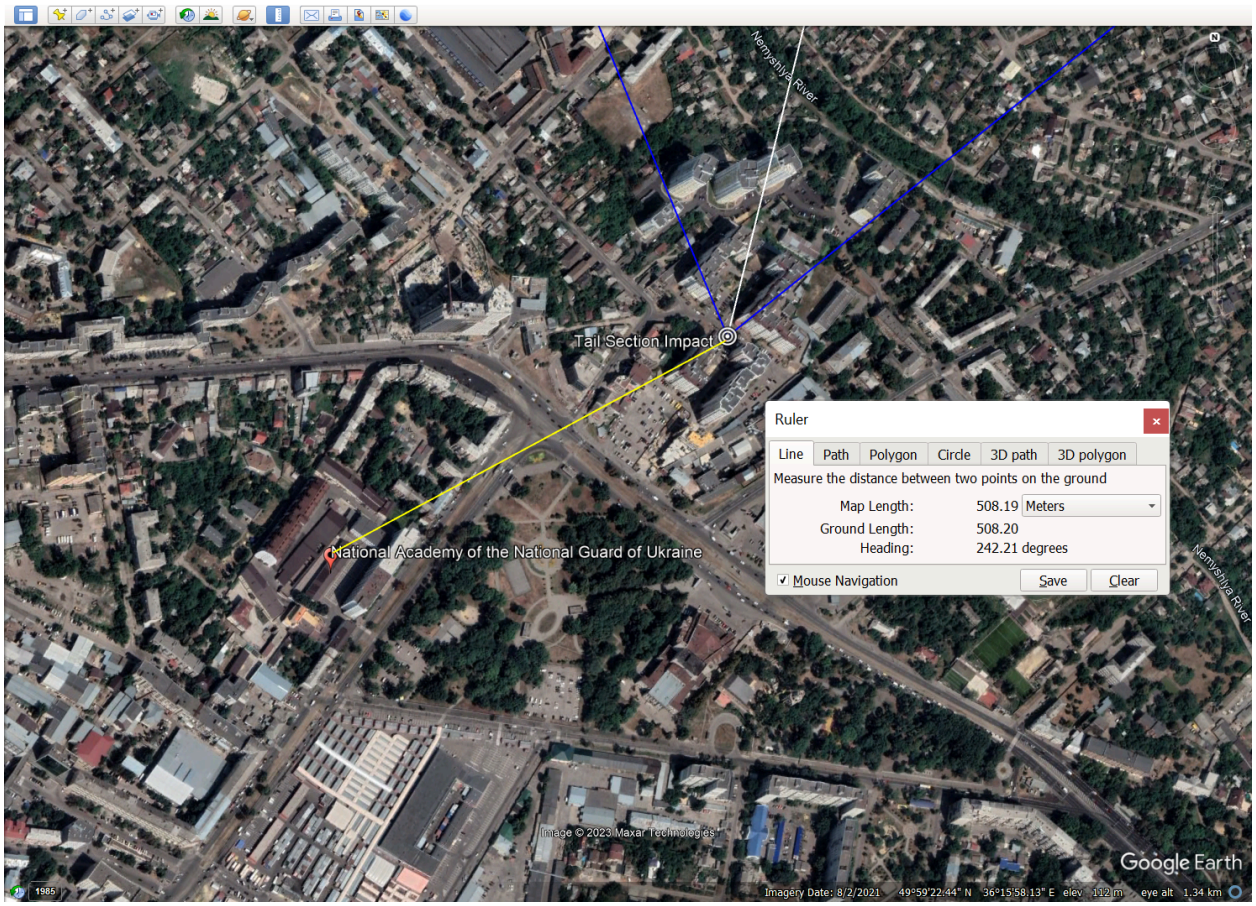
The investigator found that the rocket motor of the rocket landed approximately 500 meters northwest of the campus for the National Academy of the National Guard of Ukraine (NANGU). This is according to the site's description on Google Maps[30], Yandex Maps[31], and Wikimapia[32].

The NANGU website[33] describes itself in the following way:

> "The National Academy of the National Guard of Ukraine is a powerful institution of higher education that carries out targeted training of military specialists."

The NANGU website also lists that it trains officers in four faculties: "Operative", "Command Staff", "Faculty of Logistics", and "Faculty of Humanities", with bachelor programs lasting four years and Master's level programs lasting 1.5 years.

[29] https://twitter.com/Cen4infoRes/status/1504876129416626179?s=20&t=3ZbtXTB7-5sqF2f2urq5kA
[30] https://maps.app.goo.gl/p5ziZVDFe4Sz7niDA
[31] https://yandex.com/maps/org/national_academy_of_national_guard_of_ukraine/1029726031/?ll=36.264656%2C49.988660&z=16.88
[32] https://wikimapia.org/#lang=en&lat=49.988760&lon=36.261921&z=18&m=w&show=/3256784/The-National-Academy-of-the-National-Guard-of-Ukraine&search=49.990925%2C%2036.267720
[33] http://nangu.edu.ua/about



The image below shows the location of the rocket motor impact relative to the Kharkiv campus for the National Academy of the National Guard of Ukraine (orange box), located some 500 meters southwest (Credit: Google Earth Pro).

The investigator did not find any other evidence of military structures, installations, or assets in the area.

Are There Any Indications of What the Location Was Being Used for?

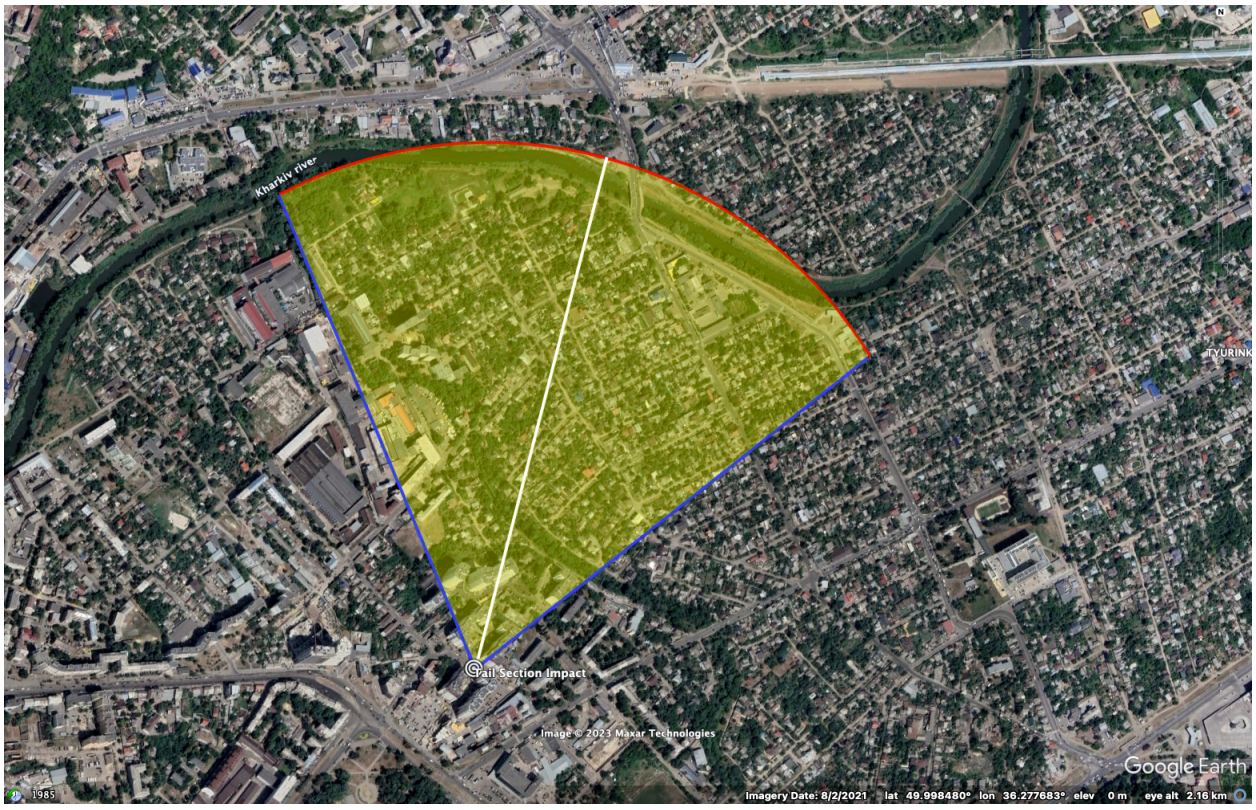
The investigator found that the rocket motor landed in a residential area that contained: residential apartment buildings; hotels; commercial establishments, including a shopping mall; a mosque; and detached homes. The intersection into which the rocket motor embedded itself is surrounded by residential apartment buildings and commercial establishments, including a convenience store and a store that sells equipment for vehicle repair.

As the images in Source 1, Source 2, and Source 3, and Source 4 show, there were civilian vehicles in the vicinity of the munition remnant, both parked at residential parking lots or on the road. It is not clear if the vehicles that were on the road were in those positions at the time that the rocket motor impacted the ground, or if they arrived at the scene later.

Where Did the Explosives Land and Detonate?

According to experts spoken to by the Bellingcat Justice and Accountability team, rocket motors of a 9M55K rocket can be expected to land anywhere up to 1 kilometer from the area impacted by the submunitions that it carried, towards the point of origin of the rocket. In other words, after the rocket's submunitions have been dispersed, the rocket and rocket motor can continue to fly for as much as one kilometer before impacting the ground.

With this in mind, the investigator measured one kilometer towards the point of origin from the spot where the rocket motor impacted in order to determine the possible area of impact of submunitions:



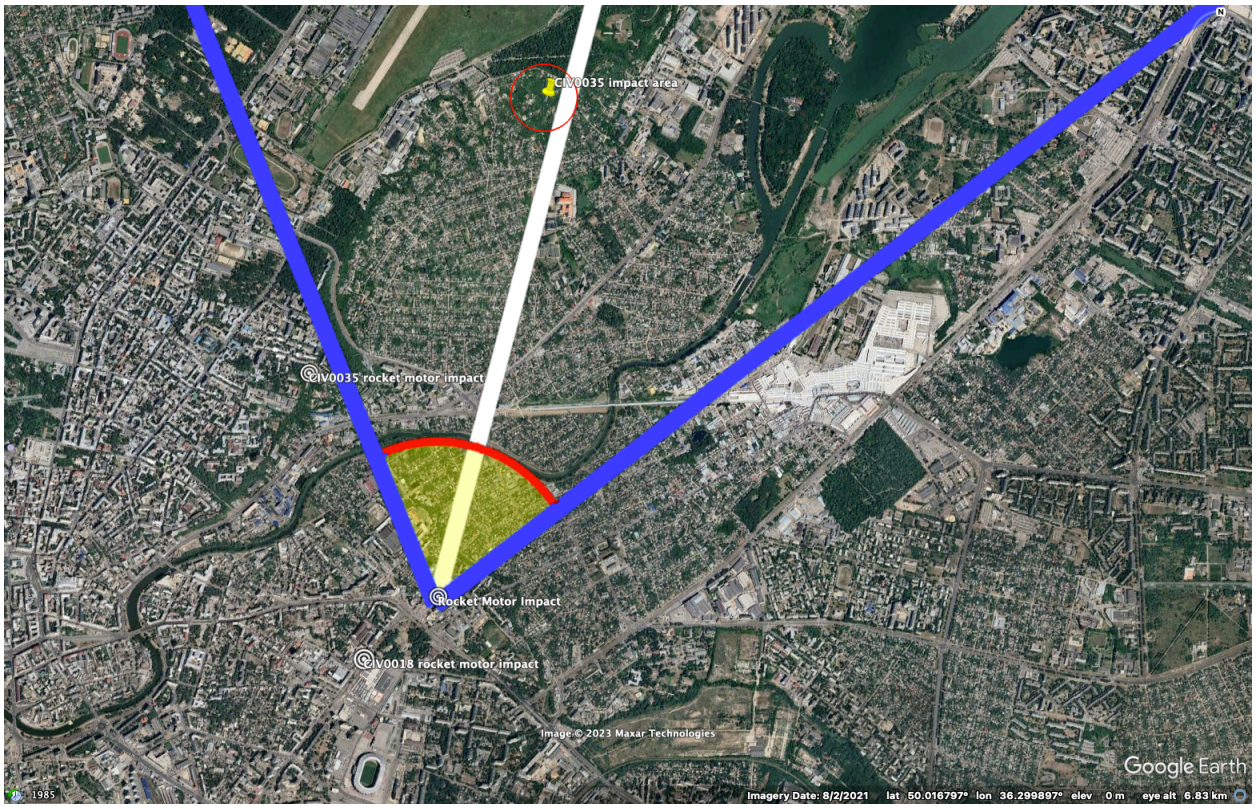
The image above shows a graphic overlay over the rocket's estimated area of origin one kilometer away from the rocket motor's point of impact. This is the possible area of impact of submunitions from this rocket (Credit: Google Earth Pro).

A survey of the area seen in the graphic above in red on Google Maps and Yandex shows that the possible area of impact of submunitions is made up primarily of detached residential homes.

This area also includes commercial establishments, a drug rehabilitation facility[34], and a vocational school[35].

There is also an industrial site[36] and an elementary school[37] located on the immediate edge of this area.

Additionally it should be noted that CIV0031, which appears to depict the impact of cluster munitions, occurred on the same date and very close to the assessed direction of origin, but three kilometers from the point of impact of the rocket motor in question.



Map depicting the rocket motor impact in relation to other rocket motors seen in CIV0018 and CIV0035 as well as the impact area of the submunitions seen in CIV0031 (Credit: Google Earth).

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34 https://yandex.com/maps/147/kharkiv/?ll=36.272587%2C49.992392&mode=poi&poi%5Bpoint%5D=36.270977%2C49.993033&poi%5Buri%5D=ymapsbm1%3A%2F%2Forg%3Foid%3D1260055511&z=16.87

35 https://yandex.com/maps/147/kharkiv/?ll=36.272587%2C49.992392&mode=poi&poi%5Bpoint%5D=36.270543%2C49.990569&poi%5Buri%5D=ymapsbm1%3A%2F%2Forg%3Foid%3D1075678393&z=16.87

36 https://yandex.com/maps/147/kharkiv/?ll=36.267265%2C49.993995&mode=poi&poi%5Bpoint%5D=36.263712%2C49.995099&poi%5Buri%5D=ymapsbm1%3A%2F%2Forg%3Foid%3D209655113197&z=17.27

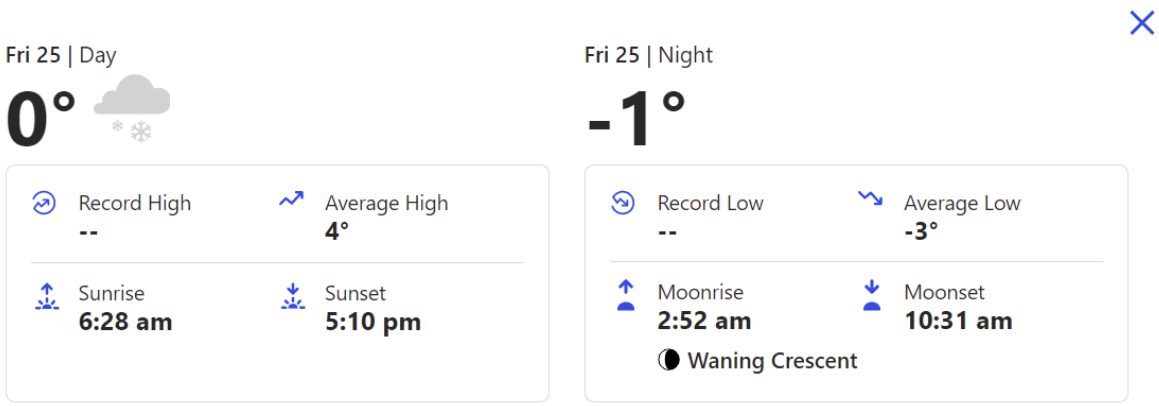
37 https://yandex.com/maps/147/kharkiv/?ll=36.270949%2C49.992255&mode=poi&poi%5Bpoint%5D=36.266508%2C49.993798&poi%5Buri%5D=ymapsbm1%3A%2F%2Forg%3Foid%3D1048558874&z=16.27

Timeline of the Incident

The investigator found a reference to a munition remnant impacting a street in Kharkiv on 25/02/2022 via a Telegram post[38] which was shared at 11:34 EET. This reference suggests that the city of Kharkiv was under missile barrage as early as that time on that day.

The earliest reference to the event that is the subject of this report that the investigator found was an S4I1[39] of the munition remnant embedded in the pavement that was shared on Telegram at 11:44 EET on 25/02/2022. Subsequently, the same Telegram channel posted another S3I1[40] of the same munition remnant at 11:41 EET, and a S2V1[41] at 11:45 EET on 25/02/2022. Because these three images were shared in a rapid succession—within five minutes of one another—the investigator believes that they were captured at approximately that same time, and that they were shared online shortly after they were captured. Importantly, in Source 1 it's possible to see the tracks of cars in the light snow around the rocket motor, as if cars had passed over that location. This would not have been possible with the rocket motor present. As such the image must have been taken very shortly after the impact of the rocket motor.

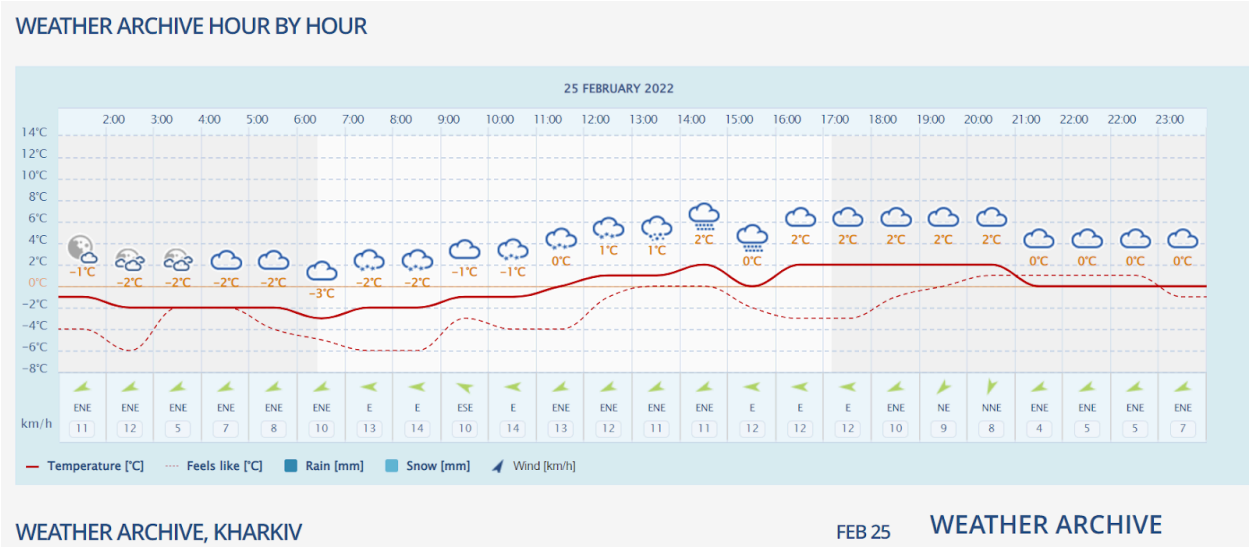
As Source 1, Source 2, and Source 3 show, there was light snow falling at the site. A check of historical weather data for Kharkiv shows that there was snow in the forecast[42] for 25/02/2022:



Weather forecast for Kharkiv calling for snow on 25/02/2022 (Credit: Weather.com[43]).

[38] https://t.me/c/1754252633/3289
[39] https://t.me/c/1754252633/3291
[40] https://t.me/c/1754252633/3292
[41] https://t.me/c/1754252633/3293
[42] https://weather.com/weather/monthly/l/Kharkiv+Kharkiv+Ukraine?canonicalCityId=dde19125370c8722fdb322107e0624d6612e6c84de1c5b1ea5a691c12df98489
[43] https://weather.com/weather/monthly/l/Kharkiv+Kharkiv+Ukraine?canonicalCityId=dde19125370c8722fdb322107e0624d6612e6c84de1c5b1ea5a691c12df98489

Another weather website[44] shows that there were intermittent periods of snow in Kharkiv on the morning of 25/02/2022, between 07:00 and 08:00 EET, and then between 10:00 and 14:00 EET:



Weather forecast for Kharkiv from 25/02/2022 showing periods of snowfall throughout much of that morning (Credit: Inertia Weather[45])

Combined, the earliest reference to the incident found and the historical weather data for Kharkiv for 25/02/2022 indicate that the incident in this report occurred that morning, approximately at around 11:40 EET.

Statements from Parties of the Conflict

Ukraine

On February 28, 2022, Ukrainian President Vladimir Zelensky issued a video[46] statement in which he spoke about the Russian attack on Kharkiv. He called the bombing of Kharkiv "a military crime", and that the areas of the city that had been bombed did not contain any military targets.

Russia

On March 1, 2022, Reuters reported[47] that Kharkiv had been hit by Russian cluster munitions on February 28, 2022. According to Reuters,

[44] https://weather.interia.com/weather-archive-25-02-2022,cId,59619
[45] https://weather.interia.com/weather-archive-25-02-2022,cId,59619
[46] https://www.facebook.com/watch/?v=902417957122147
[47] https://www.reuters.com/world/ukraines-kharkiv-struck-by-cluster-bombs-experts-say-2022-03-01/

> "When asked about allegations that Russia was using cluster munitions and vacuum bombs, Kremlin spokesperson Dmitry Peskov said: "It's undoubtedly fake news." Russian operations are focused on military targets, not civilian ones, he said."

Conclusion

On 25/02/2022, the rocket motor of a 9M55K cluster munition rocket landed at an intersection in Kharkiv's Saltivskyi district. The intersection is located in a residential area of the city.

Analysis of the angle at which the rocket motor embedded itself into the pavement allowed for an estimation of its point of origin. According to this analysis, the rocket to which the rocket motor in this report was attached was fired from a position approximately north/north-east of the intersection where the rocket motor landed.

Analysis of open sources indicated that the city of Kharkiv had come under multiple rocket launch system (MLRS) attacks at least one day prior from positions inside the Russian Federation. It is not possible to determine conclusively whether the rocket motor outlined in this report was fired from these positions, but their presence, confirmed dates of activity, and location relative to the site make them possible candidates for points of origin.

Further Action

Determine whether any other CIVHARM events can be connected to this incident. This determination can be made if, for example, a 9M55k cargo section can be found to have landed in the vicinity of the rocket motor highlighted in this incident report. This may include: CIV0035, CIV0018 and CIV0031.