

CASE FILE 01 / 237UAP00051

237UAP00051

High-altitude public UAP report; score 110

HIGH-VALUE UNRESOLVED

REPORT NO.	UAP-OM-01-237UAP00051	DISPOSITION	HIGH-VALUE UNRESOLVED
PRIMARY CASE	237UAP00051	GENERATED	2026-05-20 18:32 UTC
REPORT TIME	2021-05-20T19:49:00+00:00	OBSERVER	37.50015, -76.98615
SOURCE CASE IDS	237UAP00051		

Abstract

This case file evaluates a reported UAP sighting against the available orbital-object layer. No compact same-launch group fully identifies the file by itself. The final disposition is assigned under a normal-object favored standard, where ordinary aerospace/orbital explanations are preferred when they reasonably fit the report.

This is a standalone independent analysis prepared from public-source records and public orbital datasets. It is not an official government determination, classification marking, or agency-authored report.

1. Executive Summary

237UAP00051 was screened against historical public LEO catalog objects orbital elements at the extracted time and observer coordinate. The screen did not produce enough mundane evidence to close the case under the normal-object favored standard. Hard features retained for follow-up: radar/primary evidence.

1.1 Key Findings

- Source score 110 based on: radar/primary-return language, multiple aircraft/facility witnesses, NORAD/AMOC/EADS/CONR check, negative official correlation, high-altitude report.
- Report time used: 2021-05-20T19:49:00+00:00.
- External object layer used: public LEO catalog objects.
- Disposition standard: UNRESOLVED requires case-specific causal fit. Satellite density above the horizon is context only and cannot by itself resolve the report.
- Non-causal context / rejection screens: very dense orbital-object sky background; context only, not causation; NASA/JPL known-small-body rejection screen present.
- Remaining hard features: radar/primary evidence.
- Objects above horizon: 839; at/above 10 deg: 401.
- No compact same-launch/designator group survived the report threshold.
- No explicit Starlink/balloon wording was found in the source excerpt used for ranking.

1.2 Bottom Line

HIGH-VALUE UNRESOLVED: Hard report features remain after the normal-object screens, such as primary/radar evidence, multiple witnesses, footage references, or motion language that still conflicts with the available object layer.

2. Source Control

The source-control table identifies the public report records reviewed for this case and lists public access links where available. The table is included so this PDF remains interpretable when distributed by itself.

CASE ID	REPORT DATE FIELD	FACILITY / TITLE	TEXT EXTRACT	PUBLIC PDF LINK
237UAP00051	19:49 05/20/2021 Paged: NO	ZDC	text extract present	237UAP00051.pdf

3. Original Report Evidence

PRIMARY EXCERPT USED FOR MATCHING	Mode C intruder alert observed by controller moving slowly to the NW 50 SE of RIC @ FL400. 2 aircraft at FL390 were queried. First aircraft reported an unidentified aerial phenomenon just above them at FL400 and second aircraft (some time later) saw contrails above them at FL400. HQ DEN requested CONR to look at replay. CONR observed primary target off the HPW031 at 12 NM. The unknown phenomenon was traveling NW bound at approximately FL400. HQ DEN asked AMOC for replay and negative results found. ZDC reported calls signs of two previous aircraft as SCX3036 and PPJ510.
REPORT TIME USED	2021-05-20T19:49:00+00:00
OBSERVER COORDINATE USED	37.50015, -76.98615
OBSERVER SOURCE BASIS	aviation_radial:HPW031 at 12 NM (public text extract 237UAP00051)

4. Methodology

1. **Spacetime extraction.** The report time and observer coordinate were extracted from the public text report and normalized to UTC. Aviation fixes/radials were resolved during earlier preprocessing where applicable.
2. **External object dataset.** The object layer used historical Space-Track/TLE-derived public LEO catalog objects element rows. The analytic mode for this case is historical public LEO catalog objects element propagation and same-launch/designator sky grouping.
3. **Propagation.** Orbital elements were propagated to the report minute and observer location. For launch-object checks, samples around the report minute were retained. For Starlink group checks, objects above the horizon were clustered by sky position and filtered for same-launch groupings.
4. **Comparison.** The output was compared against the report's count of lights, direction cue, motion language, altitude/radar language, and whether the file itself already suggested a satellite explanation.
5. **Causation standard.** Mere object presence above the horizon is treated as background context only. A normal-object disposition requires a case-specific causal fit, such as a named launch object, a compact same-launch trajectory group, or source language that directly supports that object class.
6. **Disposition assignment.** *Identified* means a specific normal object fits the report spacetime and the hard reported features do not materially conflict. *Normal-object favored* means a case-specific ordinary aerospace/orbital candidate exists, but it is not a full named identification. *Insufficient* means the file is too thin to carry high anomaly value. *High-value unresolved* is used when radar, video, rapid maneuver, or multi-witness features remain after reasonable normal-object checks.

5. External Object Evidence

5.1 Search Volume and Density

This table is a screening layer only. Objects above the horizon show background opportunity; they do not establish causation unless a specific object or compact trajectory group matches the reported behavior.

PUBLIC LEO CATALOG OBJECTS CATALOG IDS CONSIDERED	16117	HISTORICAL ELEMENT ROWS	16117
ABOVE HORIZON AT REPORT MINUTE	839	AT/ABOVE 10 DEG	401
LARGEST SAME-SKY CLUSTER	401		

No compact same-launch/designator group survived the report threshold. In this condition, satellite density remains context only and cannot by itself resolve a report with hard features.

5.2 Same-Launch / Same-Designator Candidate Groups

#	LAUNCH DATE	COUNT	AZIMUTH SPAN	ELEVATION SPAN	MOTION LABELS	MEMBERS
No same-launch group identified.						

5.3 Primary Group Members

OBJECT	NORAD	LAUNCH	AZ	EL	RANGE KM	APPARENT MOTION	ELEMENT AGE H
No members available.							

5.4 Bright-Sky Context: Top public LEO catalog objects Objects by Elevation

OBJECT	AZ	EL	RANGE KM	APPARENT MOTION	LAUNCH DATE
NORAD 6845	9.42	83.79	1483.56	eastward, setting	73069A
NORAD 9063	44.45	83.61	1470.58	westward, setting	76077B
NORAD 30247	283.98	81.16	1036.59	eastward, setting	99025XG
NORAD 1312	345.16	79.19	2334.69	westward, setting	65004C
NORAD 22196	63.63	74.59	743.46	eastward, setting	92070D
NORAD 31980	129.63	72.25	1138.23	eastward, setting	99025CPH
NORAD 21115	63.54	71.74	1701.47	westward, setting	91009M
NORAD 8139	113.05	69.3	1472.53	westward, setting	74089H
NORAD 41209	218.93	68.46	856.98	westward, setting	00055DN
NORAD 18278	351.94	65.4	1036.45	eastward, setting	82055BA
NORAD 8143	151.78	63.69	1685.42	westward, rising	74089M
NORAD 13488	91.36	63.03	1294.42	eastward, setting	81053GJ

5.5 Largest Sky Clusters

#	COUNT	AZIMUTH SPAN	ELEVATION SPAN	MOTION LABELS
1	401	0.77-359.25 deg	10.06-83.79 deg	eastward, level, eastward, rising, eastward, setting, nearly fixed azimuth, rising, nearly fixed azimuth, setting, westward, level, westward, rising, westward, setting

5.6 Space-Track SATCAT Enrichment

Space-Track SATCAT metadata was pulled as a cached subset for NORAD catalog IDs appearing in this packet's evidence tables. This section adds owner/type/status context to the propagated object candidates.

PACKET SATCAT SUBSET ROWS	5370	FETCHED	2026-05-19T01:19:50+00:00
THIS CASE NORAD IDS CHECKED	30	SATCAT ROWS MATCHED	30
TOP OWNERS	CIS: 13, US: 12, PRC: 3, ESA: 1, IT: 1		
OBJECT TYPES	DEBRIS: 23, PAYLOAD: 4, ROCKET BODY: 3		

5.7 Space-Track Metadata for Top Propagated Objects

NORAD	OBJECT NAME	TYPE	OWNER	LAUNCH DATE	DECAY DATE
6845	COSMOS 588	PAYLOAD	CIS	1973-10-02	n/a
9063	DELTA 1 R/B	ROCKET BODY	US	1976-07-29	n/a
30247	FENGYUN 1C DEB	DEBRIS	PRC	1999-05-10	n/a
1312	DELTA 1 DEB	DEBRIS	US	1965-01-22	n/a
22196	IRIS R/B	ROCKET BODY	IT	1992-10-22	2025-12-23
31980	FENGYUN 1C DEB	DEBRIS	PRC	1999-05-10	n/a
21115	SL-8 DEB	DEBRIS	CIS	1991-02-12	n/a
8139	THORAD DELTA 1 DEB	DEBRIS	US	1974-11-15	n/a
41209	NOAA 16 DEB	DEBRIS	US	2000-09-21	n/a
18278	COSMOS 1375 DEB	DEBRIS	CIS	1982-06-06	n/a
8143	THORAD DELTA 1 DEB	DEBRIS	US	1974-11-15	n/a
13488	COSMOS 1275 DEB	DEBRIS	CIS	1981-06-04	n/a

5.6 NASA/JPL Near-Earth Object Screen

This secondary object screen checks NASA/JPL close-approach objects near the report date and propagates their observer geometry through Horizons at the report coordinate. It is a known-object rejection layer, not a generic astronomy backdrop.

NASA/JPL CAD WINDOW	event date +/- 1 day, dist-max 0.2 au	COORDINATE USED	37.50, -76.99
CLOSE-APPROACH OBJECTS	14	ABOVE HORIZON	2
BRIGHT-ISH ABOVE HORIZON	0 using apparent magnitude <= 10 screen		

5.7 NASA/JPL Objects Above Horizon

OBJECT	CLOSE APPROACH UTC	DIST AU	H	AZ	EL	APP MAG
2021 JJ3	2021-May-20 07:37	0.0440378194740369	25.39	51.37	3.09	20.70
2021 JE1	2021-May-20 19:57	0.0190147367341412	26.61	83.43	36.04	21.04

5.8 NASA/JPL Bright-Candidate Result

OBJECT	AZ	EL	APP MAG
No above-horizon close-approach object met the apparent magnitude <= 10 screen.			

- NASA/JPL CAD listed 14 near-Earth close approaches in the event-date +/-1 day window within 0.2 au.
- Horizons placed 2 of those objects above the local horizon at the report coordinate/time.
- None of the above-horizon close-approach objects were remotely bright enough for naked-eye explanation using the mag<=10 screen.

5.9 NASA / NOAA / ADS-B Expansion Layer

This source layer adds free NASA context that was previously missing from most packet cases. It is contextual evidence; it does not replace aircraft, satellite, balloon, or radar causation tests.

HOURL UTC	2021052019
CLOUD AMOUNT	25.9%
PRECIPITATION	0.0 mm/hr
10 M WIND	2.64 m/s
TEMPERATURE	28.82 C
RELATIVE HUMIDITY	39.9%
DONKI +/-1 DAY	CME: 5; FLR: 3; GST: 0

5.10 Horizons Sky Geometry Context

OBJECT	AZ	EL	APP MAG
Sun	255.71	50.42	-26.72
Moon	94.47	24.18	-10.63
Venus	244.21	63.47	-3.90
Mars	147.24	74.14	1.63
Jupiter	283.08	-35.55	-2.32
Saturn	291.37	-51.69	0.58

- Sun elevation was 50.4 deg, so this was daylight geometry, not a dark-sky sighting.
- Moon was above horizon at azimuth 94.5 deg / elevation 24.2 deg.
- Planets above horizon: Venus (63.5 deg), Mars (74.1 deg).
- NASA POWER cloud amount for the hour was 25.9%, with precipitation 0.0 mm/hr.
- DONKI event counts in +/-1 day: GST=0, FLR=3, CME=5.

5.11 Free Source Availability and Remaining Work

LAYER	STATUS	CASE-SPECIFIC NOTE
ADSB.LOL HISTORICAL RELEASE LISTING	not yet exhausted	v2021-05-20-planes-readsb-prod-0, v2021-05-20-planes-readsb-prod-1, v2021-05-20-planes-readsb-staging-0, v2021-05-20-planes-readsb-mlatonly-0
ADSB TRACKS DOWNLOADED	not yet exhausted	Requires targeted extraction from large daily history archives before claiming aircraft exhaustion.
NOAA GOES IMAGERY	not yet exhausted	Needed for cloud/lightning visual context.
NOAA GOES ABI/GLM MANIFEST	screened/present	Public S3 object availability for the report hour.
NOAA NEXRAD WEATHER RADAR	not yet exhausted	Weather radar only; not ATC radar.
NOAA IGRA RADIOSONDE	screened/present	Needed for balloon drift plausibility.
ASOS/METAR WEATHER OBSERVATIONS	screened/present	Nearest station surface observations around report time.

- ADSB.lol historical: extract aircraft traces from no public ADSB.lol annual repo found for 2021-05-20, then filter +/-60 min and 250 nmi around 37.5001,-76.9861.
- NASA POWER/Horizons/DONKI: batch context for 237UAP00051 at 2021-05-20T19:49:00+00:00.
- NOAA GOES: pull nearest ABI/GLM products for the UTC hour and render cloud/lightning map.
- NOAA NEXRAD: select nearest radar stations and render Level-II/III weather radar sweep around event time.
- NOAA IGRA: find nearest radiosonde station launches bracketing the event and model wind drift for balloon-like descriptions.
- Space-Track gp_history/decay: fetch exact historical element rows and decay/reentry status for top candidate NORAD IDs.

5.12 Weather, Imagery, and Balloon Query Plan

This plan identifies the concrete free sources needed for the next case-specific weather and balloon checks. These are not treated as completed exclusions until the data are downloaded and plotted.

GOES SATELLITE	GOES16
GOES ABI PREFIX	https://noaa-goes16.s3.amazonaws.com/ABI-L2-CMIPF/2021/140/19/
GOES GLM LIGHTNING PREFIX	https://noaa-goes16.s3.amazonaws.com/GLM-L2-LCFA/2021/140/19/

5.13 Nearest Weather-Airport Candidates

STATION	NAME	DISTANCE KM	COORDINATE
KRIC	Richmond International Airport	29.40	37.51, -77.32
KFAF	Felker Army Air Field	52.80	37.13, -76.61
KPHF	Newport News Williamsburg International Airport	59.80	37.13, -76.49
KLFI	Langley Air Force Base	72.20	37.08, -76.36
KNGU	Norfolk Naval Station (Chambers Field)	87.90	36.94, -76.29

- KRIC: [IEM ASOS/METAR daily CSV query](#)
- KFAF: [IEM ASOS/METAR daily CSV query](#)
- KPHF: [IEM ASOS/METAR daily CSV query](#)

5.14 Nearest Radiosonde Stations

STATION	NAME	DISTANCE KM	COORDINATE
USM00072402	WALLOPS ISLAND; VA.	140.70	37.93, -75.48
USM00072403	STERLING; VA.	169.90	38.98, -77.49
USM00072305	NEWPORT; NC.	303.10	34.78, -76.88
USM00072318	BLACKSBURG; VA.	304.80	37.20, -80.41
USM00072317	GREENSBORO/G.-HIGH PT.; NC.	305.90	36.10, -79.94

5.15 ASOS/METAR Surface Weather Observations

surface visibility ranged 10-10 statute miles; no precipitation was reported in the retained observations; no low broken/overcast cloud ceiling was evident in the retained station observations. Surface ASOS/METAR observations describe airport-level weather and visibility; they do not by themselves prove conditions at the sighting altitude or line of sight.

STATION	DISTANCE KM	NEAREST OBS UTC	VIS SM	SKY	WIND DEG/KT	METAR
KRIC	29.40	2021-05-20T19:54:00 +00:00	10.00	SCT08500, BKN30000, M, M	20.00 / 6.00	KRIC 201954Z 02006KT 10SM SCT085 BKN300 32/10 A3036 RMK AO2 SLP286 T03220100
KFAF	52.80	2021-05-20T19:56:00 +00:00	10.00	CLR, M, M, M	110.00 / 11.00	KFAF 201956Z AUTO 11011KT 10SM CLR 26/15 A3037 RMK AO2 SLP287 T02580152 \$
KPHF	59.80	2021-05-20T19:54:00 +00:00	10.00	CLR, M, M, M	80.00 / 15.00	KPHF 201954Z 08015KT 10SM CLR 23/12 A3041 RMK AO2 SLP297 T02330117

5.16 NOAA IGRA Radiosonde Wind Profile

Nearest sounding implies mean 0-12 km wind drift toward 268.9 deg at 5.43 m/s; a passive balloon could drift about 39.1 km in two hours under this crude layer-average model. Radiosonde winds are sparse station soundings; balloon drift remains approximate without launch time, ascent rate, object altitude, and exact line-of-sight bearing.

STATION	NAME	DISTANCE KM	SOUNDING UTC	MEAN DRIFT BEARING	MEAN SPEED M/S	2H DRIFT KM	MAX WIND
USM00072402	WALLOPS ISLAND; VA.	140.70	2021-05-21T00:00:00+00:00	268.90	5.43	39.10	36.00 at 9985.00 m

5.17 NOAA GOES ABI/GLM Public File Manifest

GOES public S3 objects are listed for the report hour where available. This is an availability manifest, not yet a rendered satellite image.

SATELLITE	GOES16	BUCKET	noaa-goes16
ABI SAMPLE FILES	12	GLM SAMPLE FILES	12

ABI sample objects:

- [ABI-L2-CMIPF/2021/140/19/OR_ABI-L2-CMIPF-M6C01_G16_s20211401900181_e20211401909489_c20211401909557.nc](#)
- [ABI-L2-CMIPF/2021/140/19/OR_ABI-L2-CMIPF-M6C01_G16_s20211401910181_e20211401919489_c20211401919564.nc](#)
- [ABI-L2-CMIPF/2021/140/19/OR_ABI-L2-CMIPF-M6C01_G16_s20211401920181_e20211401929488_c20211401929566.nc](#)
- [ABI-L2-CMIPF/2021/140/19/OR_ABI-L2-CMIPF-M6C01_G16_s20211401930180_e20211401939488_c20211401939558.nc](#)

GLM lightning sample objects:

- [GLM-L2-LCFA/2021/140/19/OR_GLM-L2-LCFA_G16_s20211401900000_e20211401900205_c20211401900227.nc](#)
- [GLM-L2-LCFA/2021/140/19/OR_GLM-L2-LCFA_G16_s20211401900200_e20211401900405_c20211401900420.nc](#)
- [GLM-L2-LCFA/2021/140/19/OR_GLM-L2-LCFA_G16_s20211401900400_e20211401901005_c20211401901026.nc](#)
- [GLM-L2-LCFA/2021/140/19/OR_GLM-L2-LCFA_G16_s20211401901000_e20211401901205_c20211401901225.nc](#)

6. Annotated Evidence Figure



Generated figure copied from the local evidence-plot output. It is included as an analytic visualization, not as original sensor imagery.

7. Analytic Comparison

CRITERION	REPORT EVIDENCE	ANALYTIC TREATMENT
TIME CONSTRAINT	2021-05-20T19:49:00+00:00	Directly used in propagation; this is a hard filter, not descriptive context.
LOCATION CONSTRAINT	37.50015, -76.98615	Directly used as observer point for azimuth/elevation/range computation.
COUNT / PATTERN	two-object/light language present	No compact same-launch count match; retained for unresolved report features.
MOTION LANGUAGE	moving	Reported motion remains only partly explained; this is a principal reason for high-value unresolved status.
RADAR / OFFICIAL CHECK	not specified	Radar or hard maneuvering language is treated as a conflict/collection gap, not hand-waved away.
ANALYTIC DISPOSITION	unresolved	237UAP00051 was screened against historical public LEO catalog objects orbital elements at the extracted time and observer coordinate. The screen did not produce enough mundane evidence to close the case under the normal-object favored standard. Hard features retained for follow-up: radar/primary evidence.

8. Caveats, Limitations, and Collection Gaps

- No raw cockpit video, ATC replay, radar plot, or witness interview transcript was reviewed unless explicitly stated in the public source text.
- Aviation-derived coordinates can represent a nearby fix/radial or report point, not necessarily the actual line-of-sight intercept point.
- Starlink visibility depends on illumination, observer altitude, atmospheric conditions, and apparent brightness; this analysis tests geometry, not photometry. No brightness model is used unless explicitly stated elsewhere in the case file.
- TLE propagation is appropriate for screening and reconstruction but is not a substitute for authoritative operational ephemerides.
- When many satellites are above the horizon, generic presence is weak evidence and is not treated as causation. The report emphasizes named launch-object checks or compact same-launch trajectory groups.
- This case is retained as high-value unresolved because the hardest reported behavior is not resolved by the current normal-object layers.

Appendix A. Public Report Text Extracts

237UAP00051

SKYWATCH INCIDENT REPORT

PRIMARY CODE: UNIDENTIFIED AERIAL PHENOMENON
Date: 19:49 05/20/2021 Paged: NO
Status: Closed
POD: DEN
Reporting Facility: ZDC

REMARKS

Mode C intruder alert observed by controller moving slowly to the NW 50 SE of RIC @ FL400. 2 aircraft at FL390 were queried. First aircraft reported an unidentified aerial phenomenon just above them at FL400 and second aircraft (some time later) saw contrails above them at FL400. HQ DEN requested CONR to look at replay. CONR observed primary target off the HPW031 at 12 NM. The unknown phenomenon was traveling NW bound at approximately FL400. HQ DEN asked AMOC for replay and negative results found. ZDC reported calls signs of two previous aircraft as SCX3036 and PPJ510.

Appendix B. Computational Evidence Digest

This appendix preserves the principal computed values used in the assessment, shortened to the fields most relevant to audit and review.

```
{
  "report_time_utc": "2021-05-20T19:49:00+00:00",
  "source_excerpt": "Mode C intruder alert observed by controller moving slowly to the NW 50 SE of RIC @ FL400. 2 aircraft at FL390 were queried. First aircraft reported an unidentified aerial phenomenon just above them at FL400 and second aircraft (some time later) saw contrails above them at FL400. HQ DEN requested CONR to look at replay. CONR observed primary target off the HPW031 at 12 NM. The unknown phenomenon was traveling NW bound at approximately FL400. HQ DEN asked AMOC for replay and negative results found. ZDC reported calls signs of two previous aircraft as SCX3036 and PPJ510.",
  "historical_starlink_element_rows": 16117,
  "observer": {
    "lat": 37.50014654556583,
    "lon": -76.98614726964468,
    "source": "aviation_radial:HPW031 at 12 NM (public text extract 237UAP00051)"
  },
  "case_id": "237UAP00051",
  "starlink_above_horizon_at_report_time": 839,
  "starlink_catalog_ids_considered": 16117,
  "largest_same-sky_cluster_count": 401,
  "starlink_at_or_above_10_deg": 401,
  "top_starlinks": [
    {
      "azimuth_deg": 9.42,
      "azimuth_plus_2m_deg": 157.11,
      "azimuth_plus_5m_deg": 161.35,
      "element_age_hours": 2.6,
      "element_epoch": "2021-05-20T17:12:45.275616+00:00",
      "elevation_deg": 83.79,
      "elevation_plus_2m_deg": 64.27,
      "elevation_plus_5m_deg": 32.65,
      "epoch_altitude_km": 1455.18,
      "ground_track_bearing_deg": 163.18,
      "ground_track_label": "SSE",
      "launch_date": "73069A",
      "launch_designator": "73069A",
      "name": "NORAD 6845",
      "norad_id": "6845",
      "range_km": 1483.56,
      "sky_motion_label": "eastward, setting",
      "subpoint_lat": 38.657,
      "subpoint_lon": -76.7413
    },
    {
      "azimuth_deg": 44.45,
      "azimuth_plus_2m_deg": 349.92,
      "azimuth_plus_5m_deg": 345.3,
      "element_age_hours": 1.86,
      "element_epoch": "2021-05-20T17:57:24.246720+00:00",
      "elevation_deg": 83.61,
      "elevation_plus_2m_deg": 55.94,
      "elevation_plus_5m_deg": 27.44,
      "epoch_altitude_km": 1421.97,
      "ground_track_bearing_deg": 341.87,
      "ground_track_label": "NNW",
      "launch_date": "76077B",
      "launch_designator": "76077B",
      "name": "NORAD 9063",
      "norad_id": "9063",
      "range_km": 1470.58,
      "sky_motion_label": "westward, setting",
      "subpoint_lat": 38.3506,
      "subpoint_lon": -75.9201
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    {
      "azimuth_deg": 283.98,
      "azimuth_plus_2m_deg": 339.01,
      "azimuth_plus_5m_deg": 344.51,
      "element_age_hours": 11.3,
      "element_epoch": "2021-05-20T08:31:03.324576+00:00",
      "elevation_deg": 81.16,
      "elevation_plus_2m_deg": 45.68,
      "elevation_plus_5m_deg": 17.9,
      "epoch_altitude_km": 611.47,
      "ground_track_bearing_deg": 346.63,
      "ground_track_label": "NNW",
      "launch_date": "99025XG",
      "launch_designator": "99025XG",
      "name": "NORAD 30247",
      "norad_id": "30247",
      "range_km": 1036.59,
      "sky_motion_label": "eastward, setting",
      "subpoint_lat": 37.7892,
```

```

"subpoint_lon": -78.4985
},
{
  "azimuth_deg": 345.16,
  "azimuth_plus_2m_deg": 220.62,
  "azimuth_plus_5m_deg": 201.13,
  "element_age_hours": 4.77,
  "element_epoch": "2021-05-20T15:02:42.579744+00:00",
  "elevation_deg": 79.19,
  "elevation_plus_2m_deg": 78.65,
  "elevation_plus_5m_deg": 51.77,
  "epoch_altitude_km": 679.41,
  "ground_track_bearing_deg": 192.77,
  "ground_track_label": "SSW",
  "launch_date": "65004C",
  "launch_designator": "65004C",
  "name": "NORAD 1312",
  "norad_id": "1312",
  "range_km": 2334.69,
  "sky_motion_label": "westward, setting",
  "subpoint_lat": 40.2961,
  "subpoint_lon": -77.9554
},
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  "azimuth_deg": 63.63,
  "azimuth_plus_2m_deg": 69.89,
  "azimuth_plus_5m_deg": 71.15,
  "element_age_hours": 2.29,
  "element_epoch": "2021-05-20T17:31:49.550304+00:00",
  "elevation_deg": 74.59,
  "elevation_plus_2m_deg": 26.17,
  "elevation_plus_5m_deg": 1.33,
  "epoch_altitude_km": 288.79,
  "ground_track_bearing_deg": 72.31,
  "ground_track_label": "ENE",
  "launch_date": "92070D",
  "launch_designator": "92070D",
  "name": "NORAD 22196",
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  "launch_designator": "99025CPH",
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  "elevation_plus_2m_deg": 50.84,
  "elevation_plus_5m_deg": 26.83,
  "epoch_altitude_km": 1467.24,
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  "launch_designator": "91009M",
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  "azimuth_deg": 113.05,

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    "elevation_plus_5m_deg": 32.05,
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    "launch_designator": "82055BA",
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    "subpoint_lon": -77.61
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    "launch_designator": "74089M",
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    "norad_id": "8143",
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Appendix C. Source Exhaustion Checklist

This checklist records which source layers were actually applied to this individual report. It separates checked evidence from unexhausted collection gaps so the disposition is auditable when the PDF is read alone.

SOURCE LAYER	STATUS	CASE-SPECIFIC NOTE
NARA PUBLIC UAP/FAA REPORT	reviewed	Source IDs: 237UAP00051
TIME AND OBSERVER COORDINATE	extracted	2021-05-20T19:49:00+00:00 at 37.50015, -76.98615
ORBITAL OBJECT PROPAGATION	screened	public LEO catalog objects
SPACE-TRACK SATCAT METADATA	screened	30 NORAD IDs checked; 30 matched in local SATCAT subset
LAUNCH-OBJECT/SUPGP LAYER	not applicable	not a launch-object case
NASA/JPL KNOWN SMALL-BODY LAYER	screened	CAD/Horizons secondary screen included when this case had NEO-relevant timing/ geometry
NASA POWER/HORIZONS/DONKI CONTEXT	screened	Hourly weather, sky geometry, and space-weather context where local JSON is present
AIRCRAFT/ADS-B LAYER	not exhausted	ADSB.lol historical release pattern is recorded separately; actual aircraft exhaustion requires targeted trace extraction
NOAA GOES IMAGERY LAYER	not exhausted	Cloud/lightning imagery layer for the report hour
NOAA GOES ABI/GLM MANIFEST	screened	Public S3 object listing for the report hour
NOAA/NEXRAD WEATHER RADAR LAYER	not exhausted	Weather radar only; not ATC/primary radar
NOAA IGRA RADIOSONDE LAYER	screened	Balloon drift plausibility layer
ASOS/METAR SURFACE WEATHER	screened	Nearest station visibility, cloud, wind, precipitation, and METAR observations
WEATHER/BALLOON SOURCE PLAN	planned	Nearest weather-airport, GOES, and radiosonde queries are listed where local plan JSON is present
FINAL ANALYTIC DISPOSITION	high-value unresolved	Presence-only satellite density is context only; a stronger case-specific fit is required for normal-object disposition

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2. National Archives and Records Administration. *Record Group 615: Unidentified Anomalous Phenomena Records Collection*. <https://www.archives.gov/research/topics/uaps/rg-615>
3. National Archives and Records Administration. *Bulk Downloads for Records Related to Unidentified Anomalous Phenomena (UAPs)*. <https://www.archives.gov/research/catalog/catalog-bulk-downloads/uap-bulk-download>
4. National Archives Catalog. *Records from the Federal Aviation Administration Relating to Unidentified Anomalous Phenomena, National Archives Identifier 493468575*. <https://catalog.archives.gov/id/493468575>
5. National Archives direct digital object. *237UAP00051.pdf, FAA UAP report record copied from RG 615 bulk digital objects*. <https://s3.dualstack.us-east-1.amazonaws.com/NARAprdstorage/lz/electronic-records/rg-615/493468575/237UAP00051.pdf>
6. Hugging Face dataset. *oxzoid/space-track-tle-history: historical TLE archive used for public LEO catalog objects screening*. <https://huggingface.co/datasets/oxzoid/space-track-tle-history>
7. Space-Track.org. *Public source for the underlying U.S. Space Surveillance Network TLE distribution referenced by the historical TLE archive*. <https://www.space-track.org/>
8. Space-Track.org. *API documentation for SATCAT and catalog metadata classes used for local enrichment*. <https://www.space-track.org/documentation#/api>
9. NASA/JPL Solar System Dynamics. *Close-Approach Data API documentation for known small-body encounter screening*. <https://ssd-api.jpl.nasa.gov/doc/cad.html>
10. NASA/JPL Solar System Dynamics. *Horizons API documentation for observer geometry and apparent magnitude queries*. <https://ssd-api.jpl.nasa.gov/doc/horizons.html>
11. NASA POWER. *Hourly point API documentation for meteorological context*. <https://power.larc.nasa.gov/docs/services/api/temporal/hourly/>
12. NASA. *DONKI space weather API documentation*. <https://api.nasa.gov/>
13. ADSB.lol. *Interactive API documentation and OpenAPI definition*. <https://api.adsb.lol/docs>
14. ADSB.lol. *Historical open-data release documentation*. <https://www.adsb.lol/docs/open-data/historical/>
15. OpenSky Network. *REST API documentation*. <https://openskynetwork.github.io/opensky-api/rest.html>
16. OpenSky Network. *Historical data via Trino documentation*. <https://openskynetwork.github.io/opensky-api/trino.html>
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22. Iowa Environmental Mesonet. *ASOS/AWOS/METAR data download service*. <https://mesonet.agron.iastate.edu/request/download.phtml>
23. CelesTrak. *Spacetrack Report No. 3: Models for propagation of NORAD element sets*. <https://celestrak.org/NORAD/documentation/spacetrk.pdf>
24. CelesTrak. *Supplemental GP element sets documentation and current endpoint index*. <https://celestrak.org/NORAD/elements/supplemental/>