



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

January 29, 2021

Weather Factual

METEOROLOGY

ANC20LA074AB

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A. ACCIDENT

Location: Soldotna, Alaska
Date: July 31, 2020
Time: around 0827 Alaska daylight time
1627 Coordinated Universal Time (UTC)
Aircraft: Piper PA-12 and De Havilland DHC-2; Registration: N2587M and N4982U

B. METEOROLOGIST

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C. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board's (NTSB) Meteorologist did not travel for this investigation and gathered the weather data for this investigation from official National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) sources including the National Centers for Environmental Information (NCEI). This specialist factual contains the meteorological factors pertinent to the weather surrounding the accident time. All times are Alaska daylight time (AKDT) based upon the 24-hour clock, where local time is -8 hours from UTC, and UTC=Z. Directions are referenced to true north and distances in nautical miles. Heights are above mean sea level (msl) unless otherwise noted. Visibility is in statute miles and fractions of miles. NWS airport and 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 and "P" for OCONUS airports.

Based on data that was provided the accident site location used was at latitude 60.503° N, longitude 150.994° W for N4982U and latitude 60.502° N, longitude 150.991° W for N2587M at an approximate elevation of 240 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 Weather Prediction Center, 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 joint NWS and Federal Aviation Administration (FAA) Advisory Circular (AC) “Aviation Weather Services”, AC 00-45H change 2¹.

1.1 Surface Analysis Chart

The Alaska section of the NWS Surface Analysis Chart for 0700 AKDT is provided as figure 1 with the location of the accident site marked within the red circle. The chart depicted a high pressure system at 1017-hectopascals (hPa) north of Prince William Sound. No frontal boundaries were noted near the accident site.

The station models around the accident site depicted air temperatures in the low-50’s degrees Fahrenheit (°F), dew point temperatures in the upper 40’s °F with a temperature-dew point spread of 3°F or less, a variable wind under 10 knots, and overcast skies.

1

https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/1030235

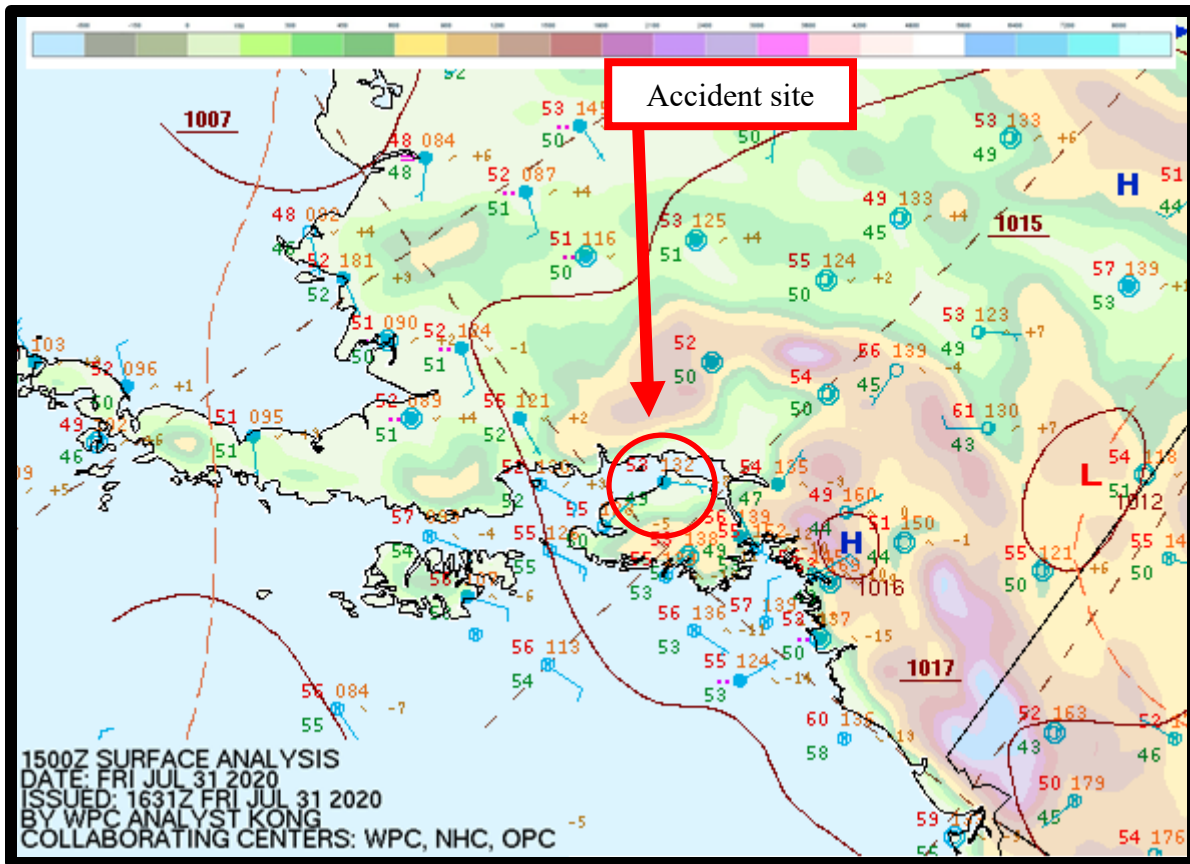


Figure 1 – NWS Surface Analysis Chart for 0700 AKDT.

2.0 Surface Observations

The area surrounding the accident site was documented using official Aviation Routine Weather Reports (METARs) and Specials (SPECIs). Figure 2 is a sectional chart with the accident site and the closest weather reporting locations to the accident site marked.

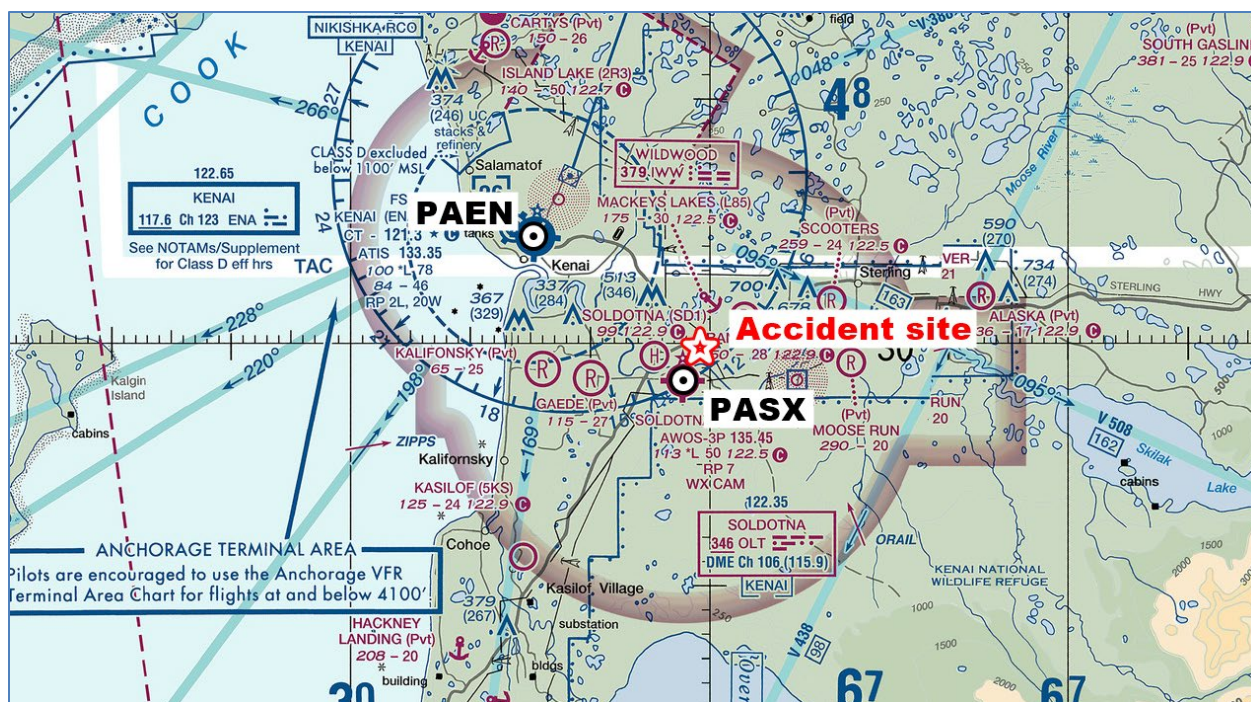


Figure 2 – Sectional chart of accident area with the location of the accident site and the closest surface observation sites.

The closest official weather reporting facility to the accident site was from Soldotna Airport (PASX), Soldotna, Alaska, at an elevation of 113 ft, located 2 1/2 miles southwest of the accident site (figure 2). PASX had an Automated Weather Observing System (AWOS²) whose reports were not supplemented. PASX had an 15° easterly magnetic variation³. The following observations were taken and disseminated during the times surrounding the accident:⁴

[0356 AKDT] METAR PASX 311156Z AUTO 0000KT 10SM CLR 12/09 A2997 RMK
AO2 SLP156 T01170094 10161 20117 56008=

[0456 AKDT] METAR PASX 311256Z AUTO 0000KT 10SM CLR 11/09 A2995 RMK
AO2 SLP152 T01110094=

[0556 AKDT] METAR PASX 311356Z AUTO 16003KT 10SM OVC110 11/10 A2995 RMK
AO2 SLP151 T01110100=

[0656 AKDT] METAR PASX 311456Z AUTO 0000KT 10SM BKN110 11/09 A2994 RMK
AO2 SLP149 T01060094 56008=

² AWOS – Automated Weather Observing System is equipped with meteorological instruments to 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.

³ Magnetic variation – The angle (at a particular location) between magnetic north and true north. Latest measurement taken from <https://adip.faa.gov/agis/public/#/airportData/SXQ>

⁴ Bolded sections in this report highlight information that directly reference the weather conditions that affected the accident location around the accident time.

***[0756 AKDT] METAR PASX 311556Z AUTO 11003KT 10SM BKN110 11/09 A2993 RMK
AO2 SLP146 T01110094=***

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***[0856 AKDT] METAR PASX 311656Z AUTO 00000KT 10SM OVC085 15/11 A2993 RMK
AO2 SLP143 T01500111=***

**[0956 AKDT] METAR PASX 311756Z AUTO 04004KT 10SM FEW080 BKN100 15/11
A2992 RMK AO2 SLP142 T01500111 10156 20106 56006=**

**[1056 AKDT] METAR PASX 311856Z AUTO 01004KT 10SM FEW080 SCT100 17/11
A2992 RMK AO2 SLP140 T01670111=**

PASX weather at 0756 AKDT, automated, wind from 110° at 3 knots, 10 miles visibility or greater, a broken ceiling at 11,000 ft above ground level (agl), temperature of 11°Celsius (C), dew point temperature of 9°C, and an altimeter setting of 29.93 inches of mercury (inHg). Remarks: automated station with a precipitation discriminator, sea level pressure 1014.6 hPa, temperature 11.1°C, dew point temperature 9.4°C.

PASX weather at 0856 AKDT, automated, wind calm, 10 miles visibility or greater, an overcast ceiling at 8,500 ft agl, temperature of 15°C, dew point temperature of 11°C, and an altimeter setting of 29.93 inHg. Remarks: automated station with a precipitation discriminator, sea level pressure 1014.3 hPa, temperature 15.0°C, dew point temperature 11.1°C.

The next closest official weather observation point was at Kenai Municipal Airport (PAEN), Kenai, Alaska, at an elevation of 100 ft, located 10 miles west-northwest of the accident site (figure 2). PAEN had an Automated Surface Observing System (ASOS⁵) whose reports were supplemented by air traffic control when the tower was in operation⁶. The following observations were taken and disseminated during the times surrounding the accident:

**[0353 AKDT] METAR PAEN 311153Z AUTO 00000KT 10SM FEW055 12/10 A2994 RMK
AO2 SLP140 T01170100 10150 20111 58007 TSNO=**

**[0453 AKDT] METAR PAEN 311253Z AUTO 04003KT 10SM CLR 10/08 A2993 RMK
AO2 SLP138 T01000083 TSNO=**

**[0553 AKDT] METAR PAEN 311353Z 35003KT 10SM SCT120 11/09 A2993 RMK AO2
SLP135 T01110094=**

**[0653 AKDT] METAR PAEN 311453Z 05003KT 10SM OVC110 12/09 A2992 RMK AO2
SLP132 T01170094 58008=**

⁵ ASOS – Automated Surface Observing System is equipped with meteorological instruments to observe and report wind, visibility, weather, ceiling, temperature, dewpoint, altimeter, and barometric pressure. ASOS are maintained by the NWS.

⁶ ATC hours from 0600 to 2200 local time.

***[0753 AKDT] METAR PAEN 311553Z 04006KT 10SM BKN100 OVC120 14/11 A2991
RMK AO2 SLP129 T01390106=***

ACCIDENT TIME 0827 AKDT

***[0853 AKDT] METAR PAEN 311653Z 04007KT 10SM OVC085 16/11 A2991 RMK AO2
SLP130 T01560106=***

***[0953 AKDT] METAR PAEN 311753Z 01006KT 10SM OVC080 17/11 A2990 RMK AO2
SLP127 T01670106 10172 20100 56004=***

***[1053 AKDT] METAR PAEN 311853Z 03009KT 10SM BKN080 OVC110 18/11 A2990
RMK AO2 SLP126 T01780106=***

PAEN weather at 0753 AKDT, wind from 040° at 6 knots, 10 miles visibility or greater, a broken ceiling at 10,000 ft agl, overcast skies at 12,000 ft agl, temperature of 14°C, dew point temperature of 11°C, and an altimeter setting of 29.91 inHg. Remarks: automated station with a precipitation discriminator, sea level pressure 1012.9 hPa, temperature 13.9°C, dew point temperature 10.6°C.

PAEN weather at 0853 AKDT, automated, wind from 040° at 7 knots, 10 miles visibility or greater, an overcast ceiling at 8,500 ft agl, temperature of 16°C, dew point temperature of 11°C, and an altimeter setting of 29.91 inHg. Remarks: automated station with a precipitation discriminator, sea level pressure 1013.0 hPa, temperature 15.6°C, dew point temperature 10.6°C.

The observations for PASX and PAEN surrounding the period indicated VFR⁷ conditions with ceilings around 8,600 ft msl.

⁷ As defined by 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.

3.0 Satellite Data

Data from the Geostationary Operational Environmental Satellite number 17 (GOES-17) 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 (band 2) and infrared (band 13) imagery at wavelengths of 0.64 microns (μm) and 10.3 μm , respectively, were retrieved for the period. Satellite imagery surrounding the time of the accident, from 0700 AKDT through 1000 AKDT at approximately 5-minute intervals were reviewed, and the closest images to the time of the accident are documented here.

Figure 3 is the GOES-17 visible imagery at 0830 AKDT provided at 2X magnification with the accident site highlighted by a red square. Inspection of the visible imagery indicated broken cloud cover above the accident site at the accident time. Figure 4 is the GOES-17 infrared imagery at 0830 AKDT at 6X magnification with a temperature enhancement curve applied and the accident site highlighted by a red square. Inspection of the infrared imagery indicated cloud cover above the accident site at the accident time. It should be noted these figures have not been corrected for any parallax error. Based on the brightness temperatures above the accident site and the vertical temperature profile provided by the 0400 AKDT Anchorage, Alaska (PANC)⁸, sounding, the approximate cloud-top heights over the accident site were 11,000 ft msl at 0830 AKDT (temperature of about 267 Kelvin).

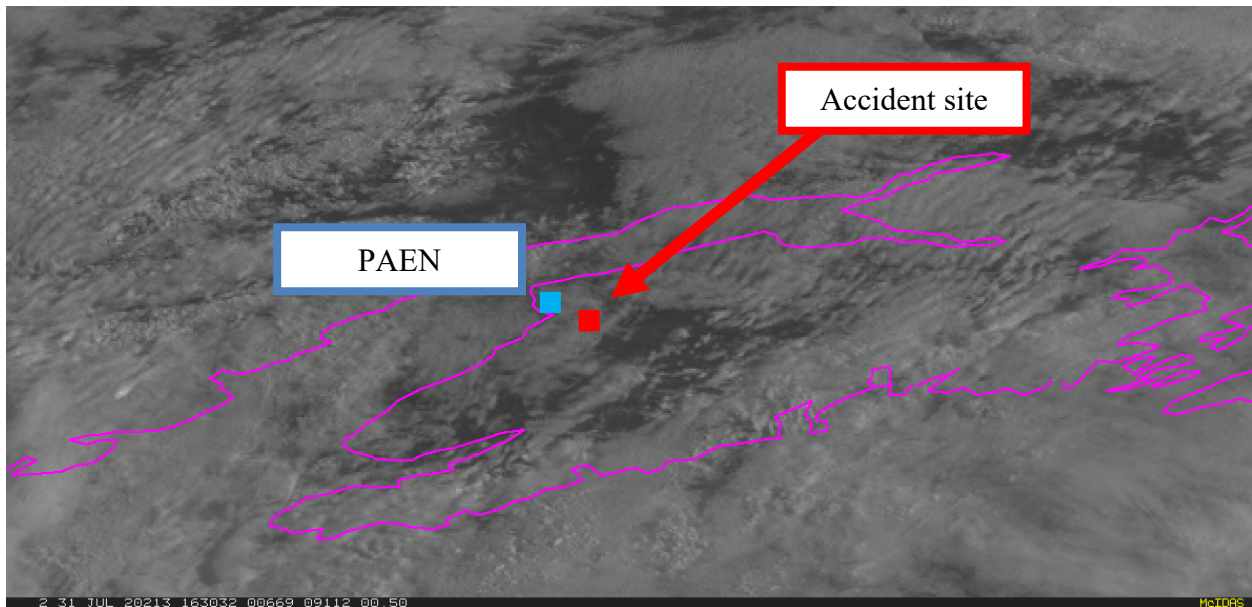


Figure 3 – GOES-17 visible image at 0830 AKDT.

⁸ Not shown. Data from 0400 AKDT PANC upper air sounding, site number 70273.

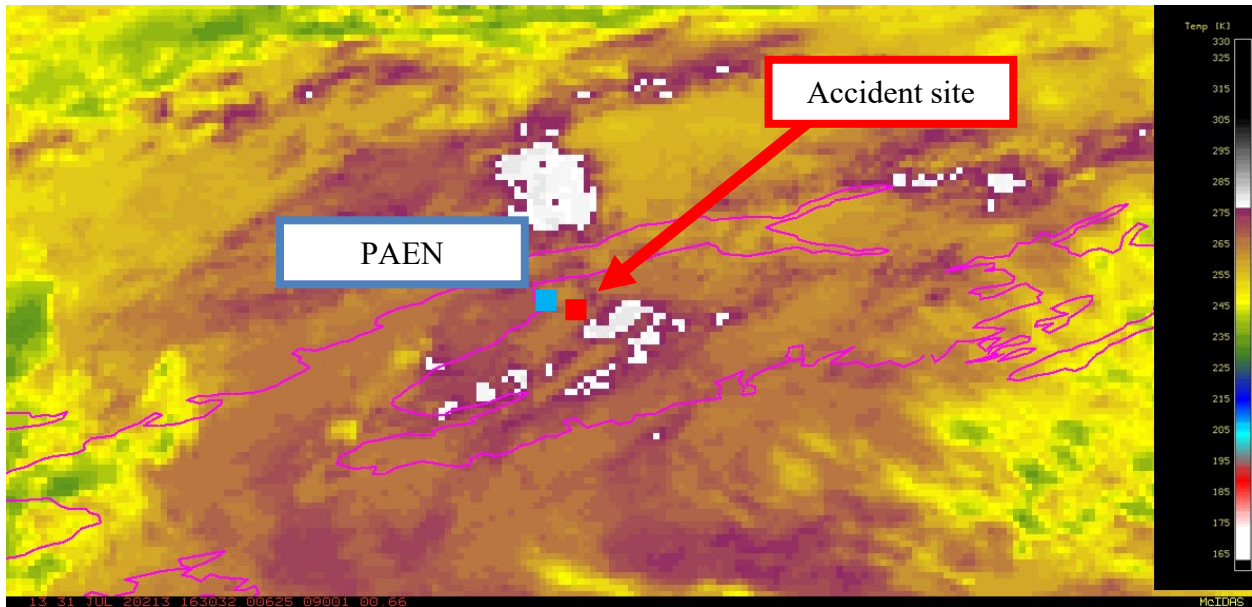


Figure 4 – GOES-17 infrared image at 0830 AKDT.

4.0 Radar Imagery Information

The closest NWS Weather Surveillance Radar-1988, Doppler (WSR-88D)⁹ to the accident site was from Kenai/Anchorage, Alaska, (PAHG) located 17 miles west-northwest of the accident site. Level II archive radar data were obtained from the NCEI utilizing the NEXRAD Data Inventory Search and displayed using the NOAA’s Weather and Climate Toolkit software and no precipitation targets were noted above the accident site at the accident time.

5.0 Pilot Reports

Pilot reports¹⁰ (PIREPs) within 100 miles of the accident site from about two hours prior to the accident time to about two hours after the accident time for below 18,000 ft are provided below:

ENA UA /OV TED110025 /TM 1535 /FL040 /TP C170 /TB LGT /RM (AKFSS)

PANC UA /OV TED250005/TM 1641/FL015/TP B737/WV 01010KT/RM DURD RWY 7R

The PIREPs mentioned light turbulence in the vicinity of Anchorage, Alaska.

⁹ The WSR-88D is an S-band 10-centimeter wavelength radar with a power output of 750,000 watts, and with a 28-foot parabolic antenna that concentrates the energy between a 0.87° and 0.96° beam width. The radar produces three basic types of products: base reflectivity, base radial velocity, and base spectral width.

¹⁰ Only pilot reports with the World Meteorological Organization (WMO) header UBAK** identifier were considered.

6.0 NWS Forecast Data

The NWS and Alaska Aviation Weather Unit (AAWU) forecast for the accident site is contained in attachments 1 and 2 with scattered clouds at 4,500 ft msl, broken ceiling at 10,000 ft msl and cloud tops near FL200¹¹ forecast. No Airmen's Meteorological Information (AIRMET) advisories or other hazardous weather were forecast for the area during the period. For more information and graphics please see attachments 1 and 2.

7.0 Terminal Aerodrome Forecast

PAEN was the closest airport to the accident site with a NWS Terminal Aerodrome Forecast (TAF). The PAEN TAF valid at the time of the accident was issued at 0330 AKDT and was valid for a 24-hour period beginning at 0400 AKDT. The 0330 AKDT TAF for PAEN was as follows:

```
TAF PAEN 311130Z 3112/0112 VRB05KT P6SM BKN035
FM311800 02010KT P6SM BKN060
FM010600 VRB06KT P6SM VCSH OVC030=
```

Between 0400 and 1000 AKDT, the forecast expected a variable wind at 5 knots, greater than 6 miles visibility, and a broken ceiling at 3,500 ft agl.

8.0 Winds and Temperature Aloft Forecast

The NWS 0554 AKDT Winds and Temperature Aloft forecast valid for 1000 AKDT for the closest points to the accident site are included below:

```
FBAK31 KWNO 311354
FD1AK1
DATA BASED ON 311200Z
VALID 311800Z FOR USE 1400-2100Z. TEMPS NEG ABV 24000

FT 3000 6000 9000 12000 18000 24000 30000 34000 39000

ANC 1205 1313+05 1617+00 1621-05 1730-15 1736-28 165644 166752 164552
HOM 1113 1315+04 1422-01 1425-06 1636-16 1642-29 165345 164651 163349
```

The accident site was in between the Anchorage, Alaska (ANC), and Homer, Alaska (HOM) forecast points. The ANC forecast for use between 0600 and 1300 AKDT indicated a wind at 3,000 ft from 120° at 5 knots and at 6,000 ft a wind from 130° at 13 knots with a temperature of 5°C. The HOM forecast indicated a wind at 3,000 ft from 110° at 13 knots and at 6,000 ft a wind from 130° at 15 knots with a temperature of 4°C.

¹¹ Flight Level – A Flight Level (FL) is a standard nominal altitude of an aircraft, in hundreds of ft. This altitude is calculated from the International standard pressure datum of 1013.25 hPa (29.92 inHg), the average sea-level pressure, and therefore is not necessarily the same as the aircraft's true altitude either above mean sea level or above ground level.

9.0 Pilot Weather Briefing

The accident pilot of N2587M did receive a weather briefing through FAA Alaska Flight Service and information contained therein is located in attachment 5. A check of ForeFlight was done and revealed that the accident pilots did not request weather information through ForeFlight.

According to witness information¹² the accident pilot of N4982U was noted checking the weather before departure, but it is unknown exactly what weather information was reviewed outside of the AAWU METAR page. For more information please see the interview summaries contained in the docket for this accident.

10.0 Airborne Images Showing Sky Conditions

Images with information about sky conditions and lighting near the accident site were retrieved from personal electronic devices recovered from N4982U. The images contained views out the right side of the airplane capturing sky and terrain to the north and east. Embedded data in the images indicated they were taken between 0825:39 and 0825:56. Location data were also embedded in one of the four images presented in this report. However, the location referenced a position about 0.6 miles east of the ground features and points of interest visible in the foreground of the image.¹³ As a result, the approximate location for all the images was determined by comparing features visible in each image to available satellite imagery and mapping products.

The general area of ground features captured in the images is depicted in the area highlighted in yellow in figure 5 (the approximate track of the airplane is indicated by the green arrow for reference). The closest features visible in each image is in the general vicinity of Huckabay Road or its intersection with Walker Street.

¹² Please see docket for more information.

¹³ Altitude information in the image was reported as 87.72 meters above sea level (288 feet msl) and not consistent with the image or other data.

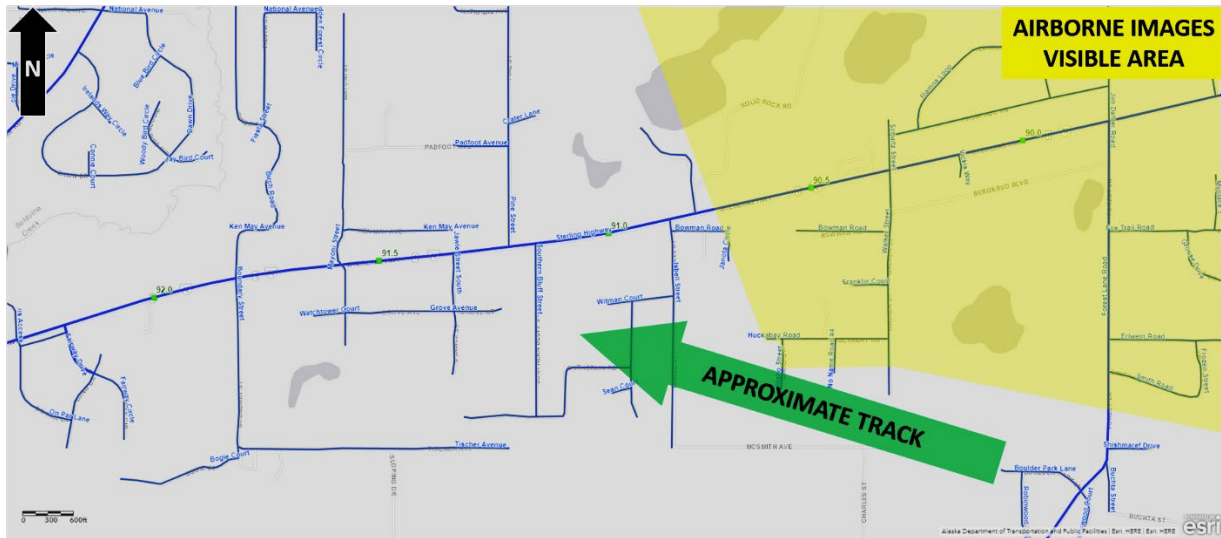


Figure 5 – Roadway map showing mile markers on Sterling Highway and the approximate area of ground surface features captured in airborne images taken near Huckabay Road between 0825:39 and 0825:56 (yellow).

Figure 6 shows a view to the north-northeast from underneath the right wing.¹⁴ Primary features visible are a tree-covered area east of Walker Street (visible below the strut) and a small lake. Shadows are present behind buildings along walker street (to the left of the strut). The horizon is visible along with broken-scattered clouds above.

¹⁴ Direction information embedded in the image file indicated 33.07 degrees true.



Figure 6 – View towards the north-northeast about 0825:39 showing ground features and sky cover.

Figure 7 shows a view to the north-northeast from behind the right wing. Huckabay Road is visible at the bottom of the image. Lake below the wing tip is across Sterling Highway opposite Walker Road. Shadows are present behind buildings in foreground. Horizon is visible along with broken-scattered clouds above.



Figure 7 – View towards the north-northeast about 0825:46 showing ground features and sky cover.

Figure 8 shows a view to the north from behind the right wing. Houses at west end of Huckabay Road are visible at the bottom of the image. Two lakes across Sterling Highway are also visible. Shadowing behind buildings and trees apparent from Huckabay Road towards Sterling Highway. Horizon is visible along with broken-scattered clouds above.



Figure 8 – View towards the north about 0825:49 showing ground features and sky cover.

Figure 9 shows a view to the east. Lake in figure 6 visible east of Huckabay Road and Sterling Highway is on the left side. Shadowing behind buildings and trees in foreground apparent. Horizon is visible along with broken-scattered clouds above.



Figure 9 – View towards the east about 0825:56 showing ground features and sky cover.

11.0 Web Camera Images

Images from the FAA’s Aviation Weather Cameras were retrieved for Soldotna and Kenai and are contained in attachments 3 and 4.

12.0 Astronomical Data

The astronomical data obtained for the accident site on July 31, 2020, indicated the following conditions:

SUN	
Begin civil twilight	0438 AKDT
Sunrise	0540 AKDT
Accident	0827 AKDT¹⁵
Sun transit	1410 AKDT
Sunset	2239 AKDT
End civil twilight	2340 AKDT

In addition, at 0827 AKDT the Sun azimuth was 84.44° or nearly due east with an altitude of 17.71° above the horizon (see figure 10).

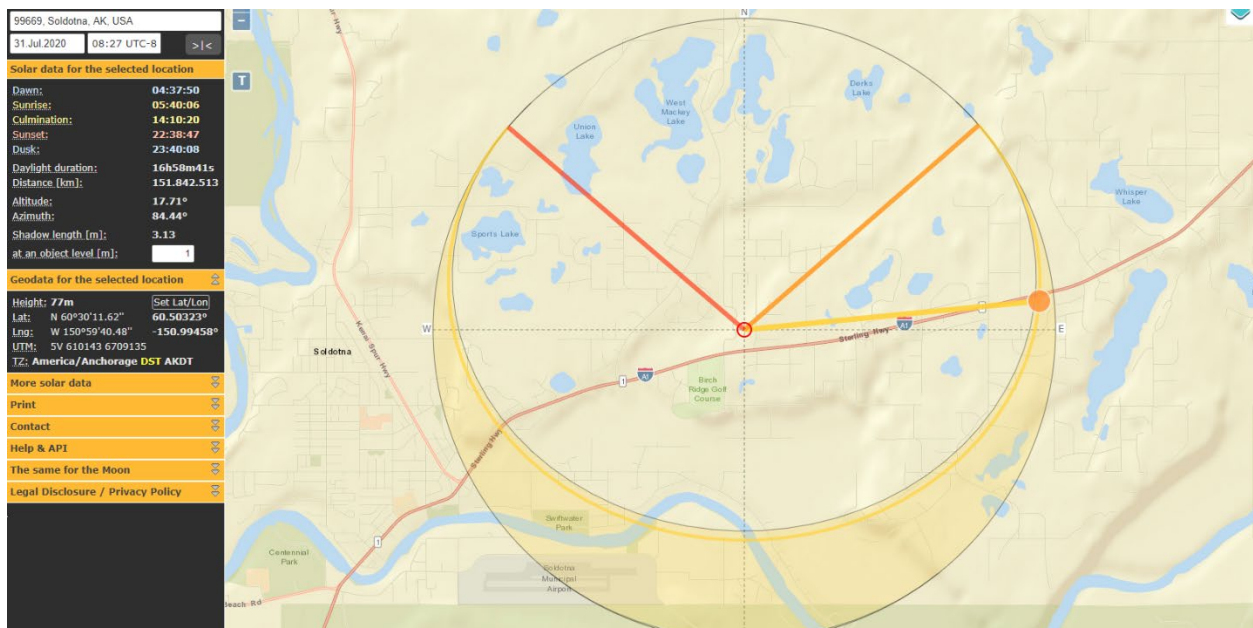


Figure 10 – Sun angle calculations for accident site at 0827 AKDT.

E. LIST OF ATTACHMENTS

Attachment 1 – NWS text forecast data valid at the accident time

Attachment 2 – NWS graphical forecast data valid at the accident time

Attachment 3 – FAA web camera imagery from Soldotna

Attachment 4 – FAA web camera imagery from Kenai

¹⁵ Inserted accident time for reference and context.

Attachment 5 – Alaska Flight Services weather briefing for N2587M

Submitted by:

Paul Suffern
Senior Meteorologist

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