

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ANC25MA018

METEOROLOGY

Specialist's Factual Report

August 27, 2025

TABLE OF CONTENTS

A. ACCIDENT	3
B. METEOROLOGY SPECIALIST	3
C. DETAILS OF THE INVESTIGATION	3
D. FACTUAL INFORMATION	4
1.0 SYNOPTIC SITUATION	4
1.1 Surface Analysis Chart.....	4
2.0 SURFACE OBSERVATIONS	5
3.0 UPPER AIR SOUNDING	10
4.0 SATELLITE DATA.....	12
5.0 NATIONAL RADAR IMAGERY	15
6.0 WEATHER SURVEILLANCE RADAR IMAGERY.....	16
6.1 Volume Scan Strategy	16
6.2 Beam Height Calculation	17
6.3 Reflectivity.....	18
6.4 Base Reflectivity Data	19
7.0 PILOT REPORTS	21
8.0 SIGNIFICANT METEOROLOGICAL INFORMATION	21
9.0 CENTER WEATHER SERVICE ADVISORIES AND INFORMATION	22
10.0 ALASKA AVIATION WEATHER UNIT	23
11.0 TEXT AIRMEN'S METEOROLOGICAL INFORMATION	24
12.0 AREA FORECAST	26
13.0 FAA WEATHER CAMERA DATA	27
14.0 ASTRONOMICAL DATA	27
15.0 ICING POTENTIAL	28
16.0 RAW PAOM ASOS ICING DATA.....	30
17.0 PILOT WEATHER INFORMATION	31
18.0 ON SCENE ICING IMAGERY	31
19.0 FLIGHT INTO KNOWN ICING.....	33
E. LIST OF ATTACHMENTS	33

A. ACCIDENT

Location: Nome, Alaska
Date: February 6, 2025
Time: 1520 Alaska standard time (AKST)
0020 coordinated universal time (UTC) February 7
Airplane: Textron Aviation (Cessna) 208B, N321BA

B. METEOROLOGY SPECIALIST

Paul Suffern
Senior Meteorologist
National Transportation Safety Board
Washington, DC

C. DETAILS OF THE INVESTIGATION

The NTSB's Senior Meteorologist did travel for this investigation. On February 12 to 18, 2025, the senior meteorologist traveled to Anchorage and Nome, Alaska in support of this investigation and embedded with the Operations (OPS) work group. Additional information was gathered with the OPS work group during travel to Alaska in May 2025. In addition, 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 Meteorology Specialist's Factual Report contains the meteorological factors pertinent to the weather surrounding the accident time for below 20,000 ft. All times are Alaska standard time (AKST) and are based upon the 24-hour clock, where local time is -9 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 64.351667° N, longitude 164.28083° W.

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 Alaska for 1500 AKST is provided as figure 1 with the location of the accident site within the black circle. The chart depicted a high-pressure system at 1025-hectopascals (hPa) located in southwestern Alaska. A stationary front stretched from west to east from the Bering Sea eastward into northwestern Canada. The accident site was located north of the stationary front (figure 1).

The station model closest to the accident site depicted an air temperature of 13°F, dew point temperature 9°F, cloudy skies, and a north wind at 5 knots.

¹ [FAA-H-8083-28A, Aviation Weather Handbook | Federal Aviation Administration](#)

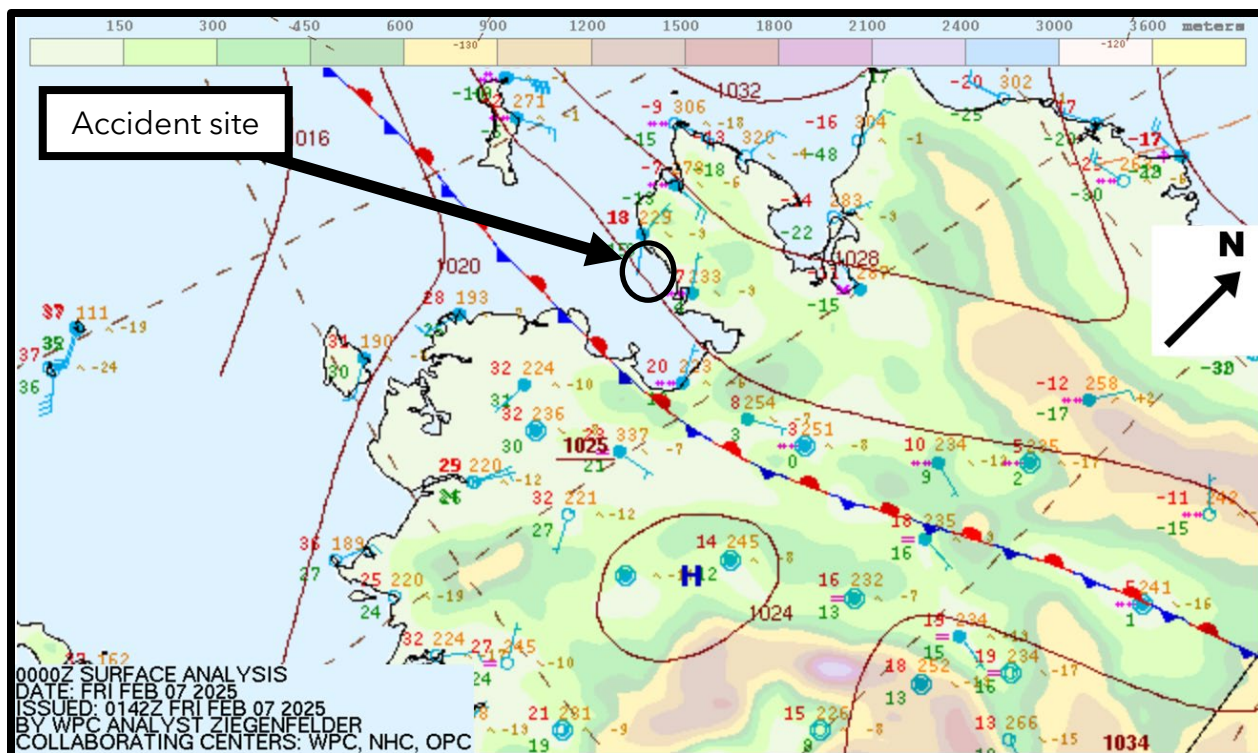


Figure 1. NWS Surface Analysis Chart for 1500 AKST.

2.0 Surface Observations

The area surrounding the accident site was documented using official Aviation Routine Weather Reports (METARs) and Aviation Selected Special Reports (SPECIs)². The following observations were taken from standard code and are provided in plain language. A magnetic variation³ of 9° east was indicated over the area (figure 2).

² Latest criteria for SPECIs can be found in the Federal Meteorological Handbook: [Federal Meteorological Handbook Number 1, Surface Weather Observations and Reports \(icams-portal.gov\)](https://www.federalregister.gov/documents/2018/01/16/2018-01-16-federal-meteorological-handbook-number-1-surface-weather-observations-and-reports)

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

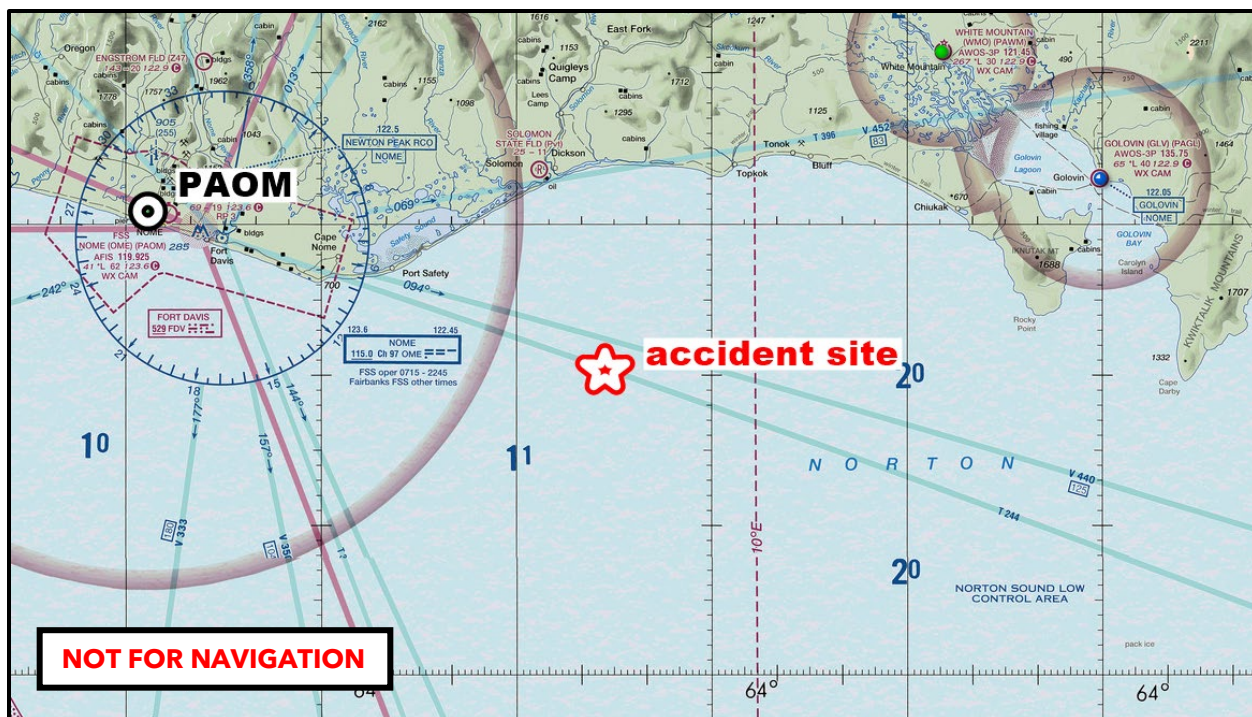


Figure 2. FAA sectional aeronautical chart of the accident area with the locations of the accident site and surface observation site noted.

Nome Airport (PAOM) was the intended destination airport and was equipped with an Automated Surface Observing System (ASOS⁴). Its longline⁵ reports were augmented by Alaska Flight Service Station (AK FSS) when the AK FSS was in operation⁶. The PAOM ASOS was located 32 miles west-northwest of the accident site (figure 2) at an elevation of 41 feet (ft), and issued the following observations surrounding the accident time:⁷

[1353 AKST] METAR PAOM 062253Z 0000KT 1SM R28/P6000FT -SN
BR BKN025 BKN030 OVC037 M09/M11 A3021 RMK AO2 SLP230 P0002
T10941106=

⁴ ASOS - Automated Surface Observing System is equipped with meteorological instruments to observe and report wind, visibility, weather phenomena, ceiling, temperature, dewpoint, altimeter, and barometric pressure. ASOS are maintained by the NWS.

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 AK FSS hours of operation in PAOM between 0700 and 2300 local.

⁷ 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.

[1415 AKST] SPECI PAOM 062315Z 36005KT 2 1/2SM
R28/5500VP6000FT -SN BKN037 OVC055 M10/M13 A3021 RMK AO2
P0000 T11001128=

[1422 AKST] SPECI PAOM 062322Z 03003KT 9SM BKN044 OVC055
M09/M12 A3020 RMK AO2 SNE21 P0000 T10941117=

[1453 AKST] METAR PAOM 062353Z 34006KT 9SM FEW009 SCT026
OVC060 M11/M13 A3021 RMK AO2 SNE21 SLP229 P0001 60009
T11061128 11089 21111 56003=

**[1505 AKST] SPECI PAOM 070005Z 00000KT 10SM -SN BKN027
BKN035 OVC055 M10/M12 A3020 RMK AO2 SNB03 P0000
T11001122=**

ACCIDENT TIME 1520 AKST

**[1545 AKST] SPECI PAOM 070045Z 35006KT 4SM HZ FEW009
BKN025 OVC032 M10/M13 A3020 RMK AO2 SNB03E12 P0000
I1000 T11001133=**

[1553 AKST] METAR PAOM 070053Z 00000KT 3SM HZ OVC027
M10/M13 A3020 RMK AO2 SNB03E12 SLP228 P0000 I1000
T11001128=

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

PAOM weather at 1505 AKST, wind calm, visibility 10 miles or greater, light snow, broken ceiling at 2,700 ft above ground level (agl), broken skies at 3,500 ft agl, overcast skies at 5,500 ft agl, temperature of -10°C, dew point temperature of -12°C, and an altimeter setting of 30.20 inches of mercury (inHg). Remarks, station with a precipitation discriminator, snow began at 1503 AKST, a trace of precipitation since 1453 AKST, temperature -10.0°C, dew point temperature -12.2°C.

PAOM weather at 1545 AKST, wind from 350° at 6 knots, visibility 4 miles, haze, few clouds at 900 ft agl, broken ceiling at 2,500 ft agl, overcast skies at 3,200 ft agl, temperature of -10°C, dew point temperature of -13°C, and an altimeter setting of 30.20 inHg. Remarks, station with a precipitation discriminator, snow began at 1503 AKST and ended at 1512 AKST, a trace of precipitation since 1453 AKST, a trace of icing since 1453 AKST, temperature -10.0°C, dew point temperature -13.3°C.

The observations from the PAOM ASOS around the accident time identified MVFR⁸ conditions. The edit logs from the PAOM ASOS from November 2024 through the accident time are found in attachment 1. The PAOM ASOS maintenance summary and additional documentation are found in attachments 2 and 3.

Unalakleet Airport (PAUN) was the departure airport for the accident aircraft and was equipped with an Automated Weather Observing System (AWOS⁹) whose longline reports were not augmented. The PAUN AWOS was located 95 miles east-southeast of the accident site, at an elevation of 27 ft, and issued the following observations surrounding the departure and accident times:

[1156 AKST] METAR PAUN 062056Z AUTO 07013KT 2 1/2SM -SN BR
SCT018 M06/M07 A3020 RMK AO2 SLP230 P0000 60000 T10611072
56003 FZRANO=

[1256 AKST] METAR PAUN 062156Z AUTO 08011KT 3SM -SN BR
BKN017 BKN024 M06/M07 A3020 RMK AO2 SLP229 P0000 T10561072
FZRANO=

[1356 AKST] METAR PAUN 062256Z AUTO 06003KT 2 1/2SM -SN BR
BKN015 OVC020 M06/M07 A3020 RMK AO2 SLP228 P0000 T10561067
FZRANO=

[1411 AKST] SPECI PAUN 062311Z AUTO 26003KT 3SM -SN BR
OVC018 M06/M07 A3019 RMK AO2 P0000 FZRANO=

**[1429 AKST] SPECI PAUN 062329Z AUTO 29003KT 2 1/2SM -SN BR
OVC014 M06/M07 A3019 RMK AO2 P0000 FZRANO=**

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 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.

DEPARTURE TIME 1437 AKST¹⁰

**[1440 AKST] SPECI PAUN 062340Z AUTO 31003KT 1 1/2SM -SN BR
SCT009 OVC012 M06/M07 A3018 RMK AO2 P0000 FZRANO=**

[1454 AKST] SPECI PAUN 062354Z AUTO 30003KT 1 1/4SM -SN BR
BKN008 OVC012 M07/M08 A3018 RMK AO2 CIG 007V011 P0000
FZRANO=

[1456 AKST] METAR PAUN 062356Z AUTO 32003KT 1 1/4SM -SN BR
BKN008 OVC012 M07/M08 A3018 RMK AO2 CIG 007V011 SLP223
P0000 60000 T10671078 11056 21067 58006 FZRANO=

[1506 AKST] SPECI PAUN 070006Z AUTO 29004KT 1SM -SN BR
BKN008 OVC014 M07/M08 A3018 RMK AO2 P0000 FZRANO=

[1512 AKST] SPECI PAUN 070012Z AUTO 28004KT 1 1/2SM -SN BR
SCT008 BKN016 OVC022 M07/M08 A3018 RMK AO2 P0000
FZRANO=

ACCIDENT TIME 1520 AKST

[1521 AKST] SPECI PAUN 070021Z AUTO 31003KT 2 1/2SM -SN BR
FEW008 SCT016 OVC022 M07/M08 A3018 RMK AO2 P0000
FZRANO=

[1528 AKST] SPECI PAUN 070028Z AUTO 32005KT 3SM -SN BR
FEW008 SCT015 OVC022 M07/M08 A3018 RMK AO2 P0000 FZRANO=

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

PAUN weather at 1429 AKST, wind from 290° at 3 knots, visibility 2 and ½ miles, light snow, mist, overcast ceiling at 1,400 ft agl, temperature of -6°C, dew point temperature of -7°C, and an altimeter setting of 30.19 inHg. Remarks, station with a precipitation discriminator, a trace of precipitation since 1356 AKST, freezing rain information is not available.

PAUN weather at 1440 AKST, wind from 310° at 3 knots, visibility 1 and ½ miles, light snow, mist, scattered clouds at 900 ft agl, overcast ceiling at 1,200 ft agl, temperature of -6°C, dew point temperature of -7°C, and an altimeter setting of 30.18 inHg. Remarks, station with a precipitation discriminator, a trace of precipitation since 1356 AKST, freezing rain information is not available.

¹⁰ See track data in air traffic control (ATC) report or docket information for this accident.

The observations from the PAUN AWOS around the departure time identified IFR conditions with light snow. The weather observations around the accident time from the St. Michael Airport (PAMK) AWOS are located in attachment 20.

3.0 Upper Air Sounding

Nome, Alaska, had an upper air sounding (PAOM sounding) that had a station ID of 70200, with a surface elevation of 20 ft. The PAOM sounding launch site was located 32 miles west-northwest of the accident site. Data from the 1500 AKST PAOM sounding were plotted on a standard Skew-T Log P diagram¹¹ using the RAOB software¹² from the surface to 600-hPa (or approximately 14,000 ft) along with the derived stability parameters and are included as figure 3. The sounding depicted the lifted condensation level (LCL)¹³ at 912 ft and the convective condensation level (CCL)¹⁴ at 9,559 ft. The entire atmosphere was below freezing with the precipitable water value at 0.30 inches.

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 Esonde 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.

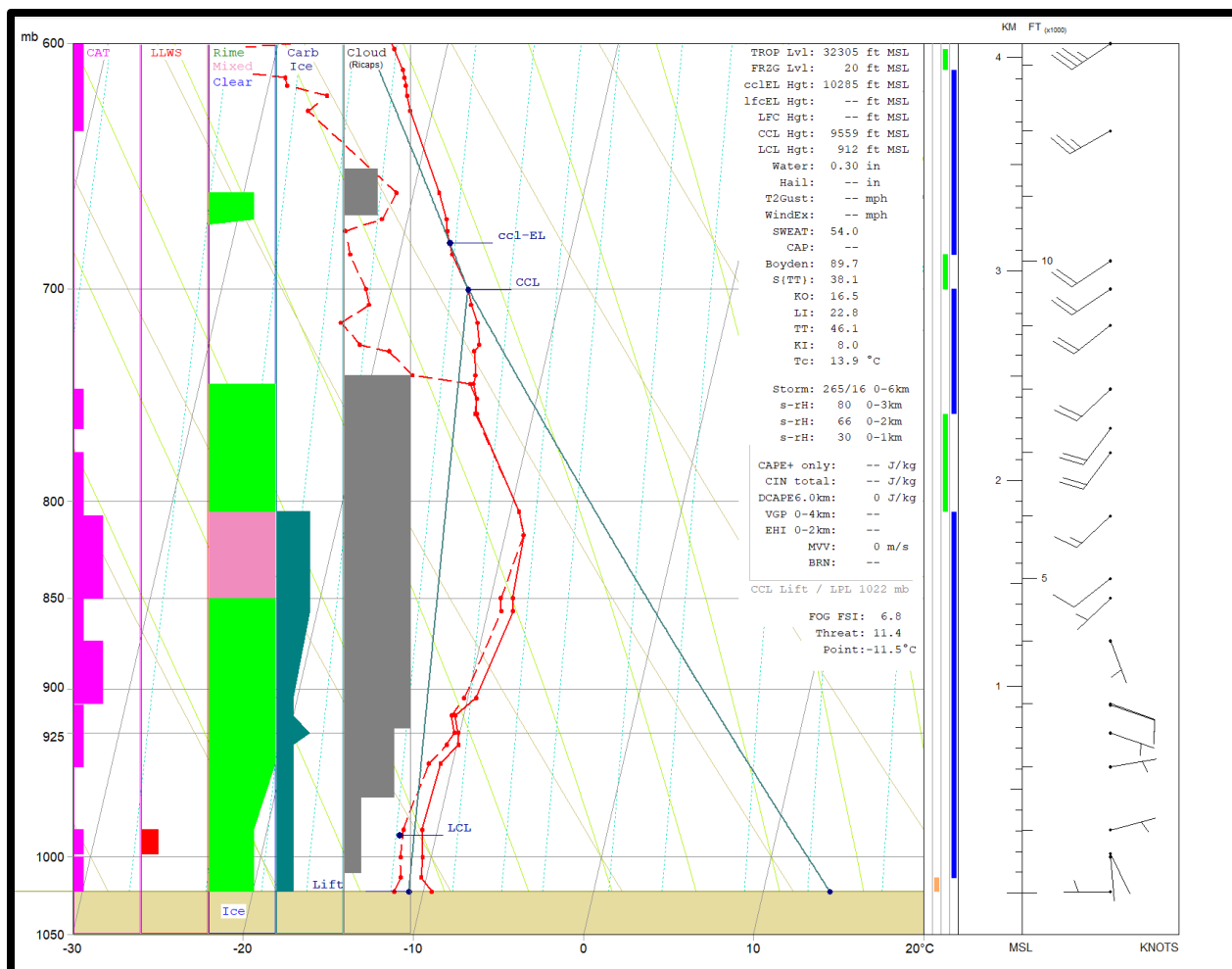


Figure 3. 1500 AKST PAOM sounding.

The 1500 AKST PAOM sounding indicated a stable layer from near the surface to 6,000 ft with a conditionally unstable atmosphere from 6,000 ft through 7,500 ft. RAOB indicated cloud cover between 400 ft agl through 8,250 ft and moderate or greater rime and mixed icing conditions between the surface and 8,250 ft.

The 1500 AKST PAOM sounding wind profile indicated a near-surface wind from the west at 5 knots with the wind veering¹⁵ to the southwest by 5,000 ft. The wind speed increased to 10 knots by 5,000 ft with a southwest wind increase to 20 knots by 7,000 ft.

¹⁵ Veering - Wind turning clockwise with height.

4.0 Satellite Data

Geostationary Operational Environmental Satellite number 18 (GOES-18) visible and infrared 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 and infrared imagery (GOES-18 bands 2 and 13) at wavelengths of 0.64 microns (μm) and 10.3 μm , respectively, were retrieved for the period from 1100 AKST through 1800 AKST and reviewed, and the closest images to the time of the accident were documented.

Figure 4 presents the GOES-18 visible image at 1520 AKST at 3X magnification with the accident site highlighted with a red square. There was cloud cover indicated above the accident site with the cloud cover moving from west to east (attachment 4). Figure 5 presents the GOES-18 infrared image at 1520 AKST at 8X magnification with the accident site highlighted with a red square. Relatively low brightness temperatures (green colors; higher cloud tops) were located above the accident site (attachment 5). A brightness temperature of 235 Kelvin¹⁶ would have been near 22,000 ft based on the vertical temperature profile provided by the 1500 AKST PAOM sounding (not shown in figure 3). It should be noted these figures have not been corrected for any parallax error.

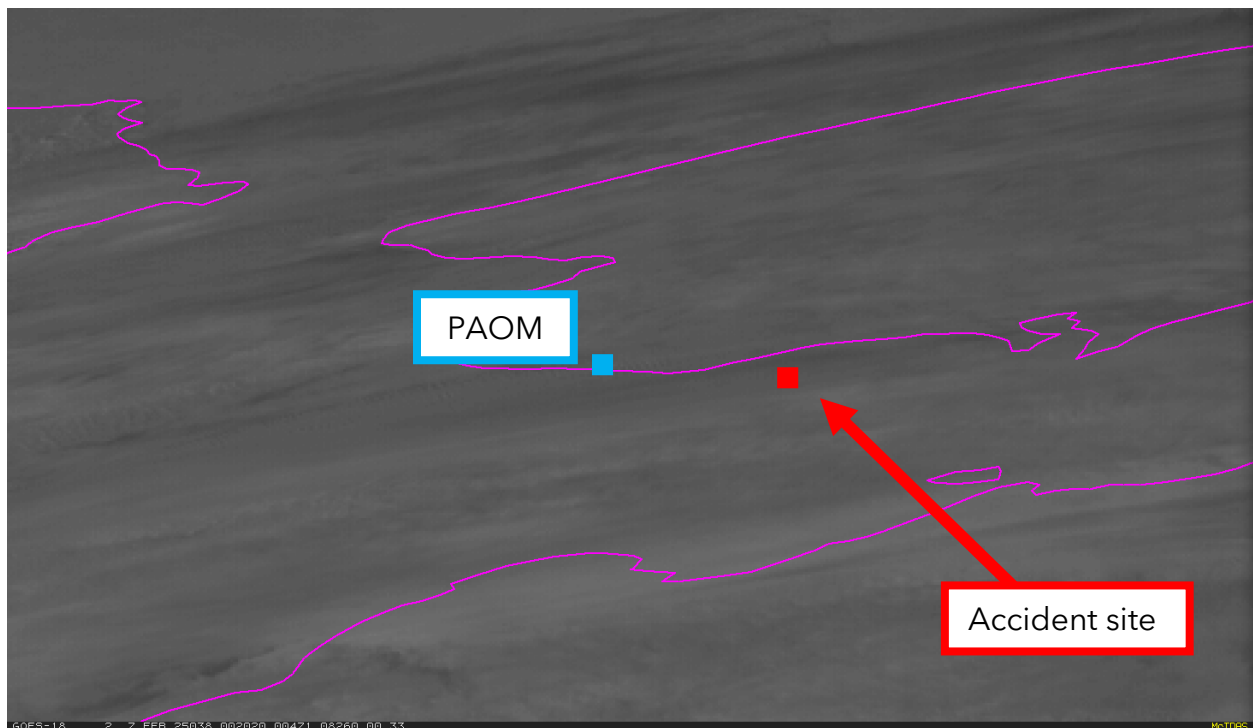


Figure 4. GOES-18 visible image at 1520 AKST.

¹⁶ around -38°C

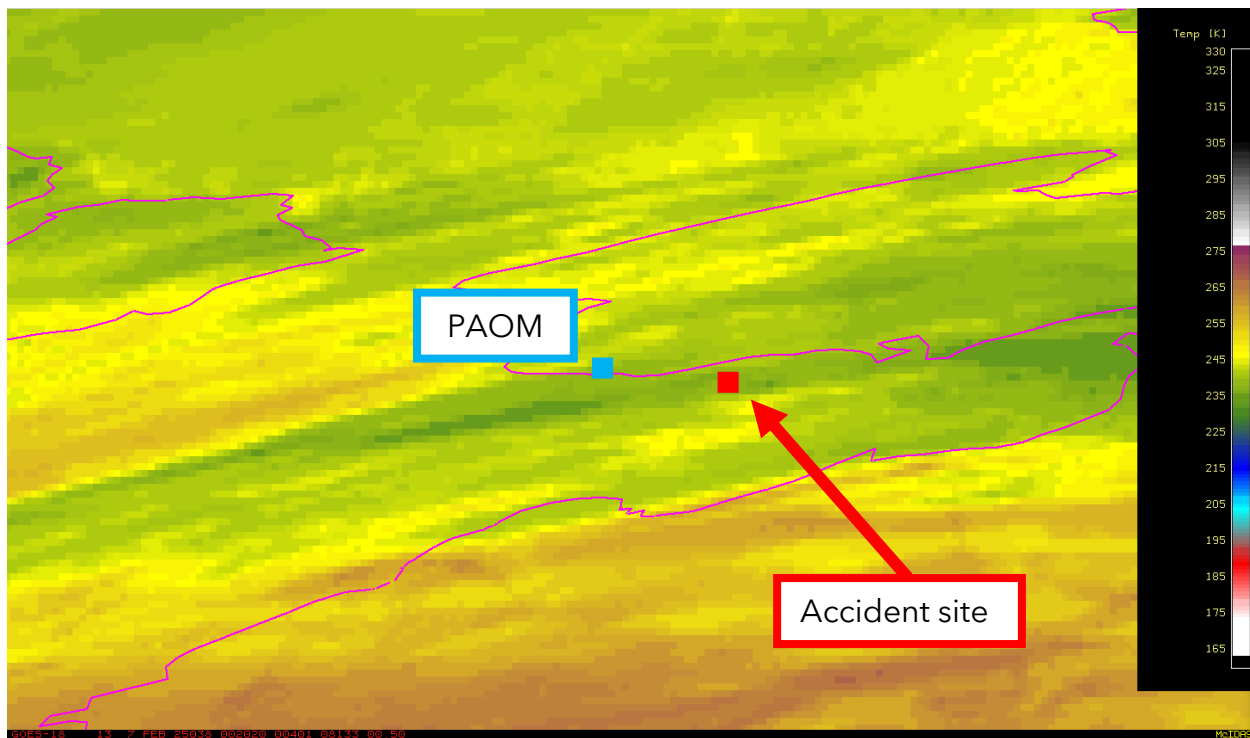


Figure 5. GOES-18 infrared image at 1520 AKST.

Additional satellite imagery was obtained from the Geographic Information Network of Alaska (GINA)¹⁷ and is provided using Joint Polar Satellite System (JPSS) data. Experimental aviation cross-section imagery was viewed using JPSS satellite information¹⁸ along the accident aircraft's approximate flight track with the data between 1400 and 1413 AKST found in figure 6. Figure 7 contains similar imagery to figure 6, except for times between 1450 and 1501 AKST with the flight track between PAUN and PAOM. Figure 8 shows exemplar standard flight routes for cross section information produced on the CIRA website. For more information on the cross-section imagery please see attachment 6.

¹⁷ Additional information and imagery from the JPSS, Cooperative Institute for Research in the Atmosphere (CIRA), and Center for Satellite Applications and Research (STAR) can be found at: [AV Cloud Product Evaluation \(alaska.edu\)](https://cloudproductevaluation.alaska.edu/)

¹⁸ [CIRA Aviation Homepage \(colostate.edu\)](https://ciraaviation.colostate.edu/)

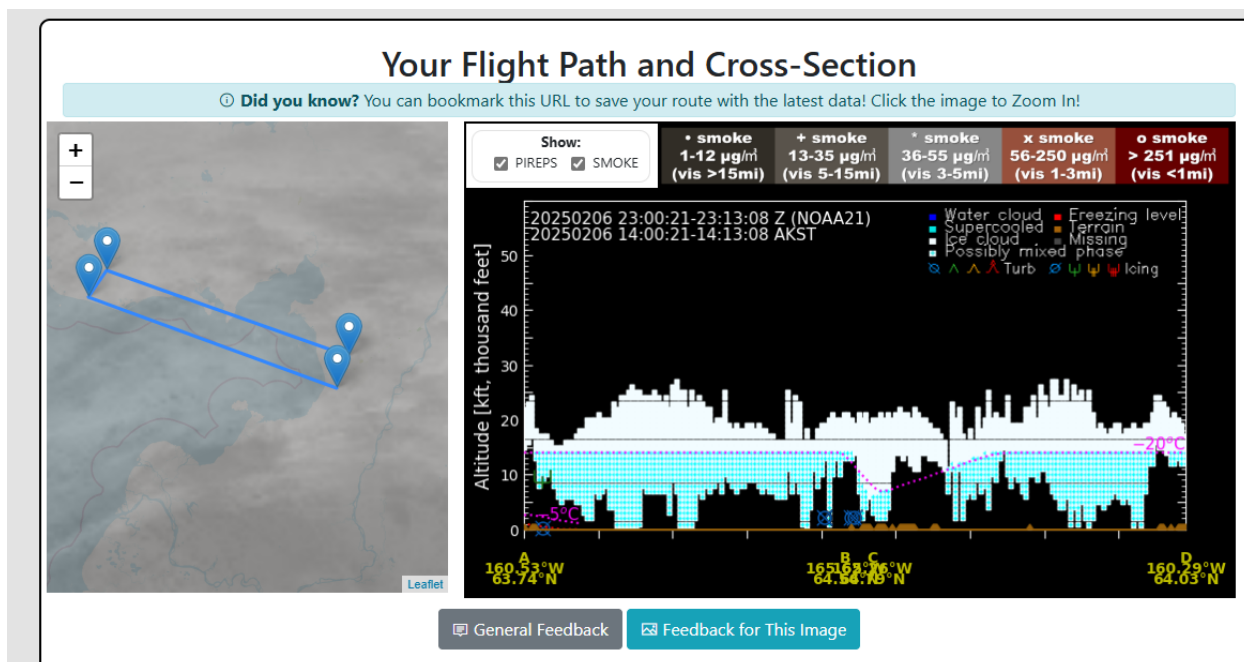


Figure 6. Experimental Aviation Cross-section Product between 1400 and 1413 AKST along the route of the accident flight.

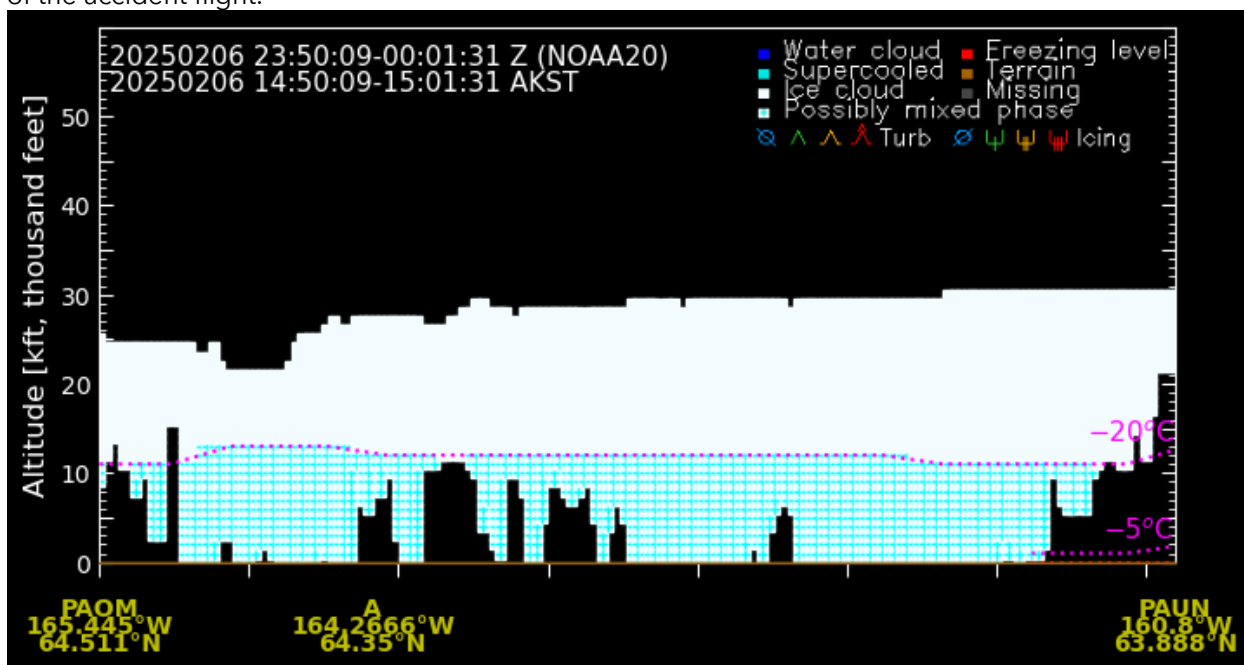


Figure 7. Experimental Aviation Cross-section Product between 1450 and 1501 AKST along the route of the accident flight.

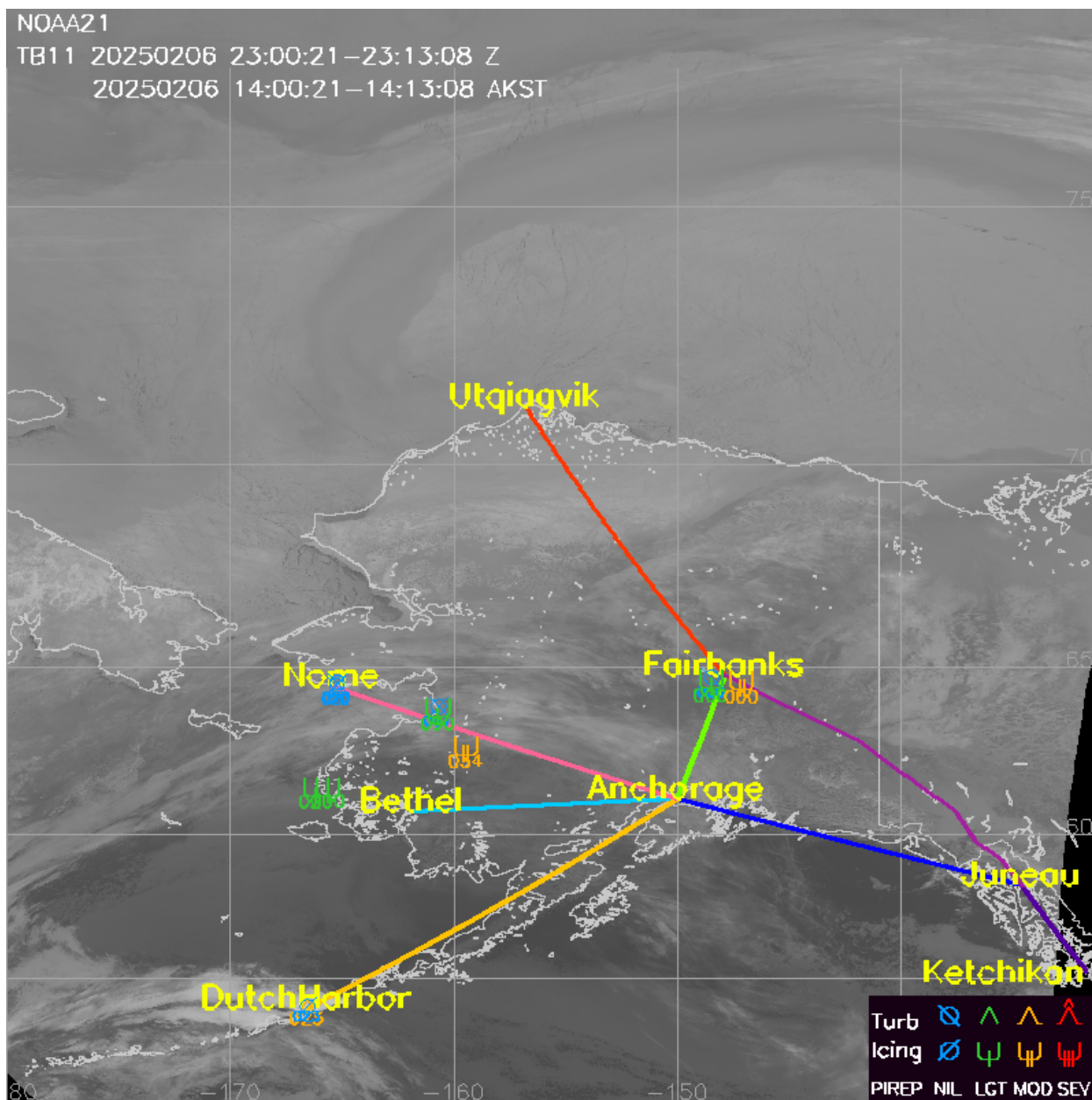


Figure 8. Exemplar Experimental Aviation Cross-section Product cross-section locations.

5.0 National Radar Imagery

A regional view of the NWS National Reflectivity Mosaic is included as figure 9 for 1530 AKST with the approximate location of the accident site marked by a red circle. The mosaic imagery depicted precipitation echoes above the accident site.

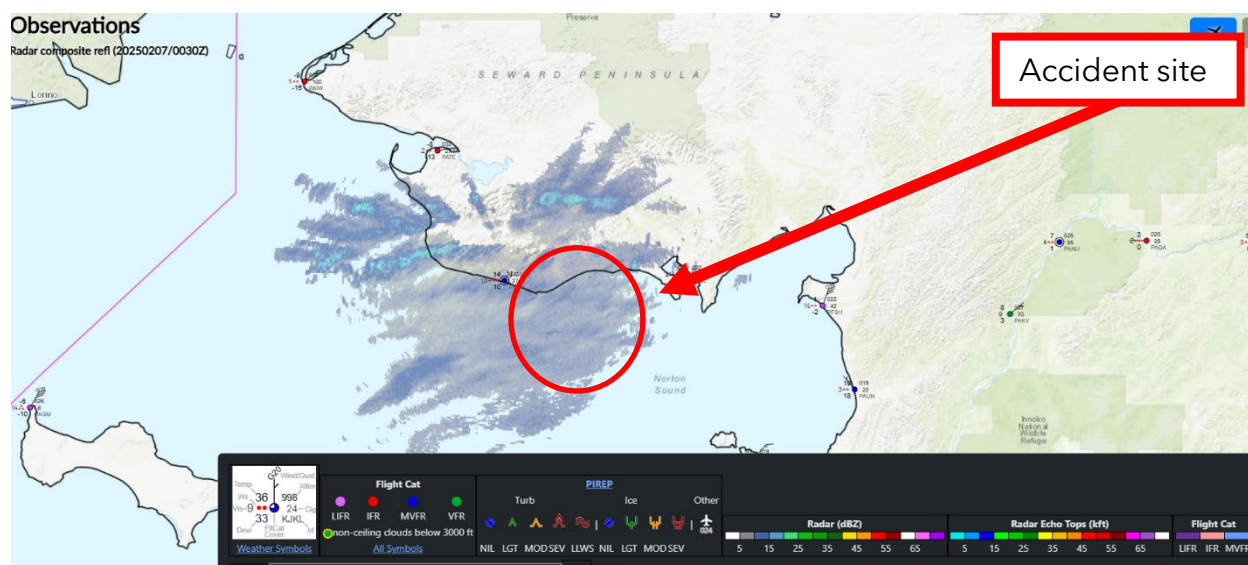


Figure 9. National Reflectivity Mosaic for 1530 AKST.

6.0 Weather Surveillance Radar Imagery

The closest NWS Weather Surveillance Radar-1988, Doppler (WSR-88D)¹⁹ to the accident site was Nome, Alaska, WSR-88D, (PAEC) located 28 miles west-northwest of the accident site. The 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.

6.1 Volume Scan Strategy

During the period surrounding the accident, the PAEC WSR-88D radar was operating in the precipitation mode VCP-215 (figure 10). The following figure provides an indication of the different elevation angles in this VCP, and the approximate height and width of the radar beam with distance from the radar site.

¹⁹ 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.

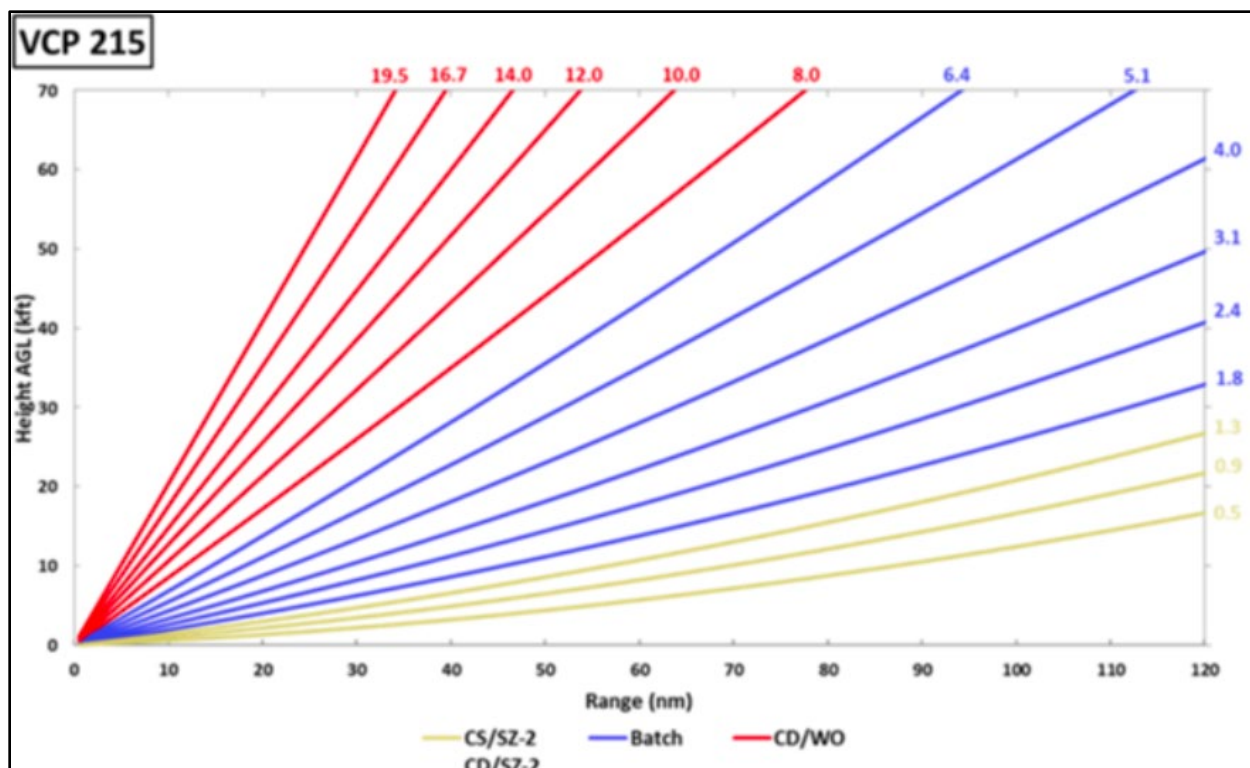


Figure 10. VCP-215 Precipitation Mode Scan Strategy²⁰.

6.2 Beam Height Calculation

Assuming standard refraction²¹ of the PAEC WSR-88D radar beam with the antenna elevation at 90 ft, and considering a beamwidth²² of 0.95°, the following table shows the approximate heights for the radar beam center, top, and base for antenna elevations over the accident site. These heights have been rounded to the nearest 10 ft.

²⁰ Contiguous Surveillance (CS)--The low Pulse Repetition Frequency (PRF) scan of the split cut. Gives a high R_{max} value to determine proper target location and intensity, but a low V_{max} value limits the velocities that can be measured. Contiguous Doppler (CD)--The high PRF scan of the split cut. Gives a low R_{max} value causing more range folded (multiple trip) echoes, but a high V_{max} value to get higher, more accurate velocity values. Batch Mode - Uses alternating low and high PRFs on each radial for one full rotation at each elevation angle. The two resulting data sets (low PRF and high PRF) are combined to resolve range ambiguity. Used in the middle elevation angles.

W - With range unfolding (W)

WO - Without range unfolding (WO)

²¹ Standard Refraction in the atmosphere is when the temperature and humidity distributions are approximately average, and values set at the standard atmosphere.

²² Beamwidth - the angular separation between the half power points on the antenna radiation pattern, where the gain is one half the maximum value.

ANTENNA ELEVATION	BEAM CENTER	BEAM BASE	BEAM TOP
PAEC 0.88°	3,220 ft	1,810 ft	4,630 ft
PAEC 1.32°	4,530 ft	3,120 ft	5,940 ft

Based on the radar height calculations, the elevation scans reviewed from PAEC listed in the above table depicted the conditions between 1,810 ft and 5,940 ft over the accident site and these altitudes were the closest to the altitudes of the accident flight track before the accident time²³.

6.3 Reflectivity

Reflectivity is the measure of the efficiency of a target in intercepting and returning radio energy. With hydrometeors²⁴ it is a function of the drop size distribution, number of particles per unit volume, physical state (ice or water), shape, and aspect. Reflectivity is normally displayed in dBZ²⁵ and is a general measure of echo intensity. FAA Advisory Circular AC 00-24C²⁶, "Thunderstorms," dated February 19, 2013, also defines the echo intensity levels and weather radar echo intensity terminology associated with those levels. For dBZ values less than 30 the weather radar echo intensity terminology should be "light." For dBZ values between 30 and 40, the terminology should be "moderate." "Heavy" terminology is used for dBZ values greater than 40 dBZ but less than 50 dBZ, inclusive. Finally, any dBZ values above 50 dBZ shall be described as "extreme."

²³ See ATC data in the docket of this accident.

²⁴ Hydrometeors are any product of condensation or sublimation of atmospheric water vapor, whether formed in the free atmosphere or at the earth's surface; also, any water particles blown by the wind from the earth's surface. Hydrometeors are classified as; (a) Liquid or solid water particles suspended in the air: cloud, water droplets, mist, or fog. (b) Liquid precipitation: drizzle and rain. (c) Freezing precipitation: freezing drizzle and freezing rain. (d) Solid (frozen) precipitation: ice pellets, hail, snow, snow pellets, and ice crystals. (e) Falling particles that evaporate before reaching the ground: virga. (f) Liquid or solid water particles lifted by the wind from the earth's surface: drifting snow, blowing snow, blowing spray. (g) Liquid or solid deposits on exposed objects: dew, frost, rime, and glazed ice.

²⁵ dBZ - A non-dimensional "unit" of radar reflectivity which represents a logarithmic power ratio (in decibels or dB) with respect to radar reflectivity factor, Z.

²⁶

https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/1020774

6.4 Base Reflectivity Data

Figures 11 and 12 present the PAEC WSR-88D base reflectivity images for the 0.88° and 1.32° elevation scans initiated at 1518 AKST, with a resolution of 0.5° X 250 m. The images depicted reflectivity values between -10 and 10 dBZ above the accident site and along the accident flight track. The precipitation moving from southwest to northeast (attachments 7 and 8).

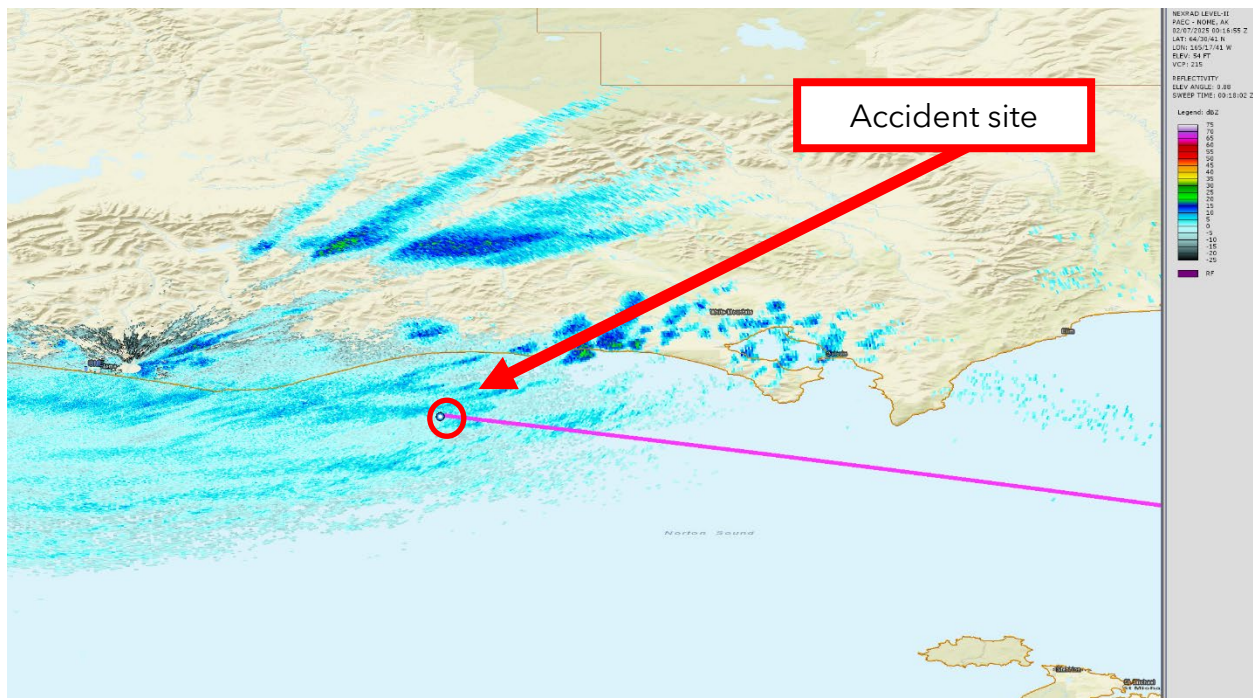


Figure 11. PAEC WSR-88D reflectivity for the 0.88° elevation scan initiated at 1518:02 AKST with the accident site marked with the red circle. The accident flight track is the pink line.

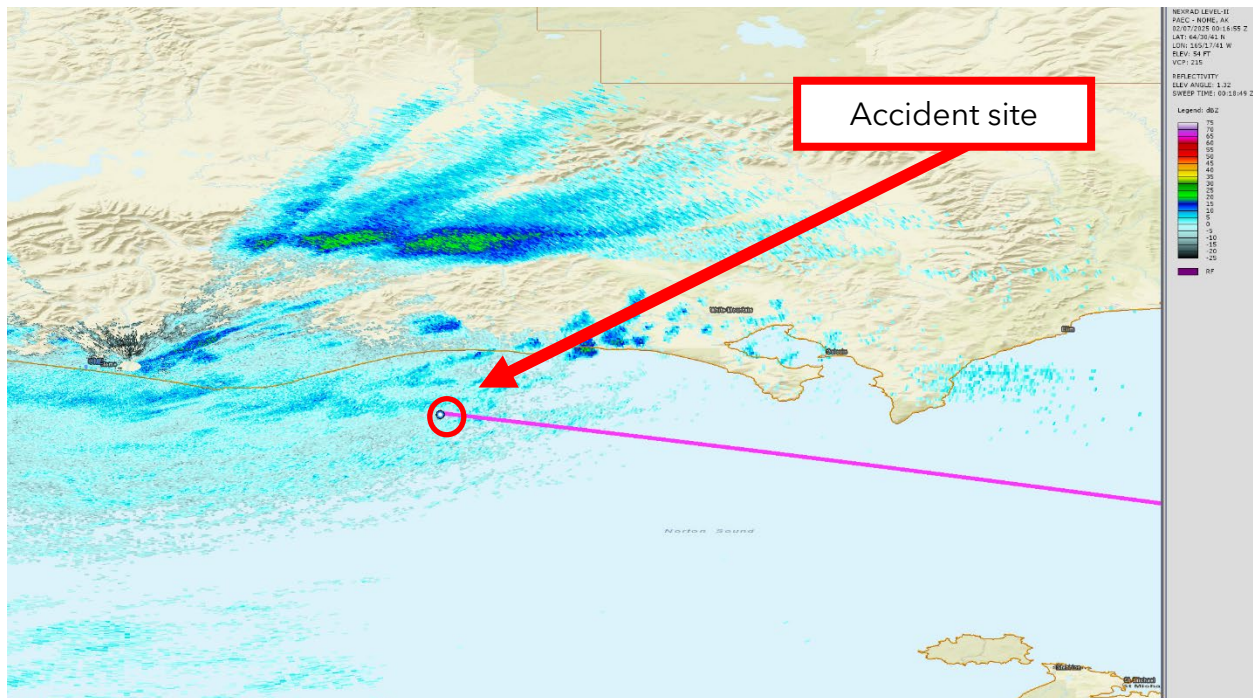


Figure 12. PAEC WSR-88D reflectivity for the 1.32° elevation scan initiated at 1518:49 AKST with the accident site marked with the red circle. The accident flight track is the pink line.

A free text message (FTM) was issued the date of the accident regarding PAEC with the text wording below:

NOUS69 PAFG 061522
FTMAEC

WSR-88D FREE TEXT MESSAGE
NATIONAL WEATHER SERVICE FAIRBANKS AK
622 AM AKST THU FEB 6 2025

PAEC (NOME) RADAR MAINTENANCE FROM 2/6 1530Z TO 2/7 0130Z.
PRODUCTS MAY NOT BE AVAILABLE DURING THIS TIME.

7.0 Pilot Reports

The longline-disseminated pilot reports²⁷ (PIREPs) distributed into the national airspace system (NAS) within 3 hours of the accident time and within 100 miles of the accident site are shown below. There was additional weather information passed along by the accident pilot and other company pilots before the accident time and that information can be found in the docket for this accident.

OME UA /OV OME/TM 0242/FL000/TP B737/WX FV02SM/RM /BA RWY 28 BA MEDIUM
/AKFSS/

OME UA /OV OME/TM 0237/FL000/TP C208/TA M11/IC MOD RIME/RM MOD RIME IC/ FZ
MIST AFTER BREAKING OUT DURD RWY 28 /AKFSS/

OME UA /OV OME/TM 0130/FL005/TP AS35/TA M10/IC LGT RIME/RM OVR CAPE NOME
/AKFSS/

OME UA /OV OME/TM 2217/FL020/TP C208/SK OVC020/TB NEG/IC NEG/RM DURC NORTH
ZAN

OME UA /OV OME360005/TM 2214/FL020/TP C208/SK OVC020/TB NEG/IC NEG/RM ZAN

8.0 Significant Meteorological Information

There were no Significant Meteorological Information (SIGMET)²⁸ advisories valid for the accident site at the accident time.

²⁷ Only PIREPs with the World Meteorological Organization headers UBAK** were considered. These do not include pilot reports only broadcast via radio.

²⁸ Significant Meteorological Information is a weather advisory that contains meteorological information concerning the safety of all aircraft. There are two types of SIGMETs: convective and non-convective. A US SIGMET advises of weather, other than convective activity, that is potentially hazardous to all aircraft. SIGMETs are issued (for the lower 48 states and adjacent coastal waters) for the following weather-impacted reasons:

- Severe Icing
- Severe or Extreme Turbulence
- Dust Storms and/or Sand Storms lowering visibility to less than 3 miles
- Volcanic Ash

If the total area affected during the forecast period is very large, only a small portion of this total area may be affected at any one time. SIGMETs are issued for 6 hour periods for conditions associated with hurricanes and 4 hours for all other events. If conditions persist beyond the forecast period, the SIGMET is updated and reissued. Convective SIGMETs are issued hourly for thunderstorm-related aviation hazards.

9.0 Center Weather Service Advisories and Information

The Anchorage (ZAN) 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. The ZAN CWSU completed several Pre-Duty Weather Briefings (PDWB) on the day of the accident. For more information please see attachment 9. An exemplar ZAN CWSU solicit PIREP request board is located below as figure 13. For more information regarding the ZAN CWSU please see the ATC material in the docket of this accident.

ZAN CWSU REQUIRED PIREPs GRAPHIC (Ceiling <= 5000ft and/or Visibility <= 5SM)						
SOLICIT PIREPS:	NO	YES	YES	YES	YES	
		CIG <= 5000ft	MVFR	IFR	LIFR	
	NORTH		HIGH		SOUTH	
SCC	BIG	DUT	SNP	ILI	TKA	YAK
FAI	OME	CDB	PBV	HOM	GKN	GST
OTZ	UNK	DLG	ADK	ENA	VDZ	JNU
BTT	MCG	AKN	SYA	ANC	CDV	PSG
TAL	BET	ADQ		PAQ		WRG
						KTN
						SIT
Intended for use by air traffic personnel only. All current and forecast information is subject to change.						
LAST METAR REPORT: 10-16T14:38:00Z			***EXPERIMENTAL PRODUCT***		LAST UPDATE: 01-26/1703 UTC	

Figure 13. Exemplar ZAN CWSU solicit PIREP request board.

10.0 Alaska Aviation Weather Unit

The NTSB Senior Meteorologist and Operations Group Chairman interviewed the Alaska Aviation Weather Unit (AAWU) forecaster responsible for the weather forecast valid at the accident time along with the AAWU Science and Operations Officer (SOO) and those interviews were transcribed and are provided as attachments 10 and 11. In addition, the AAWU issued an Icing Forecast product (figure 14) and a Flying Weather product (figure 15) around 1300 AKST and these forecasts were valid at 1500 AKST and between 1200 and 1800 AKST, respectively. The Icing Forecast indicated occasional to constant moderate icing at the accident site between 2,000 and 8,000 ft. The Flying Weather forecast indicated IFR conditions along the route of flight and at the accident site at the accident time. For more AAWU graphics valid at the accident time please see attachment 12. The history behind the AAWU icing categories and their text can be found in attachment 13.

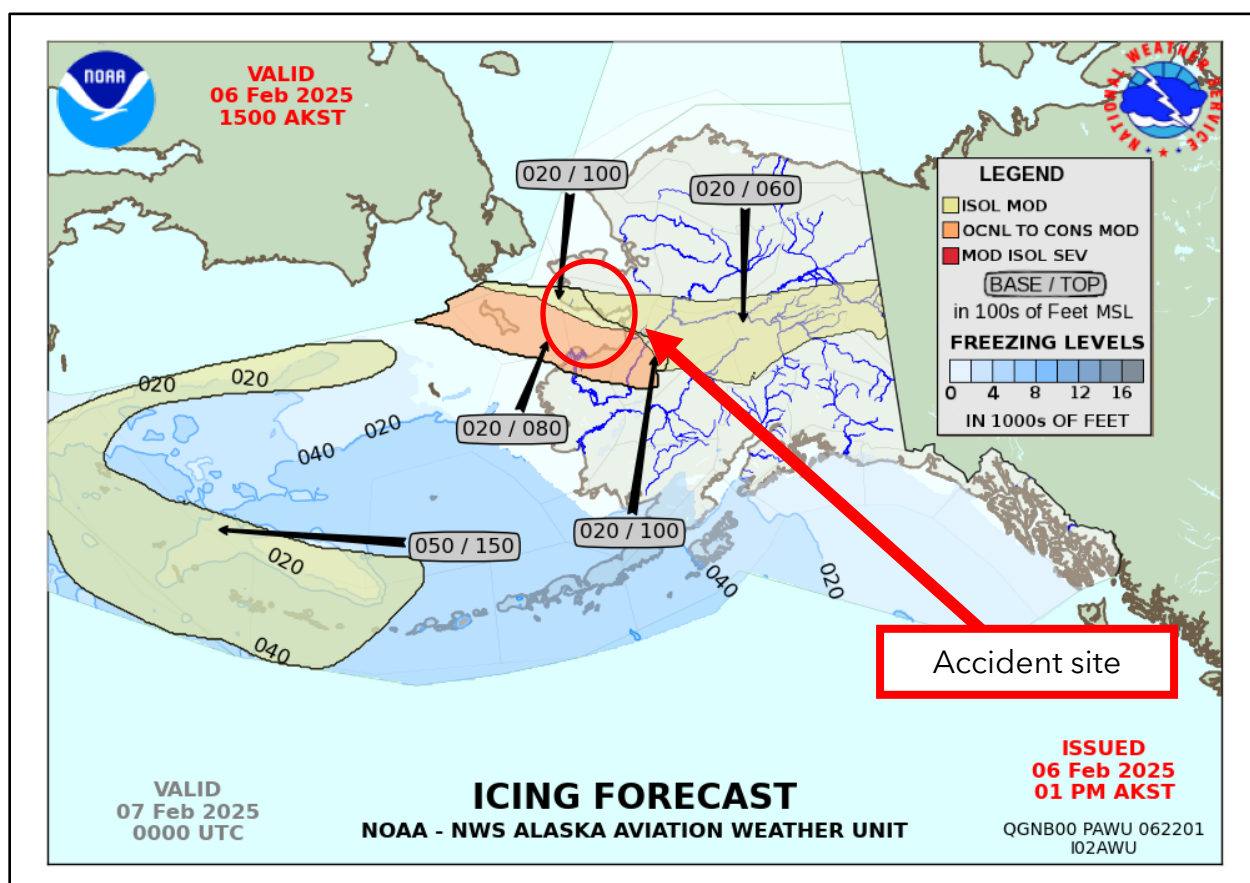


Figure 14. AAWU Icing Forecast issued at 1301 AKST and valid at 1500 AKST. The location of the accident site is marked by the red circle.

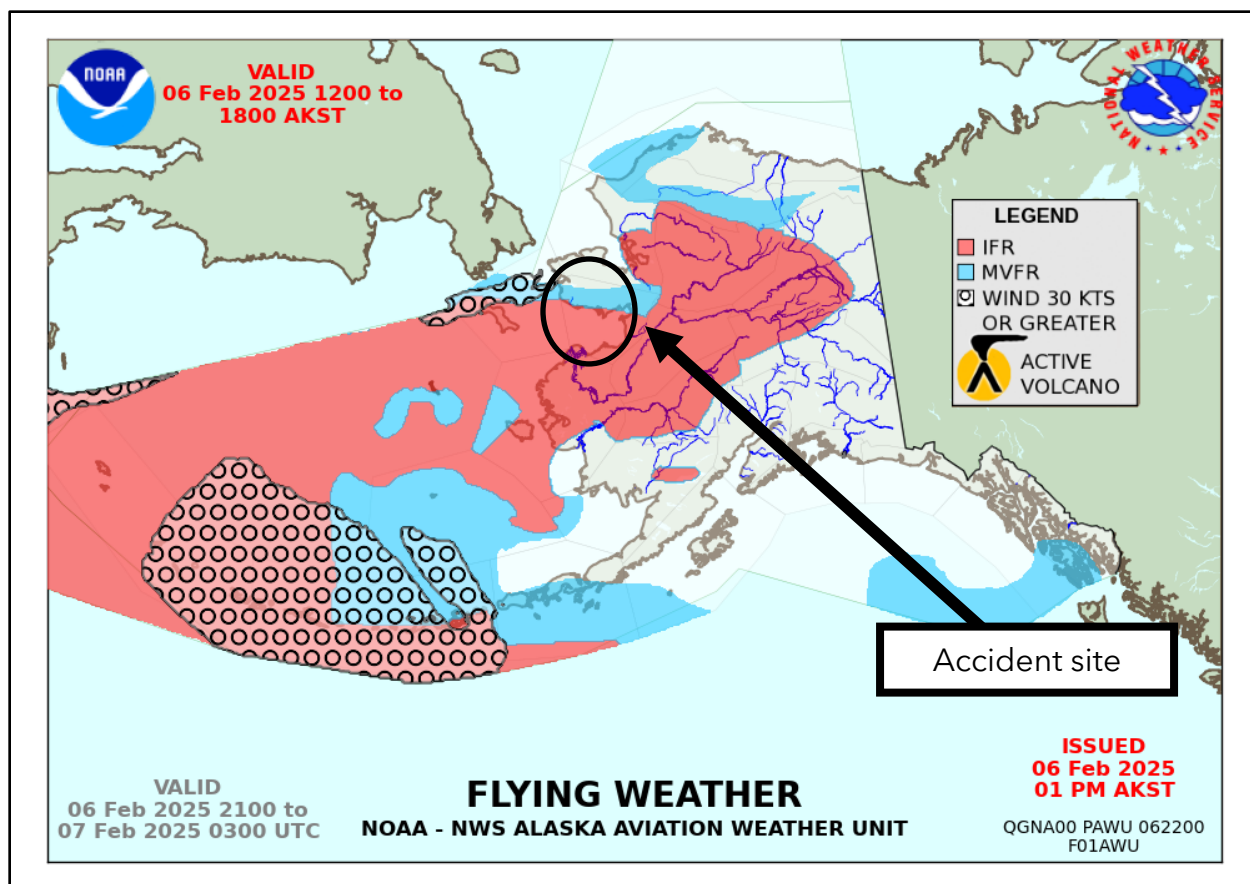


Figure 15. AAWU Flying Weather graphic issued at 1300 AKST and valid between 1200 and 1800 AKST. The location of the accident site is marked by the black circle.

11.0 Text Airmen's Meteorological Information

The AAWU had text Airmen's Meteorological Information (AIRMET) advisories Sierra and Zulu valid for the accident site at the accident time for below 15,000 ft. Text AIRMETs Sierra and Zulu were issued at 1237 AKST and forecast IFR conditions and mountain obscuration due to light snow and mist, clouds and precipitation, occasional moderate icing between 2,000 and 8,000 ft:

WAAK49 PAWU 062137
 WA9O
 FAIS WA 062115
 AIRMET SIERRA FOR IFR AND MT OBSC VALID UNTIL 070515
 .
 UPR YKN VLY FB
 SW PFYU OCNL CIG BLW 010/VIS BLW 3SM BR/FZFG. IMPR.
 .
 UPR YKN VLY FB
 S PFYU MTS OCNL OBSC IN CLDS/PCPN. NC.
 .
 TANANA VLY FC

N AK RANGE OCNL CIG BLW 010/VIS BLW 3SM BR/FZFG. DTRT.

.
TANANA VLY FC
NRN MTS OCNL OBSC BY CLDS. NC.

.
KOYUKUK AND UPR KOBUK VLY FE
OCNL CIG BLW 010/VIS BLW 3SM -SN BR/FZFG. IMPR FM W.

.
KOYUKUK AND UPR KOBUK VLY FE
MTS OCNL OBSC IN CLDS/PCPN. IMPR FM W.

.
LWR YKN VLY FF
OCNL CIG BLW 010 VIS BLW 3SM -SN BR/FZFG. IMPR FM N.

.
LWR YKN VLY FF
MTS OBSC IN CLDS/PCPN. NC.

.
NORTH SLOPES OF BROOKS RANGE FH
MTS OCNL OBSC IN CLDS/PCPN. IMPR FM W.

.
NRN SEWARD PEN AND LWR KOBUK VLY FI
PAWN-PABL LN E OCNL CIG BLW 010/VIS BLW 3SM BR. IMPR.

.
NRN SEWARD PEN AND LWR KOBUK VLY FI
E PAOT-PABL LN MTS OCNL OBSC IN CLDS/PCPN. NC.

.
**SRN SEWARD PEN AND ERN NORTON SOUND FJ
PAOM-PAGL LN S OCNL VIS BLW 3SM -SN/BR. IMPR FM N.**

.
**SRN SEWARD PEN AND ERN NORTON SOUND FJ
PAOM-PAGL LN S MTS OBSC BY CLDS/PCPN. IMPR FM N.**

.
ST LAWRENCE IS AND WRN NORTON SOUND FK
ST LAWENRCNE ISLAND S OCNL CIG BLW 010/VIS BLW 3SM -SN/-BLSN BR. NC.

.
=FAIT WA 062115
AIRMET TANGO FOR TURB/STG SFC WINDS VALID UNTIL 070515

.
LWR YKN VLY FF
AFT 03Z NW PANV-PARY LN OCNL MOD TURB FL240-FL340. NC.

.
NRN SEWARD PEN AND LWR KOBUK VLY FI
AFT 00Z SW PAOT-PASK LN OCNL MOD TURB FL240-FL340. NC.

.
**SRN SEWARD PEN AND ERN NORTON SOUND FJ
TIL 06Z NE KOTLIK OCNL MOD TURB FL240-FL340. WKN.**

.
ST LAWRENCE IS AND WRN NORTON SOUND FK
PAGM-PATC LN NW SUSTAINED SFC WND 30KTS OR GTR. WKN.

.
ST LAWRENCE IS AND WRN NORTON SOUND FK
TIL 06Z OCNL MOD TURB FL240-FL340. WKN.

.

=FAIZ WA 062115
AIRMET ZULU FOR ICING VALID UNTIL 070515

.
LWR YKN VLY FF
S PAKV-PARY LN OCNL MOD ICEIC 020-080.
FZLVL SFC. NC.

.
**SRN SEWARD PEN AND ERN NORTON SOUND FJ
PAUN SW OCNL MOD ICEIC 020-080.
FZLVL SFC. NC.**

.
ST LAWRENCE IS AND WRN NORTON SOUND FK
S BERING STRAIT-PATC LN OCNL MOD ICEIC 020-080.
FZLVL SFC. NC.

12.0 Area Forecast

The AAWU Area Forecast for the accident site was issued at 1229 AKST and forecast the AIRMETs noted in section 11.0. In addition, the Area Forecast expected few clouds at 1,500 ft, scattered clouds at 2,000 ft, and overcast skies at 2,500 ft with clouds tops to 15,000 ft, increasing clouds layer above FL200²⁹ and visibility 3 to 5 miles in light snow showers and mist:

FAAK59 PAWU 062129
FA9W
FAIC FA 062115
AK NRN HLF...

.
AIRMETS VALID UNTIL 070515
CB IMPLY POSSIBLE SEV OR GREATER TURB SEV ICE LLWS AND IFR CONDS.
NON MSL HEIGHTS NOTED BY AGL OR CIG.

.
**SRN SEWARD PEN AND ERN NORTON SOUND FJ...VALID UNTIL 070900
...CLOUDS/WX...
AIRMET IFRPAOM-PAGL LN S OCNL VIS BLW 3SM -SN/BR. IMPR FM N...
AIRMET MT OBSCPAOM-PAGL LN S MTS OBSC BY CLDS/PCPN. IMPR FM N...
PAOM-PAGL LN SW FEW015 SCT020 OVC025 TOP 150 INCRG LYRS ABV TO FL200.
VIS 3-5SM -SHSN/BR.
ELSW/OTRW SCT030 BKN040 TOP 150. OCNL VIS 3-5SM -SHSN BR.
OTLK VALID 070900-071500...IFR SN BR.
...TURB...
AIRMET TURBTIL 06Z NE KOTLIK OCNL MOD TURB FL240-FL340. WKN...
...ICE AND FZLVL...
AIRMET ICEPAUN SW OCNL MOD ICEIC 020-080.**

²⁹ 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 standard 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.

FZLVL SFC. NC...
TIL 03Z ELSW ISOL MOD ICEIC 020-100.
.

13.0 FAA Weather Camera Data

The FAA weather camera data³⁰ around the accident time for the cameras located near Nome, White Mountain, Golovin, and Unalakleet, were requested and data from three of the sites was provided by the FAA and can be found in attachment 14. The White Mountain FAA weather camera was broken and not available around the accident time

14.0 Astronomical Data

The astronomical data obtained for the accident site on February 6, 2025, indicated the following:

SUN

Begin civil twilight	0927 AKST
Sunrise	1021 AKST
Sun transit	1411 AKST
Accident time	1520 AKST³¹
Sunset	1803 AKST
End civil twilight	1857 AKST

At the time of the accident the Sun was at an altitude of 9.37° and azimuth of 196.75°.

³⁰ [FAA weather camera website](#)

³¹ Inserted accident time for reference and context.

15.0 Icing Potential

The Current Icing Product (CIP) and Forecast Icing Product (FIP³²) imagery provided information on expected icing severity as five categories: none, trace, light, moderate, and heavy. The severity estimates are roughly based on the accretion rate of ice on an airplane, and the levels are determined by the time it would take for an airfoil to accrete 1/4 of an inch of ice: trace = 1 hour; light = 15 minutes to 1 hour; moderate = 5 to 15 minutes; severe = less than 5 minutes. Note that these are general values. Users should always consider the icing susceptibility of their airframe and availability of icing protection provided by their aircraft. Different aircraft and different flight configurations (airspeed, angle of attack, etc.) will experience variations in accretion rate.

The images presented in this report show data from National Center for Atmospheric Research (NCAR)'s prototype CIP and FIP algorithms, generated using NCAR's visualization software. These algorithms differ in various ways from the operational CIP and FIP³³ that provided data used to generate the publicly available images accessible through the Aviation Weather Center (AWC). NCAR's prototype CIP and FIP represent the latest research and development conducted by their team of in-flight icing scientists, and have passed internal validation exercises using voice pilot reports (PIREPs) of icing conditions and scientific airborne research observations of in-flight icing (when available). Through coordination with the FAA and NOAA, NCAR provides the prototype CIP and FIP for an independent validation exercise to determine their suitability for operational use. Pending the outcome of that validation, the operational versions are replaced with the prototype versions. The frequency with which the operational versions are updated is dependent upon the research and development advancements in the prototype versions and available resources to support the operational upgrade. NCAR provided information regarding the potential for total ice accretion, icing probability, icing severity, and Supercooled Large Droplets (SLD)³⁴ icing. Several prototype CIP and FIP algorithms for Alaska were provided to the investigation and details on these datasets can be found in attachment 15.

³² B.C. Bernstein, F. McDonough, M. K. Politovich, B. G. Brown, T. P. Ratvasky, D. R. Miller, C.A. Wolff, and G. Cuning, Current Icing Potential: Algorithm Description and Comparison with Aircraft Observations (Journal of Applied Meteorology, 2005), pp. 969-986.

C.A. Wolff, F. McDonough, M. K. Politovich, B.C. Bernstein, and G. Cuning, FIP Severity Technical Document (Prepared for the Aviation Weather Technology Transfer Technical Review Board), pp. 1-44. <https://arc.aiaa.org/doi/abs/10.2514/6.2009-3531>

Wolff, C. A., D. R. Adriaansen, and M. K. Politovich, 2014: Diagnosing and Forecasting In-Flight Icing Conditions in Alaska. Preprints, 6th AIAA Atmospheric and Space Environments Conference, Atlanta, GA, Amer. Inst. Aero. Astro., 2014-2070, available at: <http://arc.aiaa.org/doi/abs/10.2514/6.2014-2070>.

[Icing Product Alaska \(IPA\) - Experimental | NCAR Research Applications Laboratory | RAL \(ucar.edu\)](#)

³³ [GFA: Icing - Aviation Weather Center](#)

³⁴ [GFA Help \(aviationweather.gov\)](#) and [Icing Hazards \(weather.gov\)](#)

A detailed review of the icing data from NCAR can be found in attachments 16 and 17. Radar Icing Algorithm (RadIA)³⁵ data was reviewed by NCAR for this investigation and provided in figures 16 and 17. For more information about RadIA please see attachment 15.

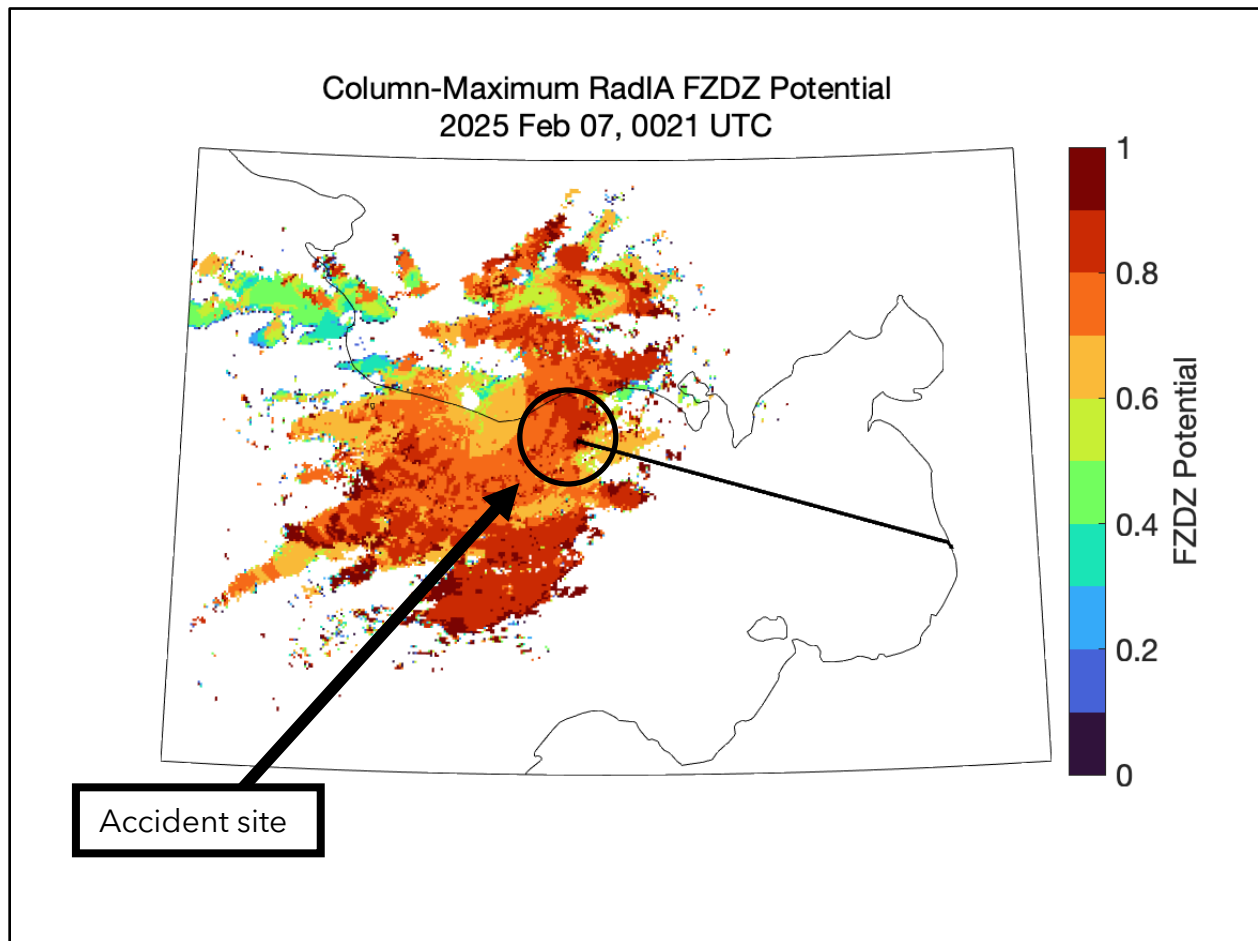


Figure 16. Column-Maximum RadIA freezing drizzle potential at 1521 AKST. The accident flight track is the black line.

³⁵ [Radar Icing Algorithm: Algorithm Description and Comparison with Aircraft Observations in: Journal of Atmospheric and Oceanic Technology Volume 39 Issue 1 \(2022\)](#)

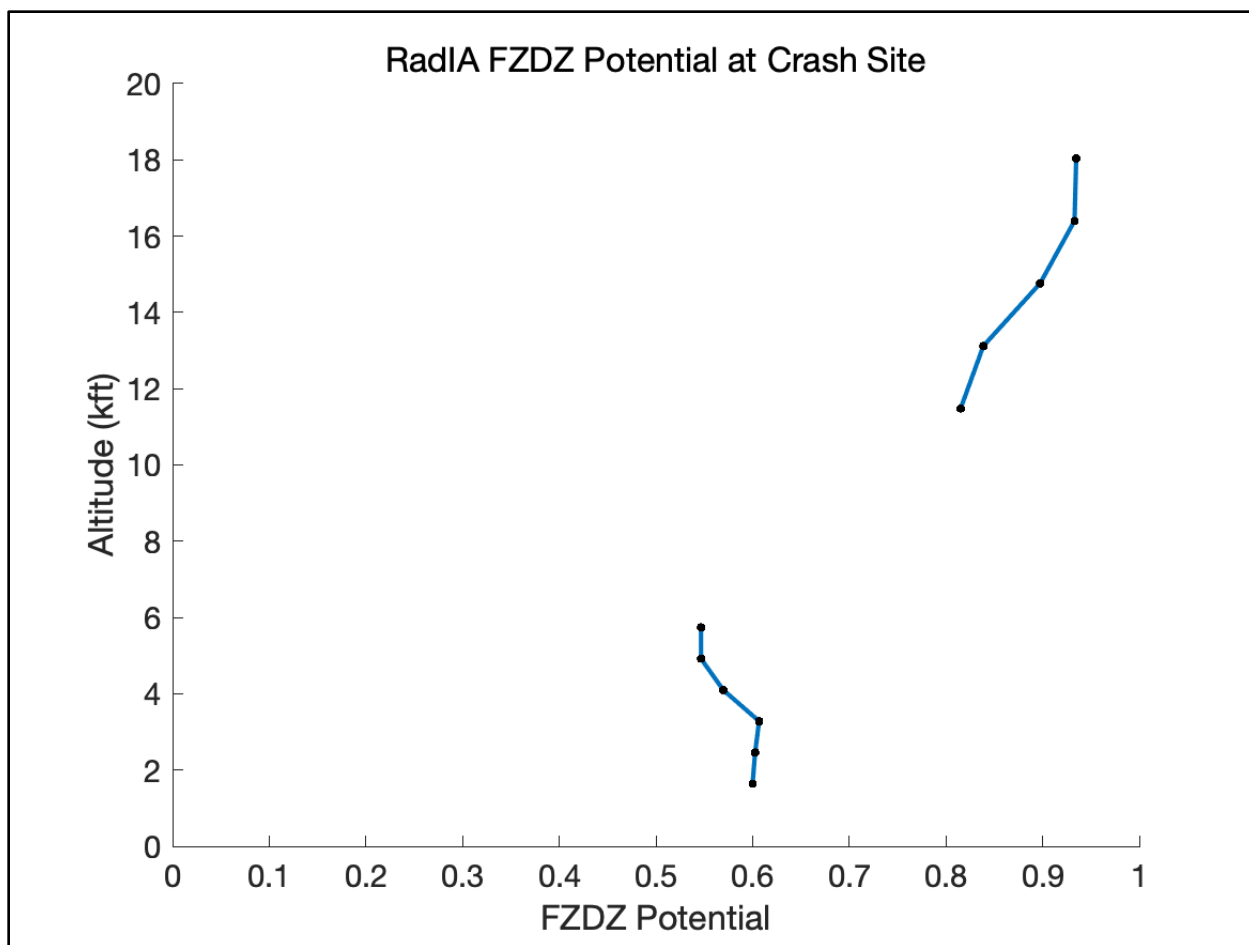


Figure 17. RadIA freezing drizzle potential above the accident site.

16.0 Raw PAOM ASOS Icing Data

The raw PAOM ASOS icing sensor data was reviewed by NCAR and the raw icing sensor data can be found in figure 18.

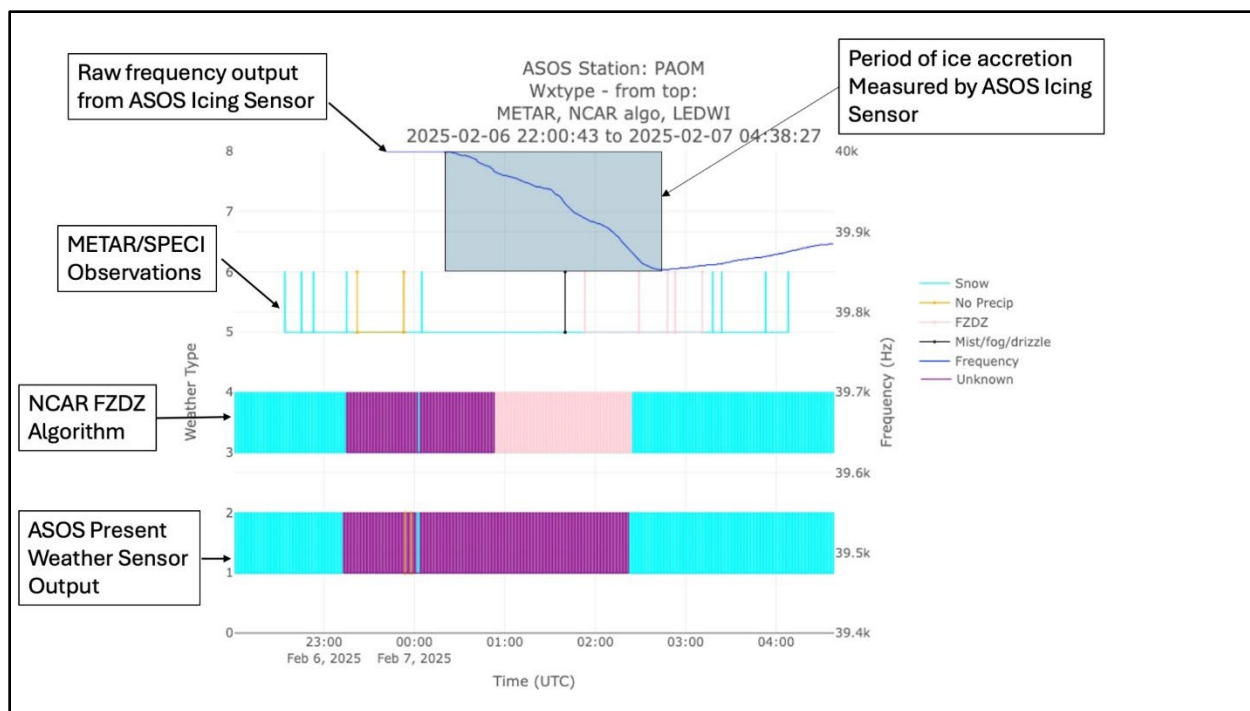


Figure 18. Raw PAOM ASOS icing sensor output around the accident time.

17.0 Pilot Weather Information

For more information regarding the accident pilot please see the Operational Factors and ATC factual report for this accident. The accident pilot did have an account with ForeFlight, but did not use the account prior to the accident time nor did the accident pilot call Alaska Flight Service³⁶ for a pre-flight weather briefing. For more information please see attachment 18.

18.0 On Scene Icing Imagery

The first responders to the accident site documented the accident wreckage and provided imagery to the investigation. One of the images depicts the tail section of the aircraft with icing noted on the airframe (figure 19).

³⁶ [Alaska Flight Service | Federal Aviation Administration](#)



Figure 19. Accident wreckage tail section with icing noted on the airframe.



Figure 20. Accident wreckage tail section with icing noted on the airframe aft of the TKS porous membranes.

19.0 Flight Into Known Icing

The FAA's legal interpretation of flight into known icing (FIKI) from 2009 can be found as attachment 19.

E. LIST OF ATTACHMENTS

Attachment 1 - PAOM ASOS edit logs

Attachment 2 - PAOM maintenance logs

Attachment 3 - PAOM maintenance documentation

Attachment 4 - GOES-18 visible satellite imagery animation from 1330 to 1700 AKST

Attachment 5 - GOES-18 infrared satellite imagery animation from 1330 to 1700 AKST

Attachment 6 - JPSS cross section imagery reference document

Attachment 7 - Animation of the PAEC WSR-88D base reflectivity imagery from 1503 to 1539 AKST for the 0.88° elevation scan

Attachment 8 - Animation of the PAEC WSR-88D base reflectivity imagery from 1503 to 1539 AKST for the 1.32° elevation scan

Attachment 9 - ZAN CWSU PDWB valid on the day of the accident

Attachment 10 - Transcript of interview with AAWU forecaster responsible for the weather forecast

Attachment 11 - Transcript of interview with AAWU SOO

Attachment 12 - AAWU graphics valid at the accident time

Attachment 13 - AAWU historical knowledge on the icing graphic categories

Attachment 14 - FAA weather camera data

Attachment 15 - NCAR Alaska icing output information

Attachment 16 - Full range of NCAR icing graphics

Attachment 17 - Accident flight specific icing graphics

Attachment 18 - ForeFlight information

Attachment 19 - FAA's legal interpretation of FIKI

Attachment 20 - PAMK AWOS observations around the accident time

Submitted by:

Paul Suffern
Senior Meteorologist