National Transportation Safety Board
Office of Aviation Safety
Washington, DC 20594

CEN23FA174

METEOROLOGY

Specialist's Factual Report

December 15, 2023

TABLE OF CONTENTS

A. ACCIDENT

Location: Victor, Colorado
Date: May 6, 2023
Time: 0935 mountain daylight time
1535 coordinated universal time (UTC)
Airplane: Pool-Cessna; Registration: N15188

B. METEOROLOGY SPECIALIST

Paul Suffern
National Transportation Safety Board
Washington, DC

C. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board's Senior Meteorologist did not travel for this investigation but gathered all data remotely. Data for this investigation were collected from official National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) sources including the Weather Prediction Center (WPC) and the National Center for Environmental Information (NCEI). This Specialist's Factual Report contains the meteorological factors pertinent to the weather surrounding the accident time. All times are mountain daylight time (MDT) and are based upon the 24-hour clock, where local time is -6 hours from UTC. Directions are referenced to true north and distances are in nautical miles. Heights are above mean sea level (msl) unless otherwise noted. Visibility is in statute miles and fractions of statute miles. NWS station identifiers use the standard International Civil Aviation Organization 4-letter station identifiers versus the International Air Transport Association 3-letter identifiers, which deletes the initial country code designator "K" for U.S. airports.

The accident site was located at approximate latitude 38.6506° N, longitude 105.08712° W, on a mountain side at an elevation of 9,200 feet (ft).

D. FACTUAL INFORMATION

1.0 Synoptic Situation

The synoptic or large-scale migratory weather systems influencing the area were documented using standard NWS charts issued by the National Center for Environmental Prediction and the WPC, located in College Park, Maryland. These are the base products used in describing synoptic weather features and in the creation of forecasts and warnings for the NWS. Reference to these charts can be found in the Federal Aviation Administration (FAA) "Aviation Weather Handbook", FAA-H-8083-28.[1]

1.1 Surface Analysis Chart

The NWS Surface Analysis Chart centered over the central United States for 0900 MDT is provided as figure 1 with the location of the accident site within the black circle. The chart depicted a low-pressure system at 1007-hectopascals (hPa) located in central-eastern Colorado and a high-pressure system at 1016-hPa located in southwestern Colorado. A trough[2] was located across central Colorado north of the accident site. Several other low-pressure systems and associated frontal boundaries were located in Kansas stretching across other portions of the Midwest. Fronts and troughs can act as lifting mechanisms to help produce clouds and precipitation if sufficient moisture is present.

The station model closest to the accident site depicted an air temperature of 60 degrees Fahrenheit (°F), dew point temperature of 21°F, clear skies, and a west wind at 15 knots.

[1] FAA-H-8083-28

[2] Trough – An elongated area of relatively low atmospheric pressure or heights.

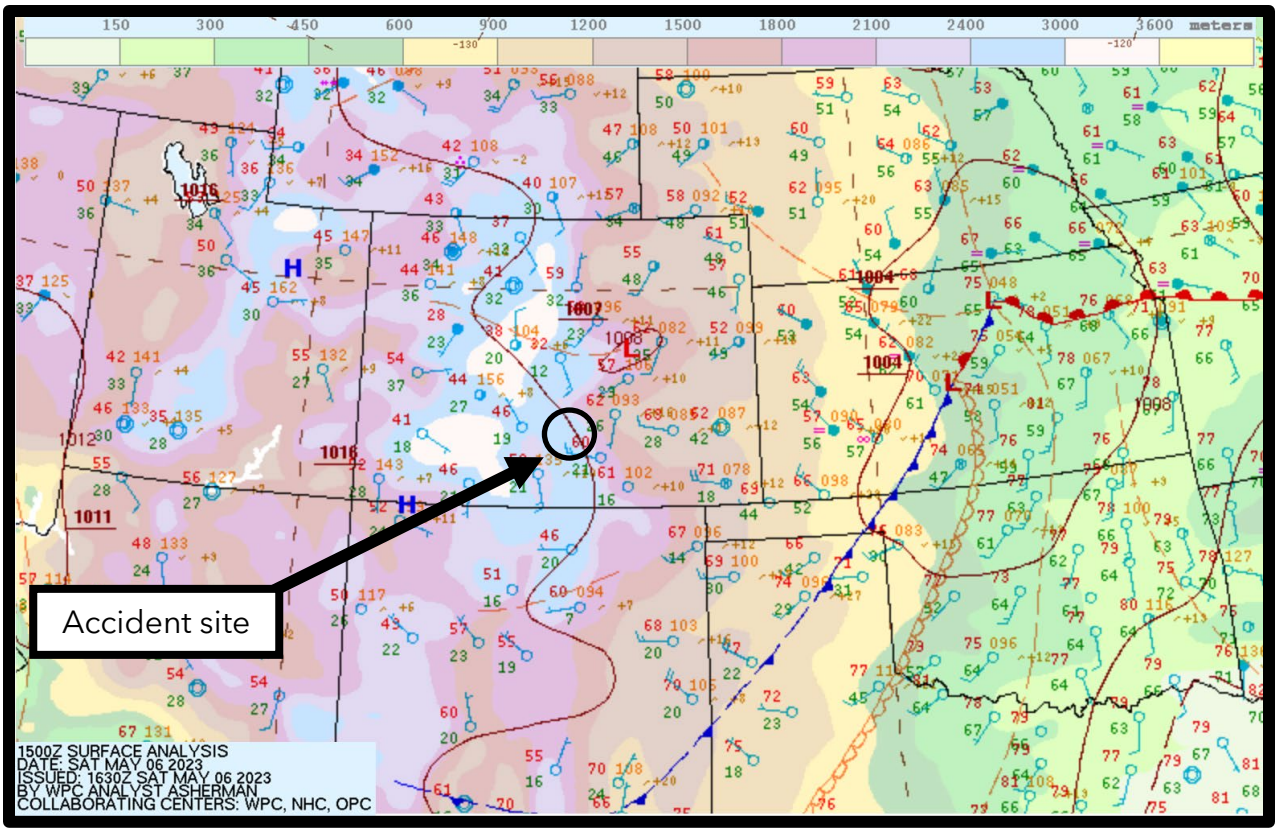

Figure 1. NWS Surface Analysis Chart for 0900 MDT.

1.2 Upper Air Charts

The NWS Storm Prediction Center (SPC) Constant Pressure Charts for 0600 MDT at 700- and 500-hPa are presented in figures 2 and 3. The charts depicted troughs above and to the west of the accident site. The 700-hPa constant pressure chart depicted a west wind around 25 knots above the accident site (figure 2) with the wind becoming southwesterly to 45 knots by 500-hPa (figure 3).

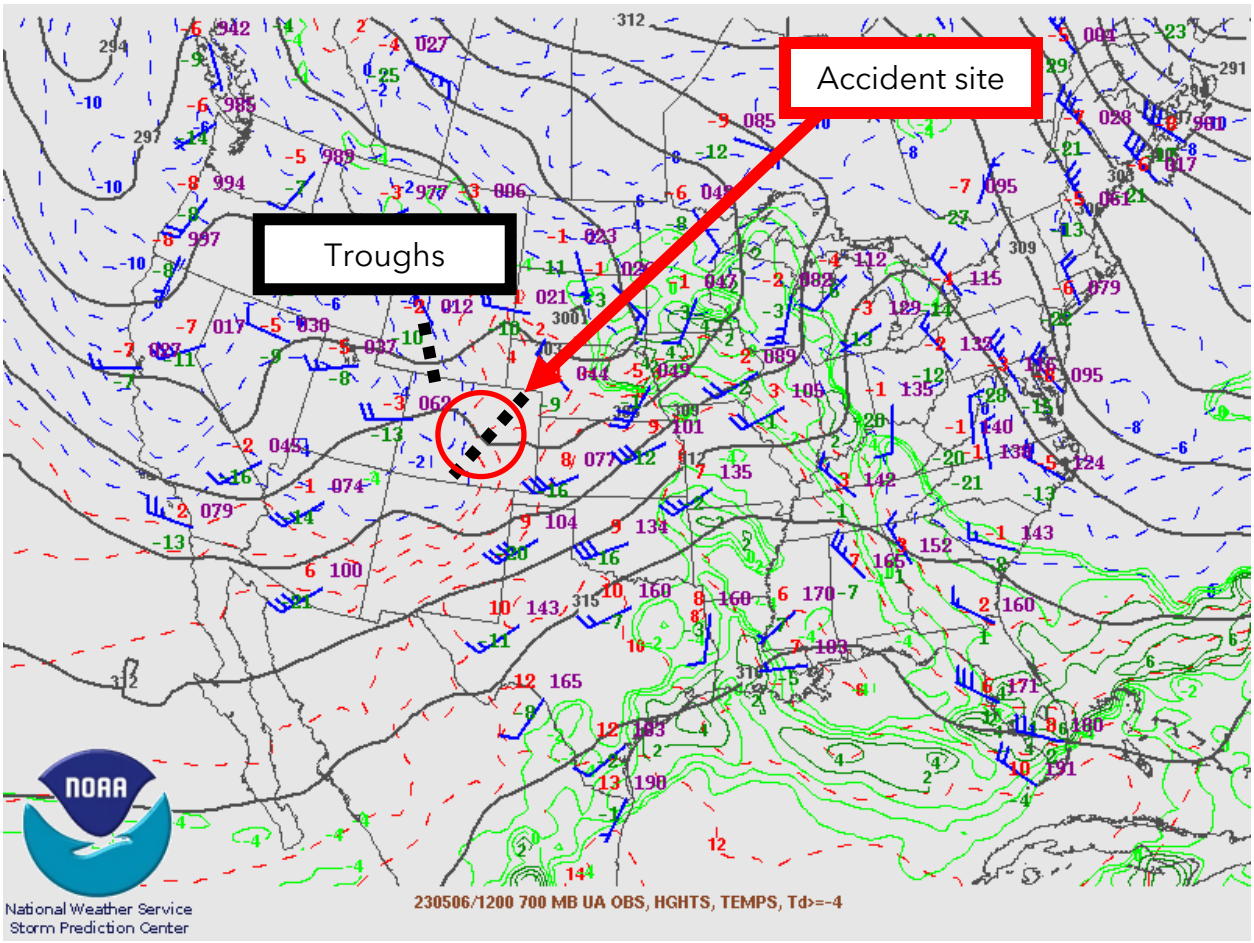

Figure 2. 700-hPa Constant Pressure Chart for 0600 MDT.

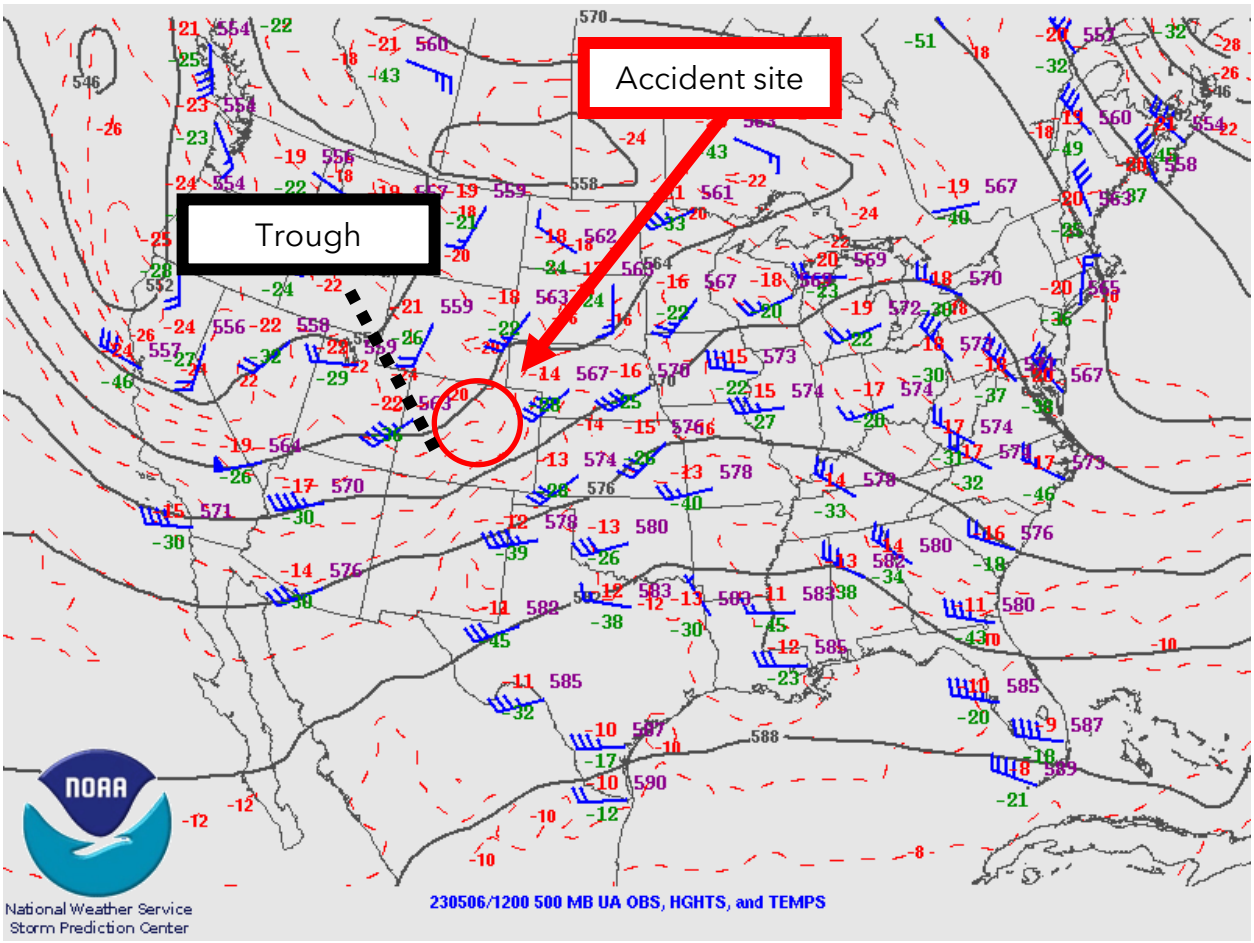

Figure 3. 500-hPa Constant Pressure Chart for 0600 MDT.

2.0 Surface Observations

The area surrounding the accident site was documented using official Aviation Routine Weather Reports (METARs) and Special Reports (SPECIs). The following observations were taken from standard code and are provided in plain language. Figure 4 is a local sectional chart with the accident site and the closest weather reporting location marked. A magnetic variation[3] of 8° east was indicated over the area.

[3] Magnetic variation – The angle (at a particular location) between magnetic north and true north. Latest measurement taken from https://skyvector.com/

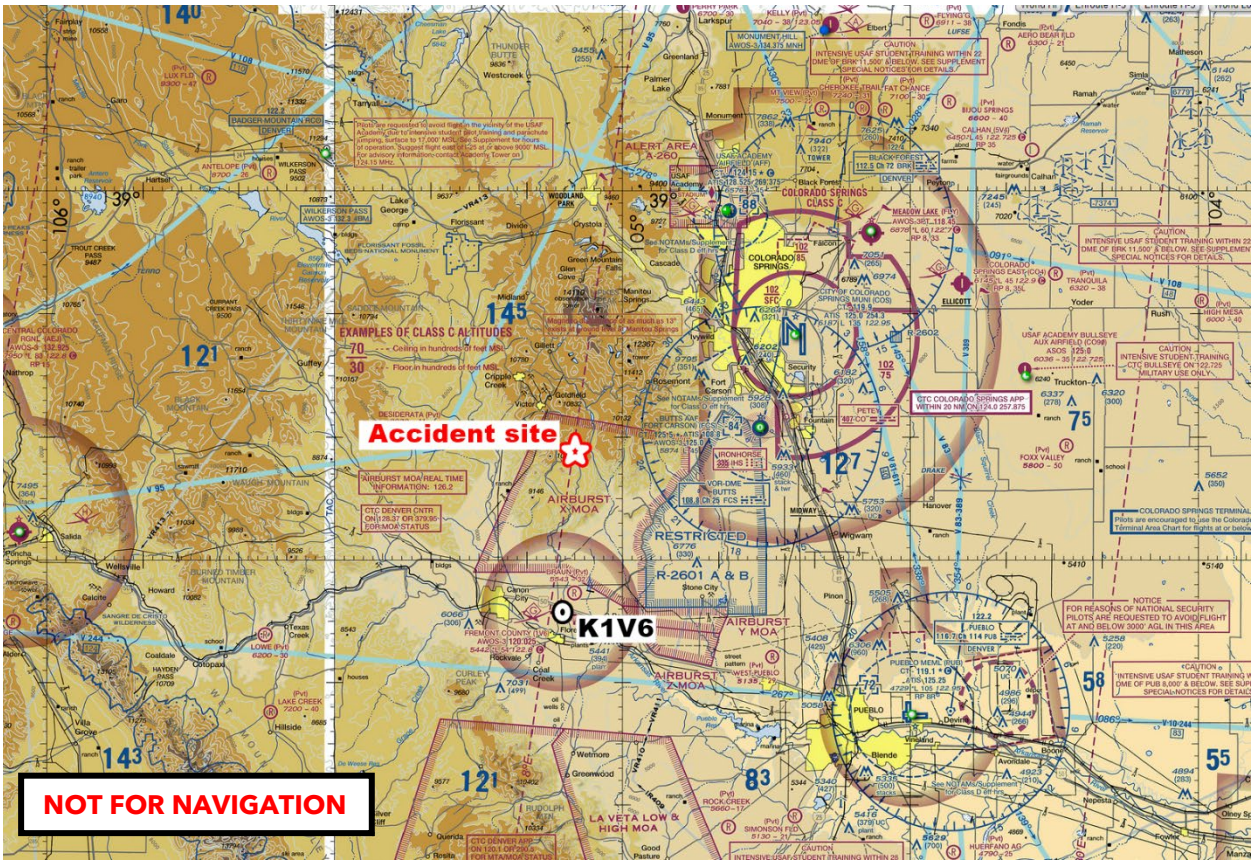

Figure 4. FAA sectional aeronautical chart of the accident area with the location of the accident site and surface observation site noted.

Fremont County Airport (K1V6) had the closest official weather station to the accident site and was also the departure airport. K1V6 had an Automated Weather Observing System (AWOS[4]) and its longline[5] reports were not augmented. The K1V6 AWOS was located 13 miles south of the accident site (figure 4), at an elevation of 5,442 ft, and issued the following observations surrounding the period of the accident:[6]

[4] AWOS – Automated Weather Observing System is equipped with meteorological instruments to typically observe and report temperature, dewpoint, wind speed and direction, visibility, cloud coverage and ceiling up to 12,000 feet, and altimeter setting. AWOS are maintained by the FAA. Certain AWOS may have different reporting or observational equipment.

[5] "Longline" refers to the dissemination of weather observations with the intent that they are available in near-real time to national databases and accessible to the general global public from a large number of vendors. This does not include public accessibility to observations from a reporting station's Very High Frequency (VHF; line-of-site) or telephone broadcast, where applicable. Longline dissemination of weather observations is the primary vehicle through which the weather observations are distributed.

[6] The bold sections of products in this report are intended to highlight the text that directly reference the weather conditions that affected the accident region around the accident time. The local times in this section next to the METARs are provided for quick reference between UTC and local times.

[0835 MDT] METAR K1V6 061435Z AUTO 28013KT 7SM CLR 16/M04 A2997 RMK AO2

[0855 MDT] METAR K1V6 061455Z AUTO 27012G20KT 10SM CLR 17/M04 A2996 RMK AO2

[0915 MDT] METAR K1V6 061515Z AUTO 28017G21KT 10SM CLR 18/M05 A2996 RMK AO2

[0935 MDT] METAR K1V6 061535Z AUTO 27019G24KT 10SM CLR 18/M06 A2996 RMK AO2

ACCIDENT TIME 0935 MDT

[0955 MDT] METAR K1V6 061555Z AUTO 26012G25KT 10SM CLR 18/M06 A2996 RMK AO2

[1015 MDT] METAR K1V6 061615Z AUTO 29017G25KT 10SM CLR 19/M05 A2996 RMK AO2

[1035 MDT] METAR K1V6 061635Z AUTO 29015G23KT 10SM CLR 20/M05 A2996 RMK AO2

The bold type observations decoded in plain language were as follows:

K1V6 weather at 0935 MDT, automated, wind from 270° at 19 knots with gusts to 24 knots, visibility 10 miles or greater, clear skies below 12,000 ft[7] above ground level (agl), temperature of 18° Celsius (C), dew point temperature of -6°C, and an altimeter setting of 29.96 inches of mercury (inHg). Remarks, automated station with a precipitation discriminator.

K1V6 weather at 0955 MDT, automated, wind from 260° at 12 knots with gusts to 25 knots, visibility 10 miles or greater, clear skies below 12,000 ft agl, temperature of 18°C, dew point temperature of -6°C, and an altimeter setting of 29.96 inHg. Remarks, automated station with a precipitation discriminator.

K1V6 weather at 1015 MDT, automated, wind from 290° at 17 knots with gusts to 25 knots, visibility 10 miles or greater, clear skies below 12,000 ft agl, temperature of 19°C, dew point temperature of -5°C, and an altimeter setting of 29.96 inHg. Remarks, automated station with a precipitation discriminator.

[7] Section 12.6.9 from the Federal Meteorological Handbook: Federal Meteorological Handbook Number 1, Surface Weather Observations and Reports (icams-portal.gov)

The observations from the K1V6 AWOS around the accident time identified VFR[8] conditions with gusting west winds to 25 knots.

3.0 Upper Air Sounding

A High-Resolution Rapid Refresh (HRRR)[9] model sounding was created[10] for the approximate accident site coordinates for 1000 MDT. The HRRR sounding was plotted on a standard Skew-T Log P diagram[11] from the surface to 500-hPa (or approximately 18,000 ft) using the RAOB[12] software package and is included as figure 5. The sounding depicted an elevation of 9,321 ft over the grid point with a near surface temperature of 7.3°C, a dew point temperature of -10.2°C, and a relative humidity of 28%. The sounding depicted the lifted condensation level (LCL)[13] at 16,311 ft and the convective condensation level (CCL)[14] at 18,539 ft. The freezing level was located at 10,929 ft. The precipitable water value at 0.12 inches.

---

[8] The NWS and the FAA Aeronautical Information Manual (AIM) section 7-1-7 defines the following general flight categories:

- Low Instrument Flight Rules (LIFR*) – ceiling below 500 ft above ground level (agl) and/or visibility less than 1 statute mile.
- Instrument Flight Rules (IFR) – ceiling between 500 to below 1,000 feet agl and/or visibility 1 to less than 3 miles.
- Marginal Visual Flight Rules (MVFR**) – ceiling from 1,000 to 3,000 ft agl and/or visibility 3 to 5 miles.
- Visual Flight Rules (VFR) – ceiling greater 3,000 ft agl and visibility greater than 5 miles.

* By definition, IFR is a ceiling less than 1,000 ft agl and/or visibility less than 3 miles while LIFR is a sub-category of IFR.

**By definition, VFR is a ceiling greater than or equal to 3,000 ft agl and visibility greater than 5 miles while MVFR is a sub-category of VFR.

[9] The HRRR is a NOAA real-time three-kilometer resolution, hourly-updated, cloud-resolving, convection-allowing atmospheric model, initialized by three-kilometer grids with three-kilometer radar assimilation. Radar data is assimilated in the HRRR every 15 minutes over a one-hour period.

[10] HRRR sounding was created using NOAA Air Resource Laboratory: READY Archived Meteorology (noaa.gov).

[11] Skew T log P diagram – is a standard meteorological plot using temperature and the logarithmic of pressure as coordinates, used to display winds, temperature, dew point, and various indices used to define the vertical structure of the atmosphere.

[12] RAOB – (The complete Rawinsonde Observation program) is an interactive sounding analysis program developed by Eosonde Research Services, The Villages, Florida.

[13] LCL - The height at which a parcel of moist air becomes saturated when it is lifted dry adiabatically.

[14] CCL – The level in the atmosphere to which an air parcel, if heated from below, will rise dry adiabatically, without becoming colder than its environment just before the parcel becomes saturated.

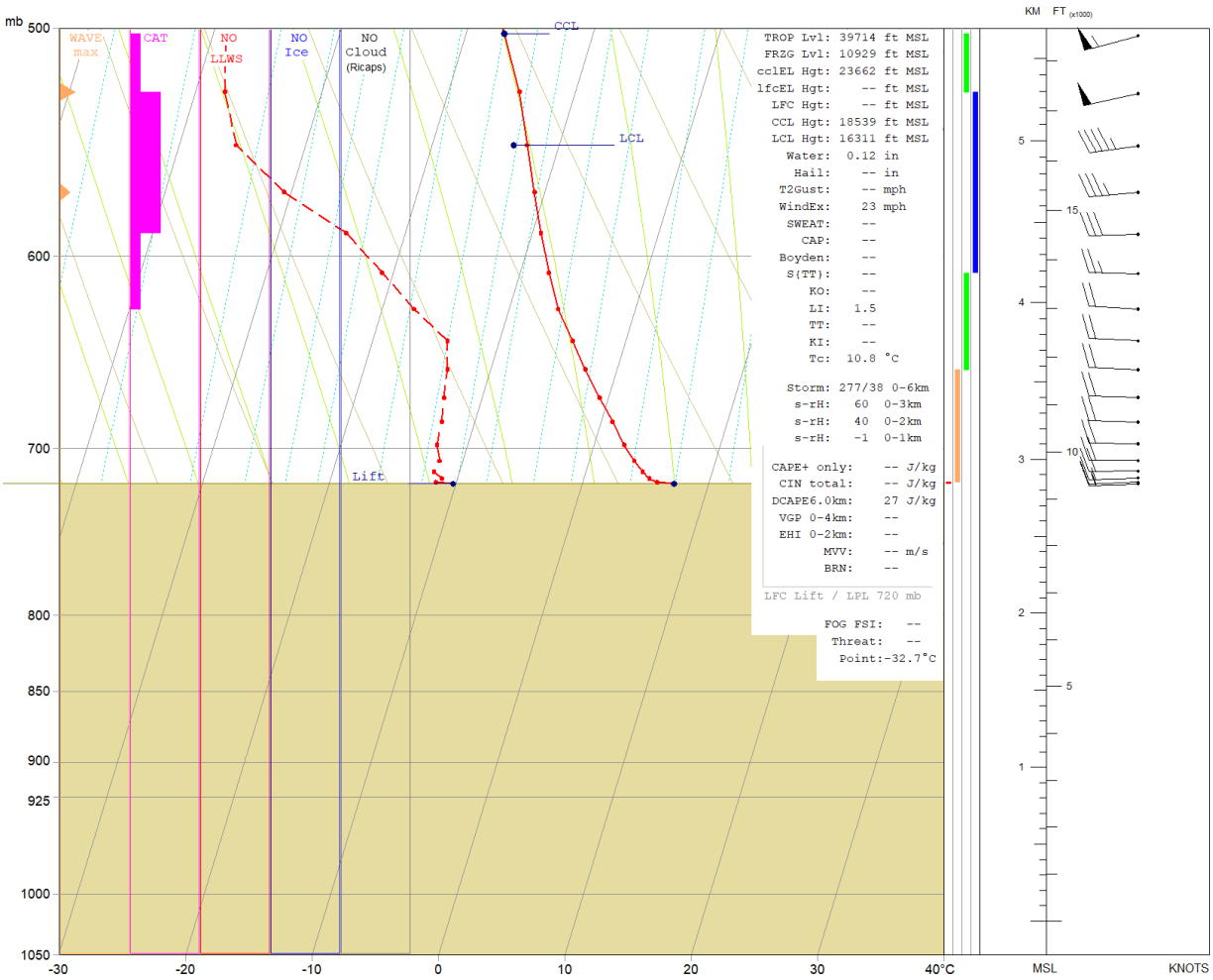

Figure 5. 1000 MDT HRRR sounding.

The 1000 MDT HRRR sounding indicated an unstable to conditionally unstable environment from the surface through 13,500 ft, then a stable environment from 13,500 ft through 17,000 ft. RAOB did not indicate clouds or icing conditions below 18,000 ft.

The 1000 MDT HRRR sounding wind profile indicated a near surface wind from 268° at 16 knots with little variation in direction through 18,000 ft. The wind speed increased to 30 knots by 14,500 ft and to 55 knots by 18,000 ft. RAOB did not indicate the possibility of low-level wind shear (LLWS), but RAOB did indicate light to moderate clear air turbulence (CAT) above 13,000 ft. Using the default mountain parameters RAOB indicated the potential for mountain wave activity (orange triangles on figure 5) in 2 layers above 14,000 ft with updraft and downdraft speeds up to 600 ft/min near the mountainous terrain.

4.0 Satellite Data

Geostationary Operational Environmental Satellite number 16 (GOES-16) visible, infrared, and water vapor data were obtained from an archive at the Space Science Engineering Center at the University of Wisconsin-Madison in Madison, Wisconsin, and processed using the Man-computer Interactive Data Access System software. Visible, water vapor, and infrared imagery (GOES-16 bands 2, 10, and 13) at wavelengths of 0.64 microns (µm), 7.3 µm, and 10.3 µm, respectively, were retrieved for the period from 0800 MDT through 1200 MDT and reviewed, and the closest images to the time of the accident were documented.

Figure 6 presents the GOES-16 visible image at 0936 MDT at 2X magnification with the accident site highlighted with a red square. The visible imagery did not indicate cloud cover above the accident site at the accident time. The low-level water vapor imagery[15] (attachment 1) did indicate transverse banding[16] across the mountainous terrain including the accident site. It should be noted these figures have not been corrected for any parallax error.

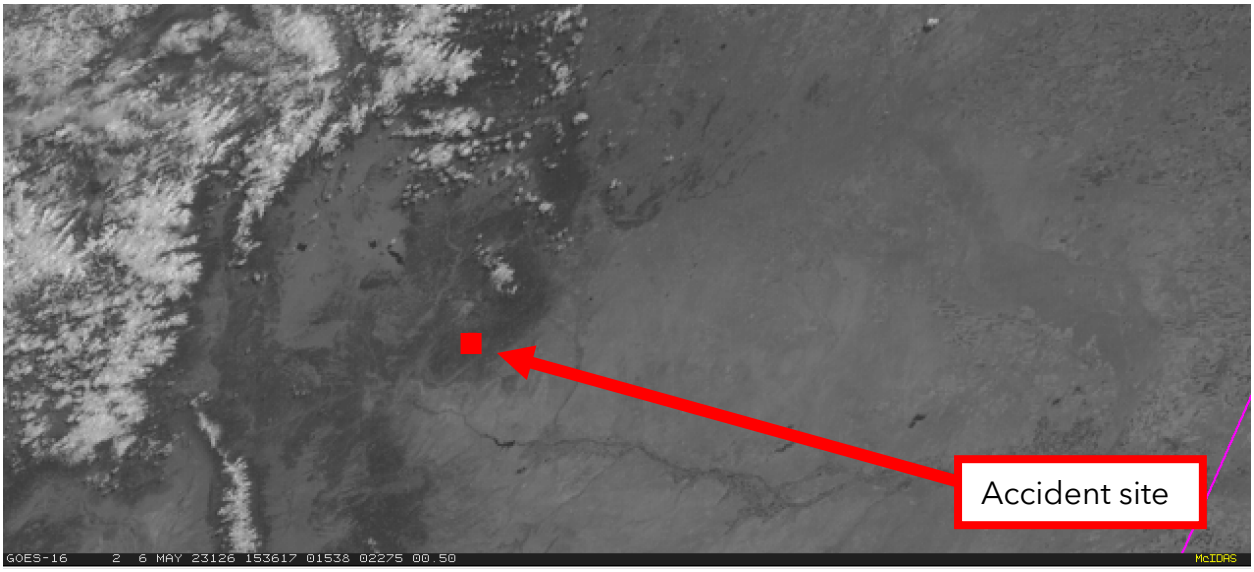

Figure 6. GOES-16 visible image at 0936 MDT.

5.0 National Radar Imagery

A regional view of the NWS National Reflectivity Mosaic is included as figure 7 for 0935 MDT with the approximate location of the accident site marked by a red circle and no echoes above the accident site.

[15] https://www.star.nesdis.noaa.gov/goes/documents/ABIQuickGuide_Band10.pdf

[16] https://www.weather.gov/source/zhu/ZHU_Training_Page/Miscellaneous/gravity_wave/gravity_wave.html

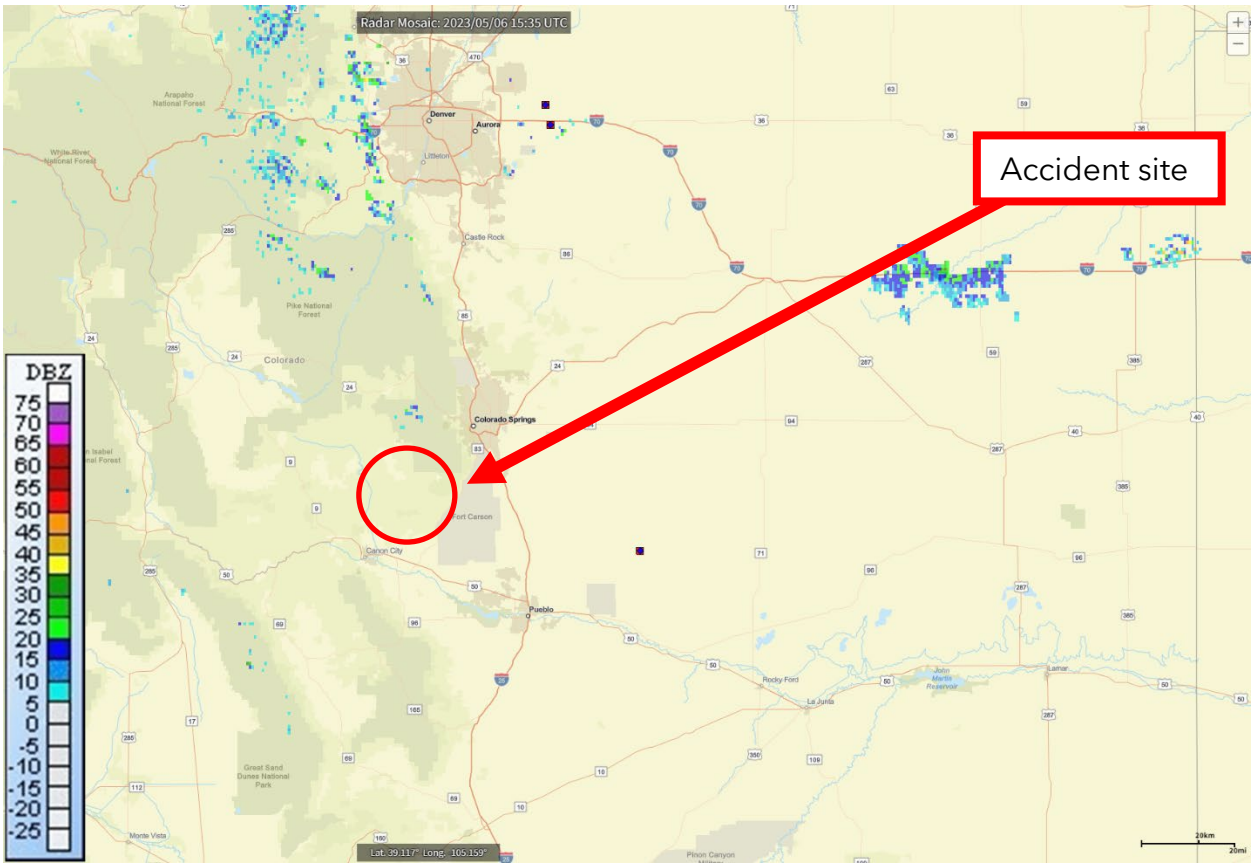

Figure 7. National Reflectivity Mosaic for 0935 MDT.

6.0 Pilot Reports

The longline-disseminated pilot reports[17] (PIREPs) distributed into the national airspace system (NAS) within two hours before and after the accident time and within 150 miles of the accident site at altitudes below 25,000 ft are shown here:

DEN UA /OV 220030/TM 1440/FL160/TP A20N/TB MOD/RM 160-140 DURD

BJC UUA /OV BJC DER 30R/TM 1453/FL064/TP LJ45/RM LLWS -10/15KT

EGE UA /OV RLG090030/TM 1505/FL190/TP B738/TB MOD CHOP/RM 190 AND BELOW-ZDV FD

BJC UA /OV BJC360005/TM 1515/FL070/TP P28A/TB LGT-MOD/RM 065-070 UDDF 100FPM

ALS UA /OV ALS066033/TM 1605/FL125/TP M20P/TB LGT-MOD/RM LGT MTN WAVE. ZDV FDCS

[17] Only PIREPs with the World Meteorological Organization headers UBCO**, UBNM**, and UBWY** were considered. These do not include pilot reports only broadcast via radio.

DEN UA /OV DEN 30W/TM 1623/FLDURC/TP B738/TB LGT TO MOD 090 170

DEN UA /OV DEN270030/TM 1623/FLDURGC/TP B738/TB LGT TO MOD 090 170

EGE UA /OV RLG092051/TM 1701/FL230/TP B737/TB LGT/RM ZDV FD

BJC UA /OV BJC DER 30L/TM 1707/FL063/TP C172/RM DWNDFT 200FPM UPDFT 1000FPM

DEN UA /OV APA180020/TM 1716/FL105/TP C172/TB MOD TURB

DEN UA /OV APA180020/TM 1717/FL105/TP C172/TB MOD TURB/RM MOD MTN WV +/- 500FT

DEN UA /OV DEN230045/TM 1723/FL170/TP ALL TYPES/TB MOD TURB/RM 170-150

ASE UA /OV DBL136045/TM 1736/FL170/TP GLF4/RM MOD MTW 170-ZDV FD

7.0 Significant Meteorological Information

There were no convective or non-convective Significant Meteorological Information (SIGMET) advisories valid for the accident site at the accident time.

8.0 Center Weather Service Advisories

The Denver (ZDV) Air Route Traffic Control Center (ARTCC) Center Weather Service Unit (CWSU) was responsible for the accident region. There was no Center Weather Advisory (CWA) valid for the accident site at the accident time.

9.0 Airmen's Meteorological Information

The NWS Aviation Weather Center (AWC) had text Airmen's Meteorological Information (AIRMET) advisory Tango valid for the accident site at the accident time. The text AIRMET Tango was issued at 0845 MDT and forecast moderate turbulence below 18,000 ft:

WAUS45 KKCI 061445
WA5T
-SLCT WA 061445
AIRMET TANGO UPDT 2 FOR TURB AND LLWS VALID UNTIL 062100
.
AIRMET TURB...MT WY CO NM
FROM 70SSW ISN TO 70SW RAP TO BFF TO GLD TO 60S GLD TO 30ESE TBE
TO 60ENE ELP TO 30N TCS TO 40SSE DVC TO 20ESE OCS TO 20W MLS TO
70SSW ISN
MOD TURB BTN FL240 AND FL420. CONDS CONTG BYD 21Z THRU 03Z.
.
AIRMET TURB...ID WY NV UT CO AZ NM OR CA AND CSTL WTRS
FROM 70WSW ONP TO 20N REO TO 20E OCS TO 40SSE DVC TO 60ENE INW

TO 20NW TRM TO 20NNE LAX TO 30SSE CZQ TO 20ESE OAK TO 80WSW ENI
TO 130W FOT TO 140WSW ONP TO 70WSW ONP
MOD TURB BTN FL180 AND FL400. CONDS CONTG BYD 21Z THRU 03Z.
.
AIRMET TURB...ID MT WA OR AND CSTL WTRS
FROM 30NW HUH TO 50WSW HVR TO 20SSE DBS TO 20ESE BOI TO 40ESE
DSD TO 150W TOU TO 30NW HUH
MOD TURB BTN FL200 AND FL350. CONDS CONTG BYD 21Z ENDG 00-03Z.
.
AIRMET TURB...WY NV UT CO AZ NM CA AND CSTL WTRS
FROM 30NE SLC TO 60SSE OCS TO 40NW DMN TO 60SSE EED TO 30WSW BZA
TO 30ESE MZB TO 30ESE LAX TO 30W RZS TO 70W EHF TO 30WNW EHF TO
RBL TO 30NE SLC
MOD TURB BLW 150. CONDS CONTG BYD 21Z THRU 03Z.
.
AIRMET TURB...WY CO NM
FROM 60WNW RAP TO 20S AKO TO 40ENE CME TO 40S CME TO 30WSW DMN
TO 50W CHE TO 30SSW BOY TO 60WNW RAP
MOD TURB BLW FL180. CONDS CONTG BYD 21Z THRU 03Z.
.
LLWS POTENTIAL...CO NM
BOUNDED BY 20NW ALS-50W TBE-40SSE FTI-40ESE ABQ-20NW ALS
LLWS EXP. CONDS ENDG 15-18Z.
.
OTLK VALID 2100-0300Z...TURB ID MT WY NV UT CO AZ NM WA OR CA
AND CSTL WTRS
BOUNDED BY 140W HQM-40SE DNJ-40ENE DDY-30NNE RSK-80SW RSK-30ENE
INW-40NNE LAX-150NW FOT-140W HQM
MOD TURB BTN FL180 AND FL400. CONDS CONTG THRU 03Z.
....

10.0 Graphical Forecasts for Aviation

The Graphical Forecasts for Aviation (GFA) products issued by the AWC before the accident flight and valid from 0900 until 1500 MDT are shown in attachment 2. The GFA surface forecasts applicable to the accident site that were valid before the accident flight's departure from 0900 until 1500 MDT indicated VFR conditions with a west wind of 10 knots with gusts between 15 and 25 knots expected. The GFA cloud forecast applicable to the accident site that was valid from 0900 until 1500 MDT indicated sky clear conditions. The Graphical AIRMETs[18] (G-AIRMETs) were overlaid on the GFA cloud forecast products. The G-AIRMET Tango valid for the accident site at the accident time is found in figure 8. The only human-generated information reflected in the two GFA products were the G-AIRMETs.

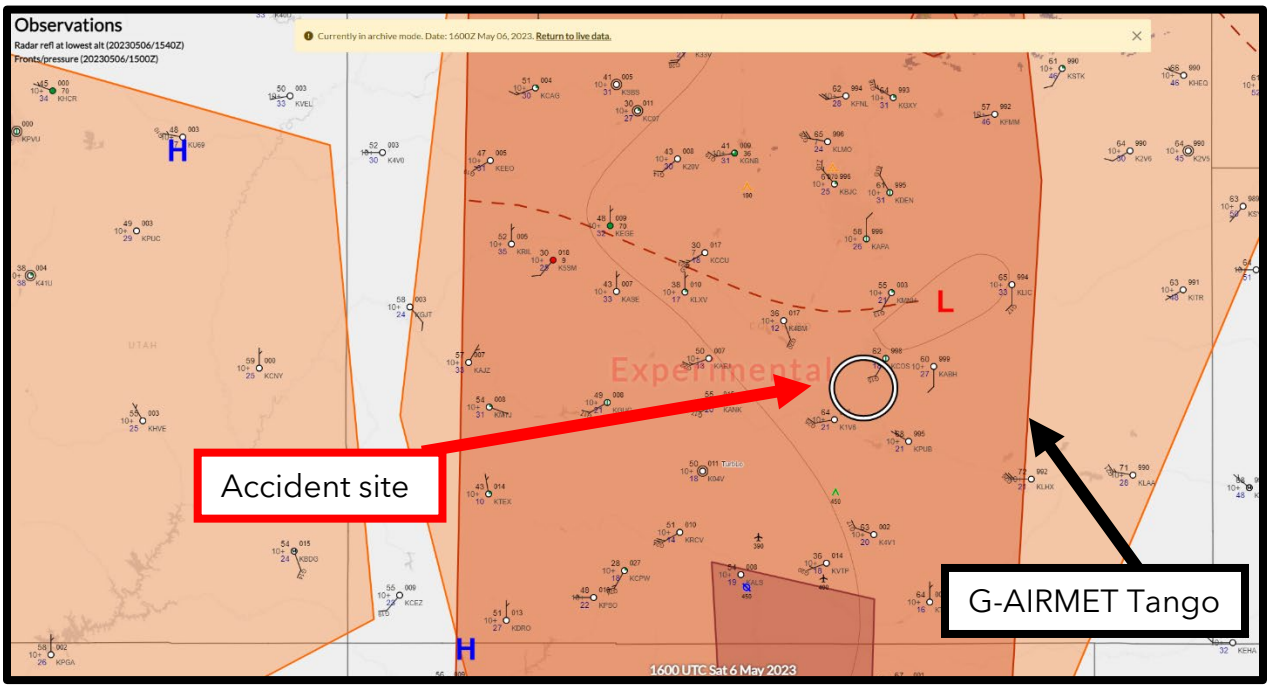

Figure 8. AWC 1000 MDT graphic with G-AIRMETs and PIREPs overlaid. The 0900 MDT AWC graphical forecast was identical.

[18] Graphical AIRMETs (G-AIRMETs), found on the Aviation Weather Center webpage at http://aviationweather.gov, are graphical forecasts of en-route weather hazards valid at discrete times no more than 3 hours apart for a period of up to 12 hours into the future (for example, 00, 03, 06, 09, and 12 hours). G-AIRMETs are snap shots at discrete time intervals as defined above. The text AIRMET is the result of the production of the G-AIRMET but provided in a time smear for a 6hr valid period.

11.0 Terminal Aerodrome Forecast

There were no NWS Terminal Aerodrome Forecast[19] (TAF) locations within 20 miles of the accident site or 30 miles of the departure airport.

12.0 National Weather Service Area Forecast Discussion

The NWS weather forecast office in Pueblo, Colorado, (WFO PUB) was responsible for the public forecast in the region of the accident site. WFO PUB issued the following Area Forecast Discussion (AFD) at 0402 MDT, the closest AFD to the accident time with an aviation section:

> FXUS65 KPUB 061002
> AFDPUB
>
> Area Forecast Discussion
> National Weather Service Pueblo CO
> 402 AM MDT Sat May 6 2023
>
> .SHORT TERM...(Today and tonight)
> Issued at 340 AM MDT Sat May 6 2023
>
> Key messages:
>
> 1) Another day of Red Flag conditions expected across the San Luis Valley, southeastern mountains and much of the plains.
>
> Currently...Longwave trough over the western US was continuing to produce southwest flow aloft across the Four Corners region. Shortwave in the flow aloft was pushing northeast across the Great Basin, enhancing cloud cover and some light snow showers over northwestern CO. There was some cloud cover along the Continental Divide, otherwise most of the forecast area this morning has been mostly clear, with temps cooling into the 40s to around 50F for most locations as of 3 AM.
>
> Today and tonight...With a very similar upper pattern in place, a nearly identical day to Friday is anticipated across the county warning area. Brisk southwest flow aloft will continue through the short term, and pieces of energy rotating through the flow will keep some cloud cover as well as isolated showers along the Continental Divide today and tonight, and especially across the central mts. There is again an outside chance of a few high-based showers moving across the Pikes Peak region this afternoon, but for the most part

[19] According to NWS Instruction 10-813: "An NWS TAF consists of the expected meteorological conditions significant to aviation at an airport for a specified time period. For the U.S., this is the area within five (5) statute miles (SM) of the center of an airport's runway complex." www.nws.noaa.gov/directives/sym/pd01008013curr.pdf

the eastern plains and I-25 Corridor will remain dry, mostly sunny and warm. The main threat today will once again be critical fire weather conditions across much of the forecast area, with the combination of relative humidity levels dropping below 10 percent and wind gusts up to around 40 mph. Plan on above normal high temps today with 60s to near 70F for the high valleys, and 70s to lower 80s for the plains. Tonight, under partly cloudy skies, look for minimum temperatures in the 30s for the high valleys, and 40s across the plains. Moore

.LONG TERM...(Sunday through Friday)
Issued at 340 AM MDT Sat May 6 2023

Models remain in good agreement through about Wednesday, with the main concern being elevated fire weather conditions. Beyond Wednesday, operational model guidance is all over the place with the handling of an upper low. Ensemble spreads remain on the larger side, with low confidence for mid to late week.

Sunday through Wednesday...persistent southwest flow is forecast to remain in place across the region, with several embedded waves moving across the Rockies. The embedded waves will bring low chances for showers and thunderstorms to the Central Mountains pretty much each afternoon and evening. The main risks for any thunderstorms that develop will be lightning along with gusty winds up to 40 mph.

High fire danger is expected across the San Luis Valley, east into the I-25 corridor and New Mexico border region each afternoon and evening Sunday through Wednesday. These areas will see gusty winds and low humidity values leading to the critical fire weather conditions. For the rest of the Plains, much will depend on nightly cold fronts that slosh higher dewpoint air back and forth, and then morning mixing. Currently, mixing looks enhanced Monday into Tuesday, which will likely lead to more widespread critical fire weather conditions on the Plains. This will need to be monitored.

Speaking of the boundary on the Plains, there could be a couple of afternoon and evening showers and thunderstorms along it each day. Areas over the Palmer Divide, and mainly north of Highway 50 will see the best chances for a couple of storms. Monday and Tuesday afternoon and evening will likely be the best time periods for storm development.

By Wednesday, a strong upper trough is forecast to approach the region, increasing southwesterly flow across the state. Widespread high fire danger is most likely Wednesday afternoon. A dryline may set up out near the Kansas border with thunderstorms possible by late in the day. Confidence at this time in severe potential is low.

Overall, temperatures will be nice, with 70s to mid 80s across the

Plains each day. The San Luis Valley will see highs in the 70s.

Thursday into Saturday...much will depend on how this upper system wants to move across Colorado. Most model guidance now wants to bring the system across the area on Thursday, stalling the upper low over the Northern Plains, with several lobes of energy back across the Rockies. This is a change from yesterdays guidance where it stalled the system overhead for several days. Given the continued forecast uncertainty, kept NBM pop chances across the CWA. But there could be several periods of elevated chances for precipitation for later in the work week. Temperatures are likely to be cooler, with 60s and 70s for highs. Mozley

&&

.AVIATION...(For the 12Z TAFS through 12Z Sunday morning)
Issued at 340 AM MDT Sat May 6 2023

VFR conditions are expected across all of the forecast area over the next 24 hours, including the three main TAF sites of KCOS, KPUB and KALS. Southwest flow aloft will persist, while at the surface south-southwest winds will start to increase by 17z, then gusts up to 35-45 kts will be likely at TAF sites from approx 18z through 03z.

&&

.PUB WATCHES/WARNINGS/ADVISORIES...
Red Flag Warning from 11 AM this morning to 10 PM MDT this evening for COZ221-224>237.

Fire Weather Watch from Sunday morning through Sunday evening for COZ224-225-227>230-232-233-237.

&&

$$

13.0 Winds and Temperature Aloft Forecast

The NWS 0758 MDT, Winds and Temperature Aloft forecast valid for the closest point to the accident site is included below:

FBUS31 KWNO 061358
FD1US1
DATA BASED ON 061200Z
VALID 061800Z FOR USE 1400-2100Z. TEMPS NEG ABV 24000

FT 3000 6000 9000 12000 18000 24000 30000 34000 39000
PUB **2611+06 2633+00 2443-16** 2467-29 238343 238551 237156

The closest forecast point to the accident site was Pueblo, Colorado, (PUB). The forecast was valid for 1200 MDT and for use between 0800 and 1500 MDT.

14.0 Pilot Weather Information

Title 14 CFR 91.103 states that "Each pilot in command shall, before beginning a flight, become familiar with all available information concerning that flight." FAA AC 91-92 "Pilot's Guide to a Preflight Planning" (dated March 15, 2021) provided pilot guidance on preflight self-briefings, including planning, weather interpretation, and risk identification/mitigation skills. The AC further stated in part:

> Pilots adopting these guidelines will be better prepared to interpret and utilize real-time weather information before departure and en route, in the cockpit, via technology like Automatic Dependent Surveillance-Broadcast (ADS-B) and via third-party providers. [20]

A search of archived information indicated that the accident pilot did not request weather information from Leidos Flight Service. A search of ForeFlight information indicated that the accident pilot did not have a ForeFlight account. It is unknown what weather information, if any, the accident pilot checked or received for or during the accident flight.

15.0 Astronomical Data

The astronomical data obtained for the accident site on May 6, 2023, indicated the following:

SUN	
Begin civil twilight	0528 MDT
Sunrise	0557 MDT
Accident time	**0935 MDT**[21]
Sun transit	1256 MDT
Sunset	1957 MDT
End civil twilight	2026 MDT

At the time of the accident the Sun was had an altitude of 40.89° and azimuth of 102.05°.

[20] https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_91-92.pdf. The AC also listed multiple online FAA resources for aviation flight planning services for adverse weather.
[21] Inserted accident time for reference and context.

E. LIST OF ATTACHMENTS

Attachment 1 – GOES-16 Low-level water vapor imagery animation from 0831 to 1031 MDT

Attachment 2 – GFA information valid at the accident time

Submitted by:

Paul Suffern
Senior Meteorologist