

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ANC23FA056

METEOROLOGY

Specialist's Factual Report

August 29, 2023

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A. ACCIDENT

Location: Wainwright, Alaska
Date: July 20, 2023
Time: 1105 Alaska daylight time (AKDT)
1905 coordinated universal time (UTC)
Helicopter: Bell 206-L4; Registration: N311MH

B. METEOROLOGY SPECIALIST

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C. SUMMARY

On July 20, 2023, about 1105 Alaska daylight time, a Bell 206L-4 helicopter, N311MH, was destroyed when it was involved in an accident near Wainwright, Alaska. The pilot and three passengers were fatally injured. The helicopter was operated by the pilot as a Title 14 Code of Federal Regulations Part 135 on-demand charter flight.

D. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board's Senior Meteorologist was not on scene for this investigation and conducted the meteorology phase of the investigation remotely, collecting data 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 report documents the general weather products and forecasts over the region during the period and documents the pertinent meteorological parameters to the accident. All times are reported as Alaska daylight time (AKDT) based upon the 24-hour clock, local time is -8 hours from UTC, and UTC=Z. Airport and 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 "P" for the Pacific region with the second letter "A" for Alaska airports. Both the IATA and ICAO are identifiers are identified in parentheses for reference. Directions are referenced to true north and distances in nautical miles. Heights are in feet (ft) above mean sea level (msl) unless otherwise noted. Visibility is in statute miles and fractions of statute miles.

The accident site was located at latitude 70.653972° N, longitude 158.55984° W, which was within Lake Itinik.

1.0 Synoptic Condition

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 (NCEP) and the WPC located in College Park, Maryland. These are the base products used in describing weather features and in the creation of forecasts and warnings. Reference to these charts can be found in the joint NWS and Federal Aviation Administration (FAA) "Aviation Weather Handbook", FAA-H-8083-28¹.

1.1 Surface Analysis Chart

The NWS Alaska Surface Analysis Chart for 1000 AKDT is included as figure 1 with the approximate accident site marked by a red star. The chart depicted a low-pressure system at 1012-hectopascals (hPa)² immediately south of the accident site along a stationary front that extended westward over the Artic Coastal Plain. A high-pressure system at 1022-hPa was located west of Banks Island, Northwest Territories Canada, in the Arctic Ocean with a ridge of extending southwestward over Alaska coastal range and the accident site. To the southwest over extreme eastern Russia, another low-pressure system at 1008-hPa with a trough extending southeastward to Nome and Bethel was depicted. Multiple stations over western Alaska reporting light continuous rain and mist from this system, which was expected to be the next major weather producer to impact Alaska for the next several days.

The station models depicted on the surface analysis chart surrounding the accident site (enlarged in top right) depicted generally easterly winds of 10 knots or less, with visibility restricted in mist/fog and overcast clouds over Utqiagvik, with a temperature of 54° Fahrenheit (F), and a dew point temperature of 52° F. Atqasuk reported northeasterly winds of 5 knots, clear skies with a temperature of 62° F, and a dew point temperature of 57° F. Over Wainwright the winds were from the north at 5 knots, clear skies, with a temperature of 66° F, and a dew point temperature of 55° F.

¹ <https://www.faa.gov/regulationspolicies/handbooksmanuals/aviation/faq-h-8083-28-aviation-weather-handbook>

² Hectopascals (hPa) is the standard unit for reporting sea-level pressure and is interchangeable with the former term millibar (mb) with the same units. The International Standard Atmosphere (ISA) is based on a sea-level pressure of 1013.25-hPa at a temperature of 15° Celsius (C), or 59° Fahrenheit (F).

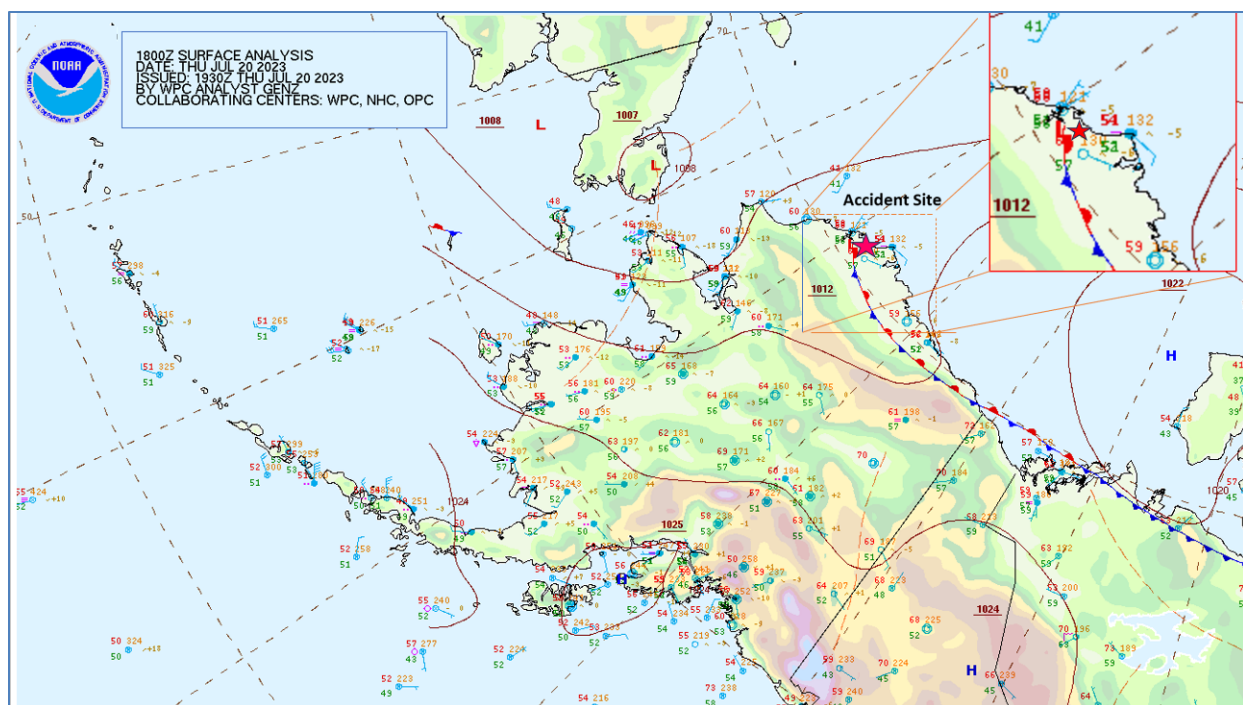


Figure 1 - NWS Alaska Surface Analysis Chart for 1000 AKDT with accident site marked by the red star, with a close-up view in the upper right side of the image.

2.0 Surface Observations

The area was documented using official Aviation Routine Weather Reports (METAR) and Aviation Selected Special Weather Reports (SPECI)³. Figure 2 is the sectional chart over the area with the accident site and closest weather reporting locations identified. Cloud heights are reported above ground level (agl) in the following section, and the magnetic variation was estimated at 13° east based on the latest sectional chart for the area.

³ The criteria for the issuance of a SPECI is defined in the Federal Meteorological Handbook number 1 (FMH-1) Surface Weather Observations, section 2.5.2.

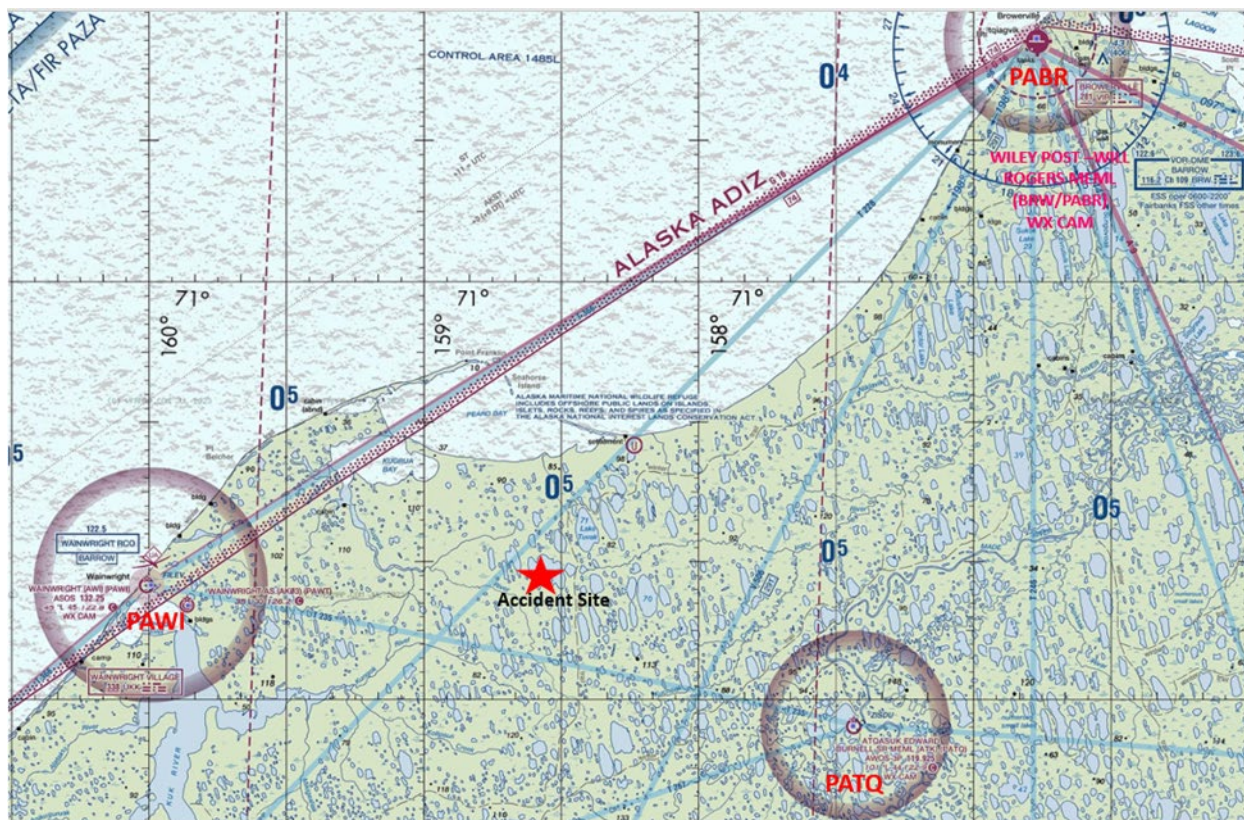


Figure 2 - Close-up of sectional chart over the area with the accident site marked by the red star and the closest weather reporting locations.

2.1 Utqiagvik, Alaska

The accident helicopter departed from Wiley-Post-Will Rogers Memorial Airport (BRW/PABR), Utqiagvik⁴, Alaska, located about 55 miles northeast of the accident site at an elevation 49 ft. The airport had an Automated Surface Observation System (ASOS)⁵, which was augmented during normal operating hours by FAA Flight Service Station (FSS) personnel. The general flight categories⁶ and

⁴ Utqiagvik or formerly known as Barrows, is the largest city of the North Slope Borough in the state of Alaska. Located north of the Arctic Circle it is the northernmost city in the United States.

⁵ An Automated Surface Observing System (ASOS) is a suite of weather sensors which measure, collect, and disseminate weather data. This serves to help meteorologists, pilots and flight dispatchers prepare and monitor weather forecasts, plan flight routes, and provide necessary information for correct takeoffs and landings.

⁶ 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.

conditions were issued longline⁷ surrounding the period from 0653 through 1230 AKDT. The time of the accident is included in bold type for reference.

*LIFR METAR PABR 201453Z 11011KT 1/4SM R08/1400V1800FT FG VV002 10/09 A2994 RMK AO2
SLP137 T01000089 58007=*

*LIFR SPECI PABR 201508Z 12009KT 1/4SM R08/1600V3000FT FG VV002 11/09 A2994 RMK AO2
T01060094=*

*LIFR SPECI PABR 201529Z 10010KT 1/4SM R08/1600V2200FT FG VV002 11/10 A2993 RMK AO2
T01060100=*

LIFR SPECI PABR 201551Z 11008KT 1/4SM R08/1600V3000FT FG VV002 11/10 A2994 RMK AO2=

*LIFR METAR PABR 201553Z 11009KT 1/2SM R08/1800V3000FT FG VV002 11/10 A2994 RMK AO2
SLP138 T01060100=*

*LIFR SPECI PABR 201600Z 12008KT 1/4SM R08/1600V2400FT FG VV002 11/10 A2993 RMK AO2
T01060100=*

*LIFR SPECI PABR 201610Z 11008KT 1/4SM R08/1400V2200FT FG VV002 11/10 A2993 RMK AO2
T01110100=*

*LIFR SPECI PABR 201629Z 12006KT 1/4SM R08/1200V2400FT FG VV002 11/10 A2993 RMK AO2
T01110100=*

*LIFR SPECI PABR 201639Z 11008KT 1/4SM R08/1200V2200FT FG VV002 11/11 A2993 RMK AO2
T01110106=*

*LIFR METAR PABR 201653Z 12007KT 1/4SM R08/1400V2000FT FG VV002 11/11 A2993 RMK AO2
SLP137 T01110106=*

*LIFR SPECI PABR 201712Z 10009KT 1/2SM R08/1600V3500FT FG VV002 12/11 A2993 RMK AO2
T01170106=*

*LIFR SPECI PABR 201720Z 11010KT 1/4SM R08/1600V2600FT FG VV002 12/11 A2992 RMK AO2
T01170106=*

*LIFR SPECI PABR 201729Z 10012KT 1/2SM R08/1800V4000FT FG VV002 12/11 A2992 RMK AO2
T01170106=*

LIFR SPECI PABR 201751Z 11009KT 1SM R08/2200VP6000FT BR VV002 12/11 A2992 RMK AO2=

-
- 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.

⁷ "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 users. This does not include 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.

LIFR METAR PABR 201753Z 11009KT 1SM R08/2200VP6000FT BR OVC002 12/11 A2992 RMK AO2
SLP132 T01220111 10122 20089 58005=

**LIFR SPECI PABR 201758Z 12009KT 3SM BR OVC002 12/11 A2992 RMK AO2 VIS 3/4 NE
T01220111=**

Departure 1815Z

**LIFR METAR PABR 201853Z 13008KT 5SM BR OVC003 13/12 A2992 RMK AO2 SLP131
T01280122=**

Accident 1905Z

IFR SPECI PABR 201940Z 14009KT 10SM OVC005 14/13 A2991 RMK AO2 T01440128=

IFR METAR PABR 201953Z 13007KT 10SM OVC006 15/13 A2991 RMK AO2 SLP128 T01500128=

VFR SPECI PABR 202019Z 11009KT 10SM SCT006 16/13 A2991 RMK AO2 T01610133=

The decoded observation in bold type above were as follows:

PABR special weather observation at 0958 AKDT, wind from 120° at 9 knots, visibility 3 miles in mist, ceiling overcast at 200 ft agl, temperature 12° C, dew point temperature 11° C, altimeter 29.92 inches of mercury (inHg). Remarks; automated observation system with a precipitation discriminator, visibility ¾ mile northeast, temperature 12.2° C, dew point 11.1° C.

PABR weather observation at 1053 AKDT, wind from 130° at 8 knots, visibility 5 miles in mist, ceiling overcast at 300 ft agl, temperature 13° C, dew point temperature 12° C, altimeter 29.92 inHg. Remarks; automated observation system with a precipitation discriminator, sea level pressure 1013.1-hPa, temperature 12.8° C, dew point 12.2° C.

2.2 Atqasuk, Alaska

The closest weather reporting location to the accident site was from Atqasuk Edward Burnell Sr. Memorial Airport (ATK/PATQ), located about 27 miles southeast of the accident site at an elevation of 101 ft. The airport had an Automated Weather Observation System (AWOS) which was not augmented by any observers during the period. The conditions reported surrounding the period were as follows:

VFR METAR PATQ 201456Z AUTO 00000KT 10SM FEW004 14/14 A2992 RMK AO2 SLP135
T01440139 56003 TSNO=

VFR METAR PATQ 201556Z AUTO 00000KT 10SM CLR 15/14 A2992 RMK AO2 SLP134 T01500139
TSNO=

VFR METAR PATQ 201656Z AUTO 00000KT 10SM CLR 16/13 A2991 RMK AO2 SLP132 T01610133
TSNO=
VFR METAR PATQ 201756Z AUTO 06003KT 10SM CLR 17/14 A2991 RMK AO2 SLP130 T01670139
10172 20139 58006 TSNO=
VFR METAR PATQ 201856Z AUTO 00000KT 8SM CLR 18/14 A2991 RMK AO2 SLP129 T01830144
TSNO=

5-Minute observations between 1900Z-2000Z

VFR METAR PATQ 201900Z AUTO 31003KT 10SM CLR 18/14 A2991
VFR METAR PATQ 201905Z AUTO 29003KT 10SM CLR 18/14 A2990
Accident 1905Z
MVFR METAR PATQ 201910Z AUTO 24005KT 5SM HZ CLR 18/14 A2990
MVFR METAR PATQ 201915Z AUTO 00000KT 5SM HZ CLR 18/14 A2990
VFR METAR PATQ 201920Z AUTO 00000KT 10SM CLR 18/14 A2990
VFR METAR PATQ 201925Z AUTO 29003KT 10SM CLR 18/14 A2990
VFR METAR PATQ 201930Z AUTO 23004KT 10SM CLR 18/14 A2990
IFR METAR PATQ 201935Z AUTO 27006KT 1SM HZ CLR 19/15 A2990
IFR METAR PATQ 201940Z AUTO 28005KT 1SM HZ CLR 18/14 A2990
IFR SPECI PATQ 201941Z AUTO 28005KT 1SM HZ CLR 18/14 A2990 RMK AO2 TSNO
VFR SPECI PATQ 201944Z AUTO 29004KT 10SM CLR 18/14 A2990 RMK AO2 TSNO
VFR METAR PATQ 201945Z AUTO 29004KT 10SM CLR 18/14 A2990
VFR METAR PATQ 201950Z AUTO 28003KT 10SM CLR 18/14 A2990
VFR METAR PATQ 201955Z AUTO 31004KT 10SM CLR 18/14 A2990
VFR METAR PATQ 201956Z AUTO 31004KT 10SM CLR 18/15 A2990 RMK AO2 SLP129 T01830150
TSNO=
VFR METAR PATQ 202056Z AUTO 30004KT 10SM CLR 21/15 A2989 RMK AO2 SLP124 T02060150
58005 TSNO=
VFR METAR PATQ 202156Z AUTO 32003KT 10SM CLR 22/16 A2988 RMK AO2 SLP121 T02170156
TSNO=

The decoded 5-minute observations in bold type above from PATQ surrounding the period were as follows.

PATQ weather at 1105 AKDT, automated, wind from 290° at 3 knots, visibility 10 miles or more, sky clear below 12,000 ft, temperature 18° C, dew point 14° C, altimeter 29.90 inHg.

PATQ weather at 1110 AKDT, automated, wind from 240° at 5 knots, visibility 5 miles in haze, sky clear below 12,000 ft, temperature 18° C, dew point 14° C, altimeter 29.90 inHg.

A review of the observations from PATQ also noted that between 1135 and 1143 AKDT there was a temporary period where the visibility decreased to

1 mile in haze with a light westerly wind, and a 4° C temperature-dew point spread.

2.3 Wainwright, Alaska

The next closest reporting location was from Wainwright Airport (AWI/PAWI), Wainwright, Alaska, was located 36 miles west of the accident site at an elevation 45 ft. The airport also had an ASOS, which was not augmented during the period. The following conditions were reported.

VFR METAR PAWI 201600Z AUTO 03005KT 10SM BKN080 OVC095 16/12 A2990

VFR METAR PAWI 201605Z AUTO 04004KT 10SM BKN080 OVC095 16/12 A2990

VFR METAR PAWI 201610Z AUTO 03005KT 10SM BKN080 OVC095 16/12 A2990

VFR METAR PAWI 201625Z AUTO 03005KT 10SM OVC080 17/13 A2990

VFR METAR PAWI 201635Z AUTO 03006KT 10SM BKN080 BKN100 18/13 A2990

VFR METAR PAWI 201715Z AUTO 02006KT 10SM FEW075 19/13 A2989

VFR METAR PAWI 201740Z AUTO 01007KT 10SM CLR 19/13 A2989

VFR METAR PAWI 201745Z AUTO 01006KT 10SM CLR 19/13 A2989

VFR METAR PAWI 201753Z AUTO 36006KT 10SM CLR 19/13 A2989 RMK AO2 SLP121 T01890133
10194 20117 58005 TSNO

VFR METAR PAWI 201825Z AUTO 01006KT 9SM CLR 18/13 A2989

VFR METAR PAWI 201855Z AUTO 01007KT 9SM CLR 20/13 A2988

Accident 1905Z

VFR METAR PAWI 201935Z AUTO 02007KT 19/13 A2988

VFR METAR PAWI 201955Z AUTO 01006KT 7SM 19/14 A2988

VFR METAR PAWI 202005Z AUTO 01006KT 10SM CLR 19/14 A2988

At the approximate time of the accident the following conditions were reported.

PAWI weather observation at 1055 AKDT, automated, wind from 010° at 7 knots, visibility 9 miles, sky clear below 12,000 ft agl, temperature 20° C, dew point temperature 13° C, and altimeter setting 29.88 inHg.

A Global Data Assimilation System (GDAS) numerical model⁸ data was obtained from the NOAA Air Resource Laboratory's archive for 1000 AKDT for the closest grid point to the accident site. The GDAS data was then plotted on a standard Skew T log P diagram⁹ using the RAOB Analysis software¹⁰ from the surface to 700-hPa or 10,000 ft and is included as figure 3.

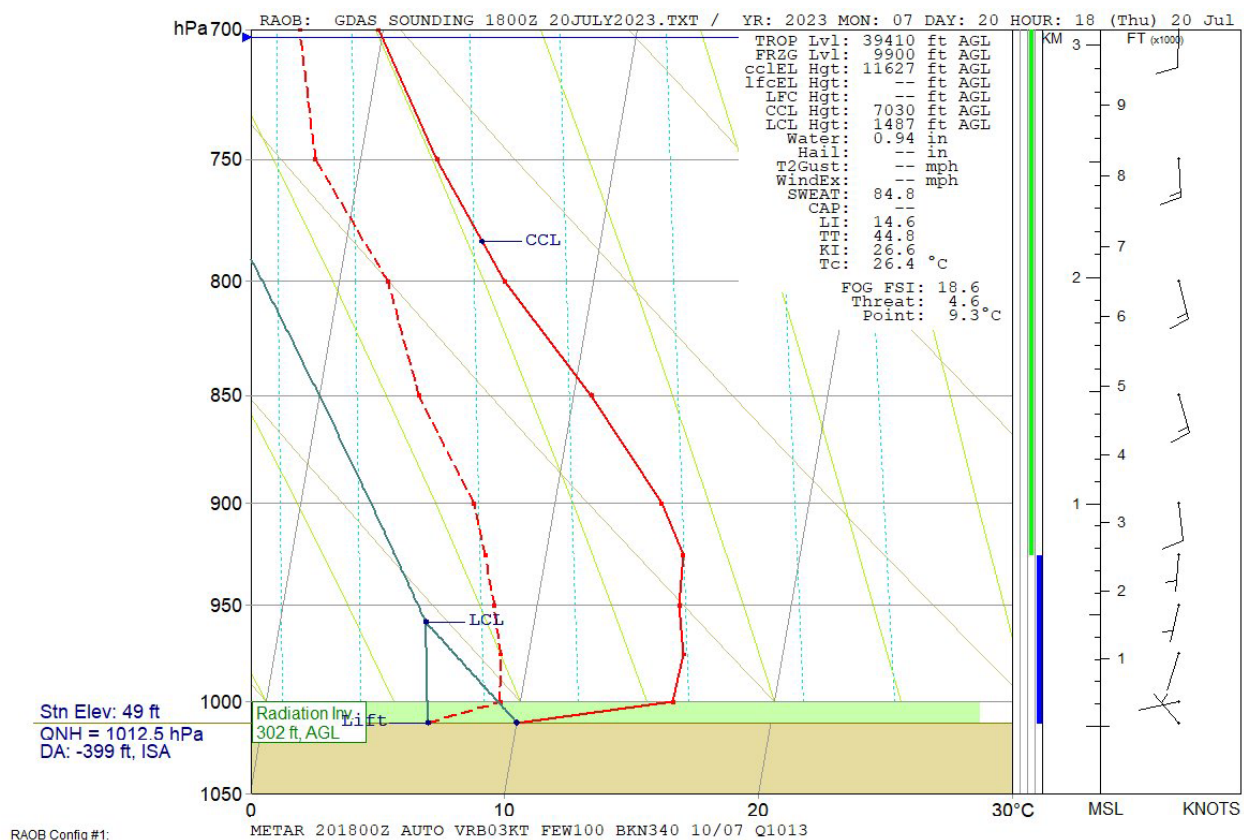


Figure 3 - GDAS numerical model sounding over the closest grid point to the accident site for 1000 AKDT.

The GDAS 1000 AKDT sounding depicted an elevation of 49 ft over the grid point with a near surface temperature of 10.0° C (50° F), a dew point temperature of 6.5° C (43.7° F), and a relative humidity of 79%. A surface-based temperature inversion was noted through 300 ft agl, where temperature increased with altitude.

^a The GDAS provided a 1° latitude and longitude resolution, every 3-hours, global 3-dimensional model data over the area, for the grid point at 70.70° N and 158.41° W.

⁹ Skew T log P diagram is a standard meteorological plot or thermodynamic diagram 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.

¹⁰ RAOB -The Universal RAwinsonde OBservation program is an interactive sounding analysis program developed by Eosonde Research Services (ERS) previously known as Environmental Research Services, The Villages, Florida.

The accident helicopter's altitude was reported by the NTSB Air Traffic Controller's preliminary report to be less than 100 ft for the entire flight before disappearing from radar coverage. The sounding indicated a lifted condensation level (LCL)¹¹ at 1,487 ft agl with the convective condensation level (CCL)¹² at 7,030 ft agl and the freezing level at about 10,000 ft. The precipitable water content was 0.94 inches. The sounding provided a Lifted Index (LI) of 14.6 with no convective available potential energy (CAPE) values and indicated a generally stable atmosphere. The RAOB Analysis program depicted a few altostratus clouds near 10,000 ft. The fog point temperature was 9.3° C, the Fog Stability Index (FSI) value of 18.6 indicating favorable conditions for the formation of radiation type fog.

The sounding wind profile indicated a light and variable surface wind at 3 knots, with winds from the south immediately above the surface through 18,000 ft. A low-level wind maximum was identified at 6,500 ft with the wind from 165° at 14 knots. The mean 0 to 6 kilometer (or 18,000 ft) steering wind was from 180° at 10 knots. The RAOB Analysis program did not flag any strong vertical wind shears below 10,000 ft to cause any significant turbulence.

A table of the GDAS sounding parameters of height, pressure (Pres), temperature (T), dew point temperature (Td), relative humidity (RH), wind direction and speed, derived Clear Air Turbulence (CAT), and Low-Level Wind Shear (LLWS) is below from the surface through 6,500 ft. The wind direction has been rounded to the nearest 5°.

Height (ft-msl)	Pres (hPa)	T (°C)	Td (°C)	RH (%)	Wind (dir/kts)	CAT (FAA)	LLWS (FAA)
49	1011	10.0	6.5	79	320/ 3		
351	1000	16.0	9.2	64	260/ 1		
1058	975	16.1	8.9	62	195/ 2		
1783	950	15.6	8.3	62	190/ 4		
2526	925	15.4	7.6	60	185/ 6	LGT	
3287	900	14.2	6.8	61	175/ 9		
4862	850	10.7	3.9	63	165/ 13		
6509	800	6.5	1.9	72	165/ 14		
8238	750	3.0	-1.8	71	180/ 13		
10063	700	-0.2	-3.3	80	180/ 11		

¹¹ Lifted Condensation Level (LCL) - the level at which a lifted parcel becomes saturated. The LCL height corresponds to cloud base height for forced ascent.

¹² Convective Condensation Level (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.

The NOAA Geostationary Operational Environmental Satellite number 18 (GOES-18) infrared and visible imagery were obtained from an archive at the Space Science Engineering Center (SSEC) at the University of Wisconsin-Madison in Madison, Wisconsin, and processed using the Man-computer Interactive Data Access System (McIDAS) software. The infrared band 13 at a wavelength of 10.3 microns (μm) provided a resolution of 2 kilometers (km) and radiative cloud top temperatures. The visible band 2 at a wavelength of 0.64 μm provided a finer spatial resolution of 0.5 km.

Figures 5 and 6 are the GOES-18 visible images at 1100 and 1110 AKDT at 4X magnificent respectively. The images depict an area of low stratiform clouds/fog extending over the Arctic Ocean and extending inland over the Alaska Arctic Coastal Plain over the Utqiagvik area extending southwestward towards Wainwright and extended over the accident site. The imagery have not been corrected for any parallax errors.



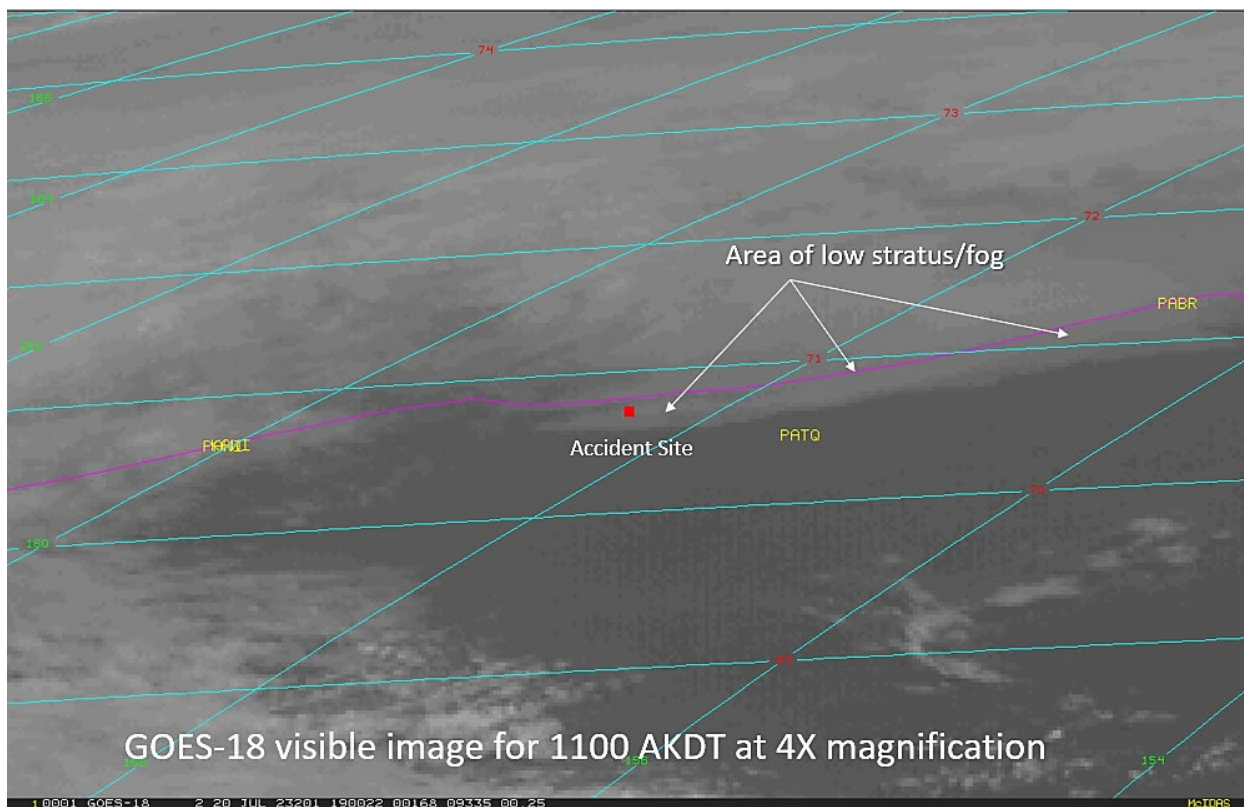


Figure 5 - GOES-18 visible image for 1100 AKDT at 4X magnification with accident site.

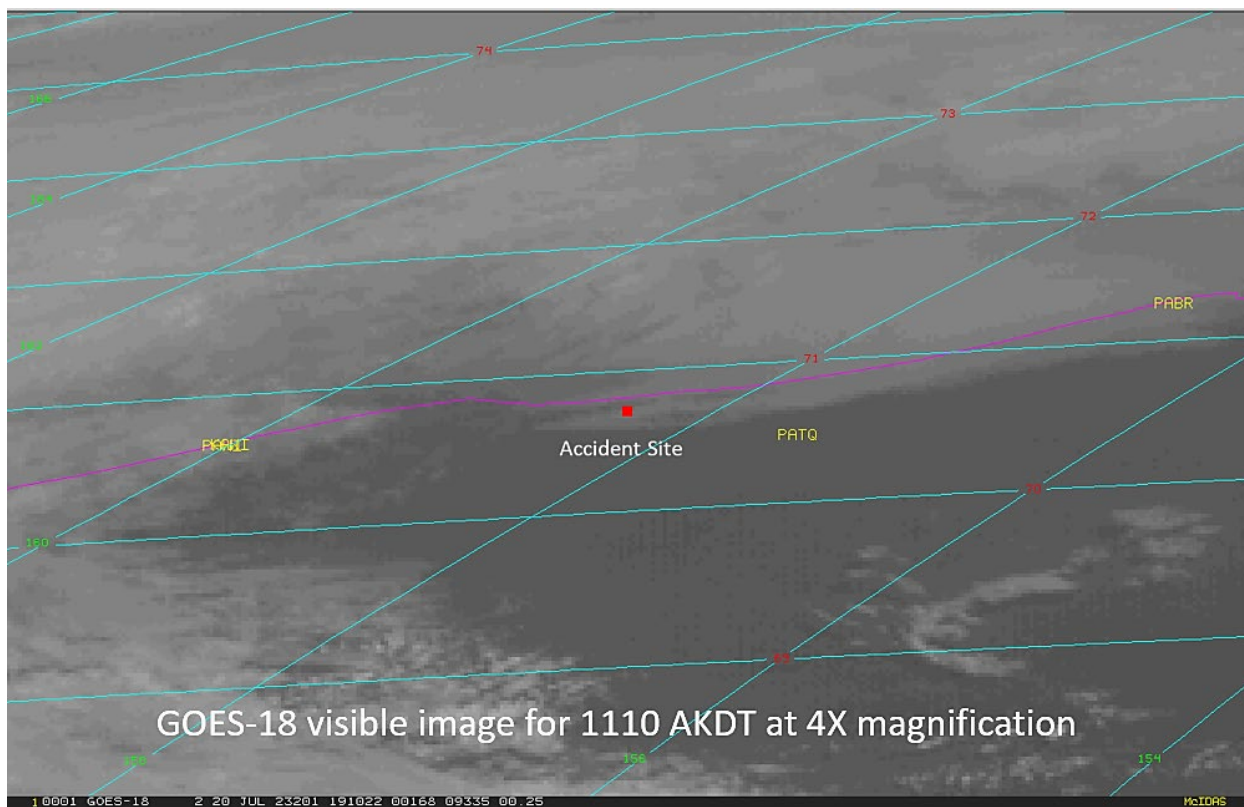


Figure 6 - GOES-18 visible image for 1110 AKDT at 4X magnification with accident site.

5.0 Pilot Reports

The only pilot report (PIREP)¹³ within 120 miles surrounding the period from 0900 through 1300 AKDT was as follows.

BRW UA /OV BRW /TM 1828 /FL007 /TP B737 /SK OVC002-TOP007 /TB NEG/IC NEG /RM (AKFSS)

The PIREP was from the flight crew of a B737 departing from PABR at 1028 AKDT that reported overcast clouds at 200 ft with tops to 700 ft, with no turbulence or icing conditions encountered.

6.0 FAA Weather Camera Images

The FAA Aviation Weather Camera¹⁴ sites surrounding the accident site were obtained and the applicable imagery documented below. The FAA weather camera program is designed to improve aviation safety and efficiency by providing pilots with near real-time visual and textual weather data. During the period on July 20th the FAA advised that there had been a significant fiber optic cable cut¹⁵, which resulted in many stations in northern Alaska not being available during the period.

6.1 Utqiagvik Weather Camera

One of the stations impacted by the cable cut was the Wiley Post-Will Rogers Memorial Airport (PABR), Utqiagvik, camera imagery. Which resulted in only limited imagery being available during the period. Figure 7 is a depiction of the PABR camera viewing areas with the approximate accident site. On the day of the accident the only image available during the period was a single image for 0947 AKDT which is included as figure 8, with the depiction of the east camera on a clear day (left side) and for 0947 AKDT (right side).

¹³ Includes PIREPs disseminated longline and may not include "ride reports" or other reports made on radio frequency to air traffic control and not transcribed into a formal PIREP.

¹⁴ <https://weathercams.faa.gov/>

¹⁵ FAA indicates that the fiber optic cut occurred on about July 14th off shore due to ice flow and is expected to be a long term outage until a ship can make the repairs. The area of the cable cut is presently blocked by ice making repairs difficult.

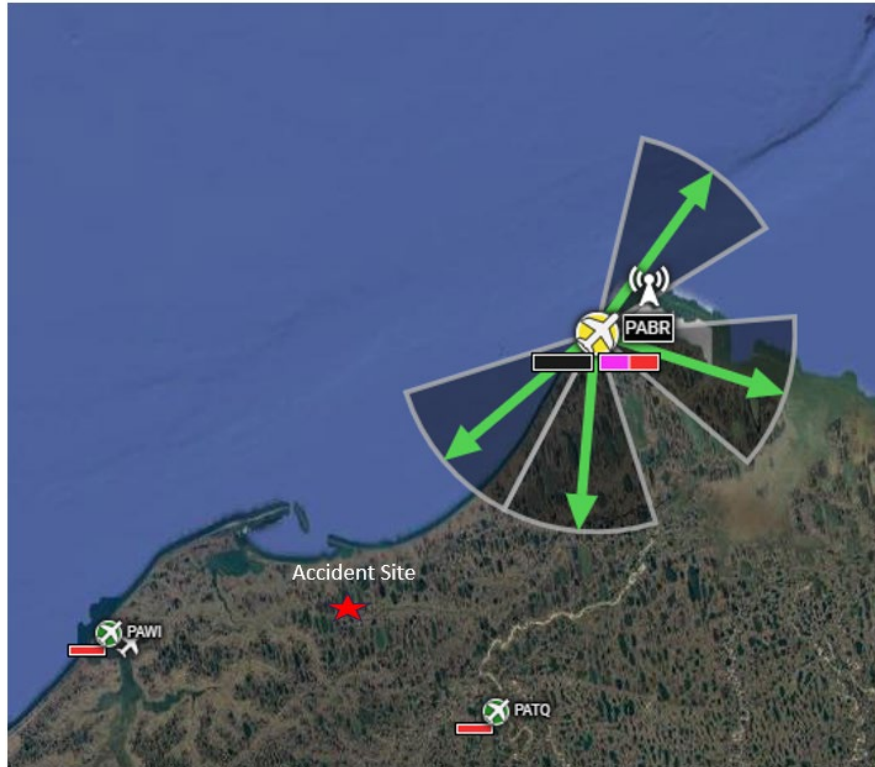


Figure 7 - Utqiagvik (PABR) camera viewing areas with the accident site marked by the red star.

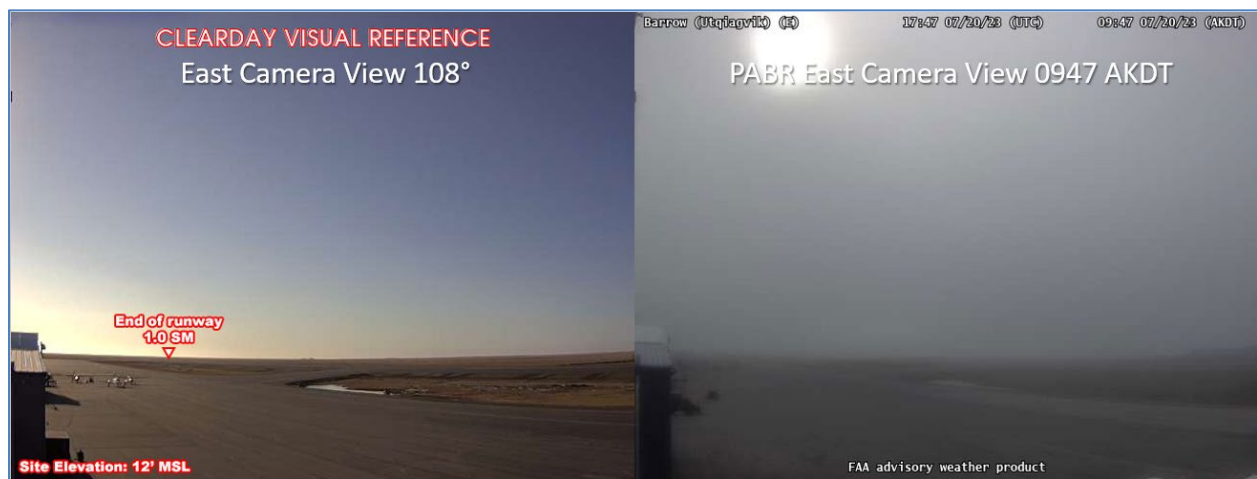


Figure 8 - Utqiagvik (PABR) East camera view on a clear day (left) and at 0947 AKDT (right).

6.2 Atqasuk Weather Camera

The Atqasuk (PATQ) camera viewing area is depicted in figure 9, with the north camera viewing the area towards PABR, and the southwest camera to the area south of the accident site. No cameras from PATQ were viewing in the general direction of the accident site.



Figure 9 - Atkasuk camera viewing areas with the accident site marked by the red star.

Images 10 and 11 are the PATQ north and southwest weather camera images on a clear day (left) and at the approximate time of the accident (right). The images depicted clear skies over PATQ at the time, with the north camera viewing image depicting higher ridges miles away from the airport.

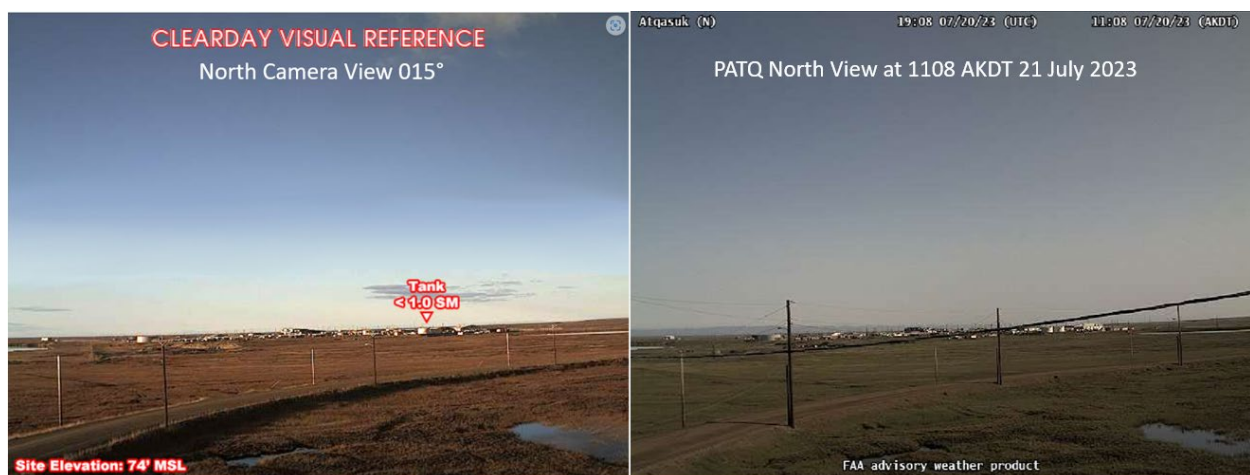


Figure 10 - Atkasuk North camera view on a clear day and at 1108 AKDT on July 20, 2023.

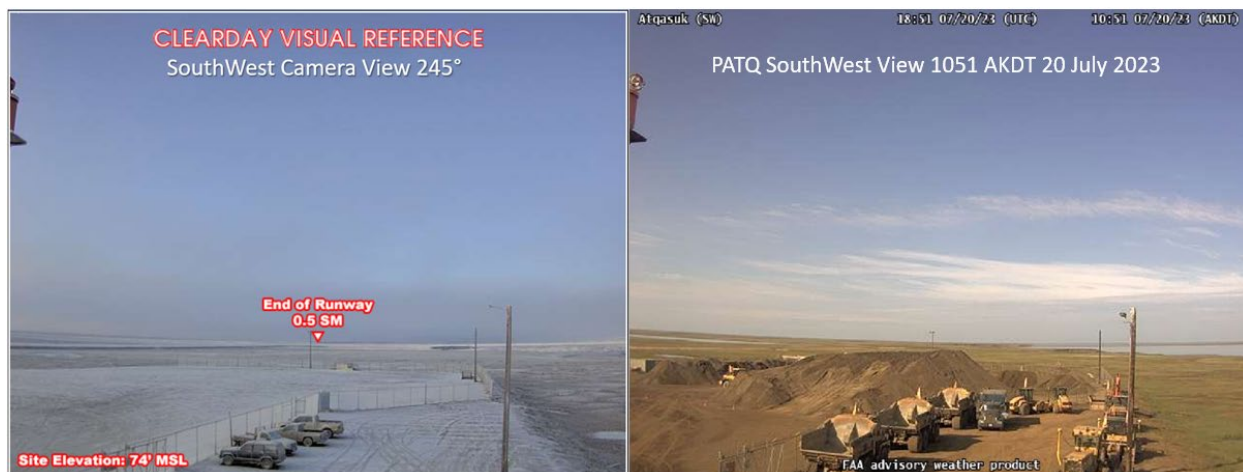


Figure 11 - Atkasuk Southwest camera view on a clear day and at 1051 AKDT on July 20, 2023.

6.3 Wainwright Weather camera

Figure 12 is a map of the Wainwright (PAWI) FAA Weather Camera's viewing and the approximate accident site marked by the red star. Figures 13 and 14 are the PAWI east and southeast weather camera images on a clear day (left) and at the approximate time of the accident (right).



Figure 12 - Wainwright (PAWI) Weather Camera Depiction.

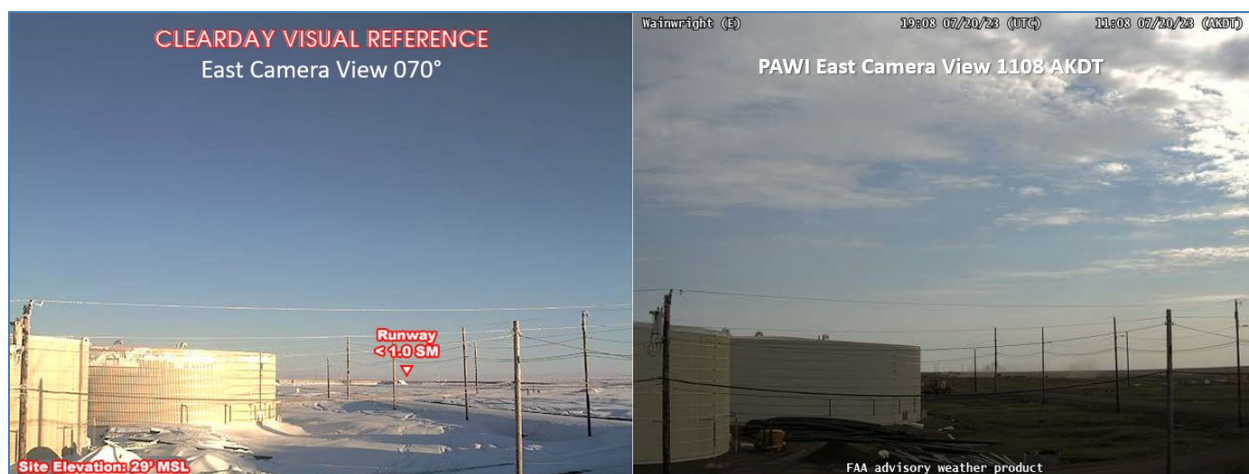


Figure 13 - Wainwright East camera view on a clear day and at 1108 AKDT on 20 July 2023.

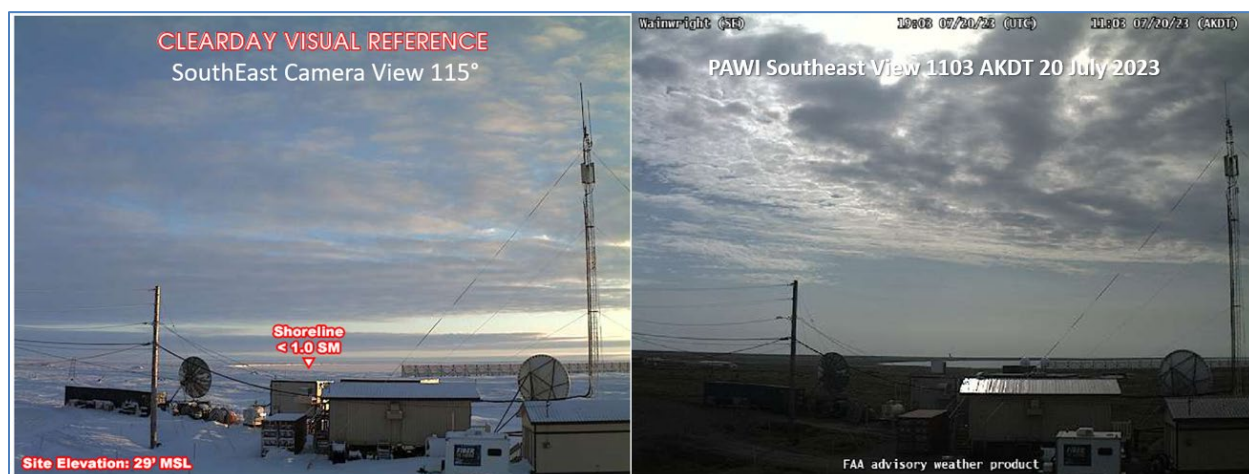


Figure 14 - Wainwright Southeast Camera view on clear day and for 1103 AKDT.

7.0 NWS Forecast

The NWS Fairbanks Weather Forecast Office (WFO) was responsible for issuing forecasts and weather warnings for the area where the accident occurred, while the NWS Anchorage Aviation Weather Unit (AAWU) was responsible for the aviation forecast and graphic products documented below. The applicable forecasts and advisories were issued surrounding the period and applicable to the accident flight.

7.1 Terminal Aerodrome Forecast

The NWS Terminal Aerodrome Forecast (TAF) issued for the departure airport of PABR was documented. While a TAF is only current for a 5 statute mile radius of the airport center, it provides a more time specific break down in winds, visibility,

weather and cloud cover, then the Area Forecast. Cloud heights are in ft agl. The following TAFs were issued surrounding the period were as follows:

TAF PABR 201121Z 2012/2112 10009KT 1/4SM FG VV002
FM201700 10010KT 3SM BR BKN003
FM202000 11009KT P6SM SCT005=

The forecast available for planning was issued at 0321 AKDT and expected LIFR conditions with wind from 100° at 9 knots, a visibility of ¼ mile in fog, with the vertical visibility of 200 ft agl through 0900 AKDT. After 0900 through 1200 AKDT, a wind from 100° at 10 knots, visibility 3 miles in mist, with a ceiling broken at 300 ft was expected. After 1200 AKDT through 0400 AKDT on July 21st, visibility was expected to be unrestricted at 6 miles or more, with scattered clouds at 500 ft.

Next scheduled TAF issued at 0953 AKDT and was as follows:

TAF PABR 201753Z 2018/2118 10010KT 1/2SM FG OVC002
FM202000 11009KT 6SM BR BKN002
FM210000 09010KT P6SM VCSH BKN025
FM210800 VRB04KT 1/2SM FG BKN002=

The TAF for PABR issued at 0953 AKDT, expected the LIFR conditions to extend through 1600 AKDT, with a wind from 100 at 10 knots, visibility ½ mile in fog, and a ceiling overcast at 200 ft.

7.2 Area Forecast

An Area Forecast (FA) is an abbreviated plain language forecast concerning the occurrence or expected occurrence of specified en route weather phenomena. The FA (in conjunction with AIRMETs, SIGMETs, Convective SIGMETs, CWAs, etc.) is used to determine forecast en route weather over a specified geographic region. The AAWU forecast issued at 0354 and current through 1600 AKDT was as follows:

FAAK59 PAWU 201154
FA9W
FAIC FA 201215
AK NRN HLF...

AIRMETS VALID UNTIL 202015
CB IMPLY POSSIBLE SEV OR GREATER TURB SEV ICE LLWS AND IFR CONDS.
NON MSL HEIGHTS NOTED BY AGL OR CIG.

ARCTIC SLP CSTL FG...VALID UNTIL 210000
...CLOUDS/WX...
****AIRMET IFR***CST/OFSHR PABR E AND OFSHR W PAWI OCNL CIG BLW 010/*
VIS BLW 3SM -RA BR/FG. DTRT...
OTRW CST/OFSHR PABR E SCT003 BKN010 ST TOP 012 LYRS ABV. VIS 1SM BR.

W PAWI SCT005 SCT025 OVC050 TOP FL220. OFSHR OCNL CIGS BLW 010 -RA.
ALG CST OCNL BKN025 -RA.
ELSW FEW070. AFT 18Z INLAND E PATQ ISOL BKN050CB TOP FL350 -TSRA.
OTLK VALID 210000-210600...CST/OFSHR PABR E IFR CIG.
OFSHR W PAWI IFR CIG RA BR. ELSW VFR. INLAND SHRA/ISOL TSRA.
...TURB...
NIL SIG. EXC VCY CB.
...ICE AND FZLVL...
ALG CST PAQT E ISOL MOD ICEIC 120-160.
W PAWI ISOL MOD ICEIC 140-FL200.
FZLVL 100.

The forecast noted that an AIRMET for IFR conditions was current for the coastal and offshore sections over PABR to near PAWI with ceilings below 1,000 ft agl and visibility below 3 miles in light rain, mist, and fog. The conditions elsewhere before 1000 AKDT expected a few clouds at 7,000 ft, with a chance of ceilings broken at 5,000 ft in cumulonimbus clouds with tops to FL350 in thunderstorms and light rain after 1000 AKDT. The forecast indicated that no significant turbulence was expected except in the vicinity of cumulonimbus clouds. The freezing level was near 10,000 ft with the potential for icing in-clouds above that level.

7.3 Alaska Aviation Weather Unit Graphics

NWS's AAWU produces a series of graphical forecasts to complement the text-based FA for Alaska. These forecasts are available from the AAWU's Web page¹⁶. The following charts were available at the time of the accident, the Flying Weather graphic (figure 15), depicting the expected flight categories expected, the Turbulence Forecast (figure 16), the Icing Forecast (figure 17), and the Convective Outlook (figure 18).

¹⁶ <https://www.weather.gov/aawu/>

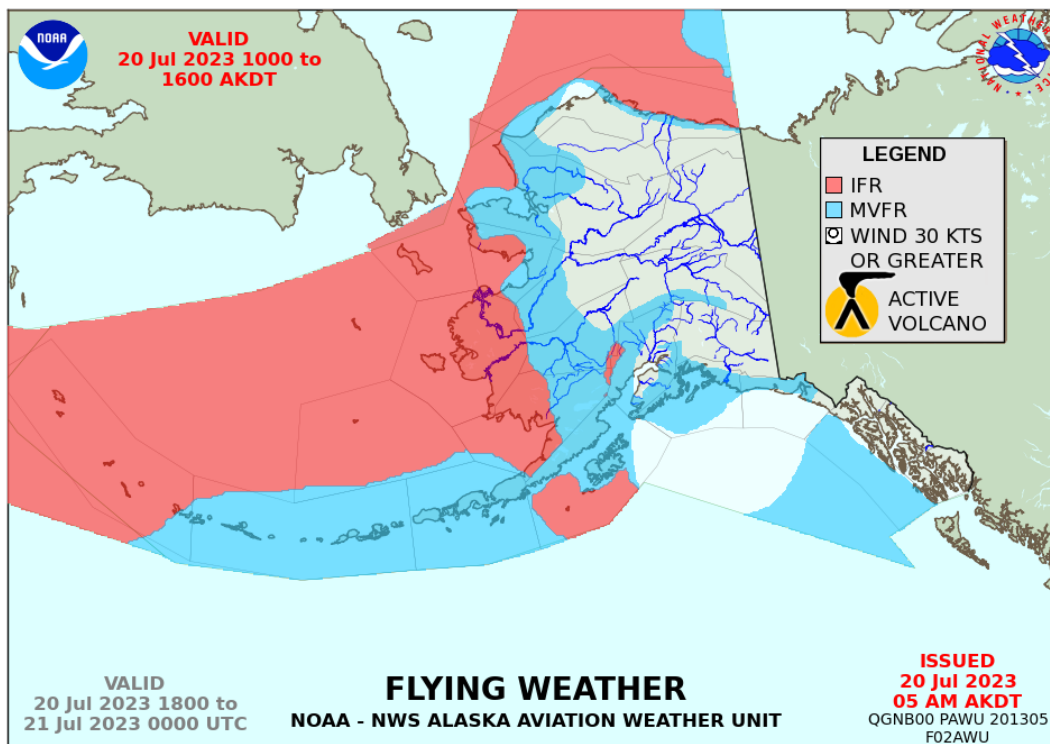


Figure 15 - Flying Weather graphic valid from 1000 through 1600 AKDT.

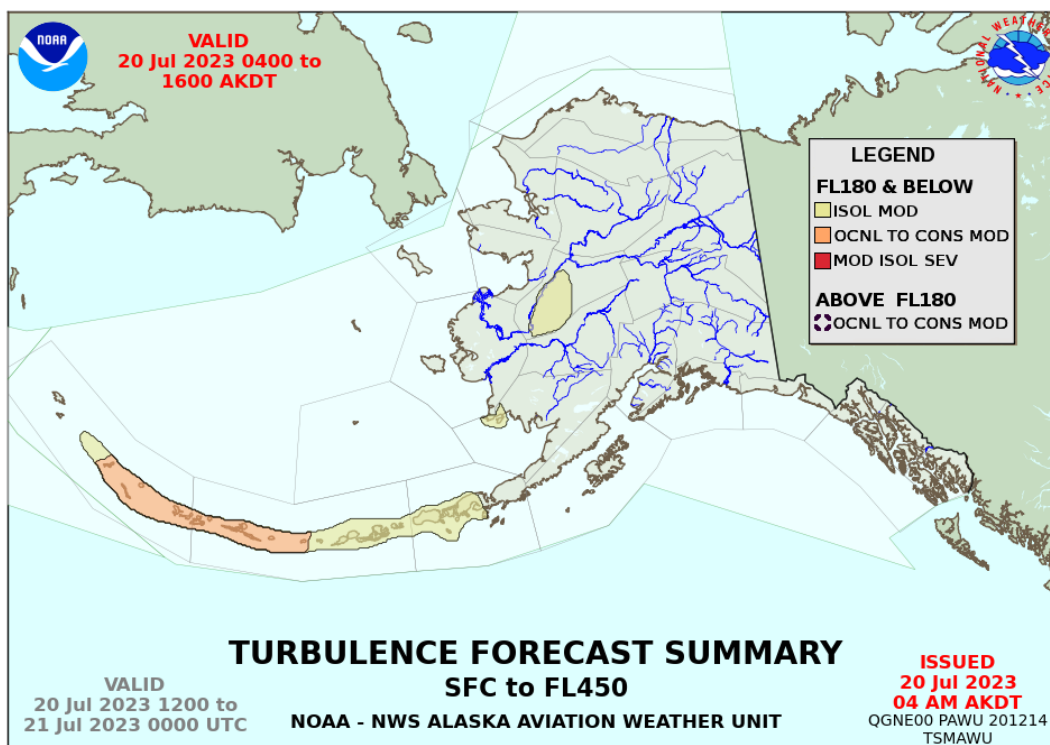


Figure 16 - Turbulence Forecast graphic valid for 0400 through 1600 AKDT.

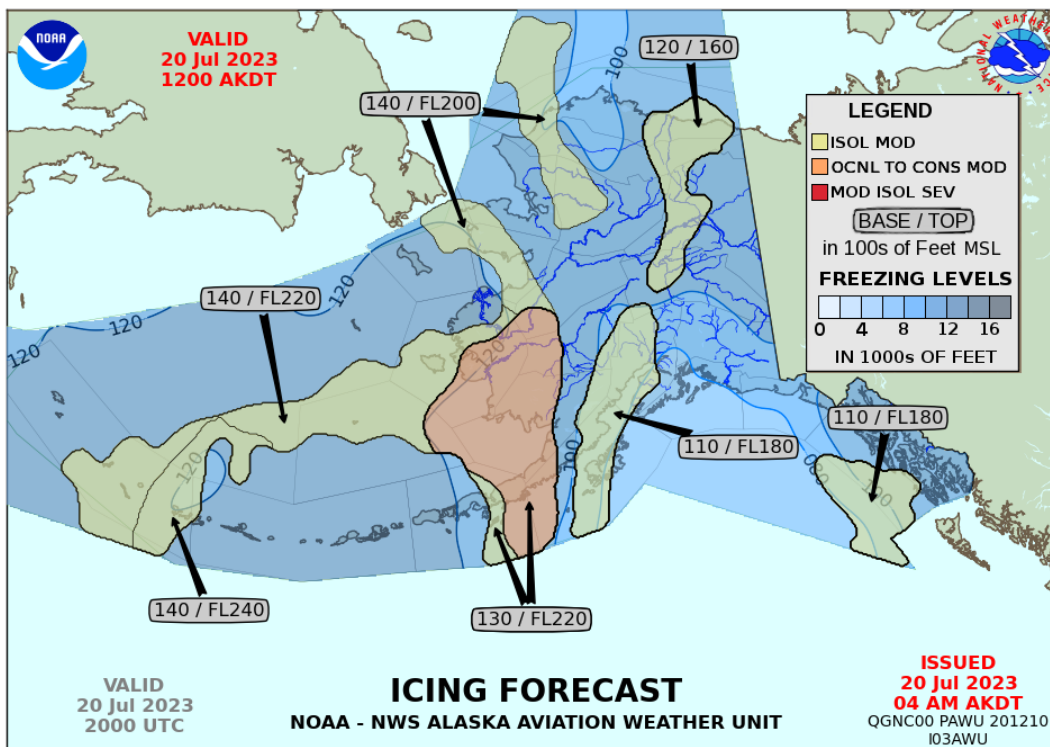


Figure 17 - Icing Forecast graphic valid through 1200 AKDT.

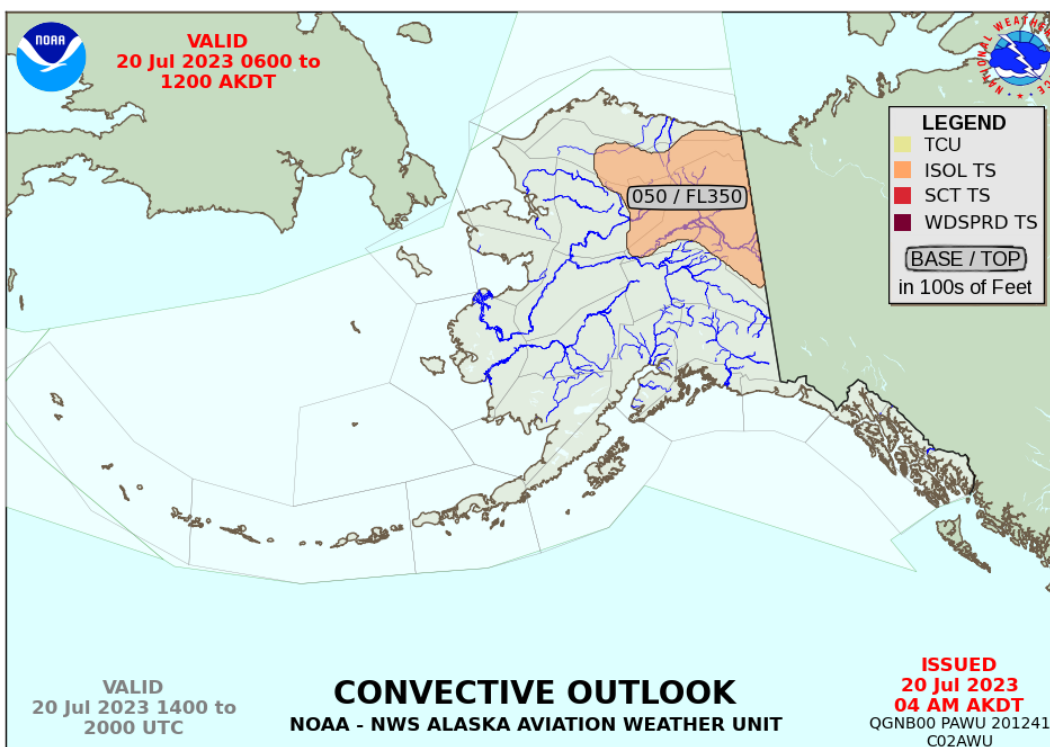


Figure 18 - Convective Outlook graphic valid through 1200 AKDT.

7.4 Area Forecast Discussion

The NWS Area Forecast Discussions (AFD) are issued by each WFO to describe the short-term weather conditions within their region with an aviation section that includes the general conditions as they relate to the creation of the TAF. These are useful for additional aviation-related issues that cannot be encoded into the TAF and provide some reasoning behind the forecast. These are generated roughly every 6 hours and correspond to the release of the latest TAFs for that office. The NWS Fairbanks WFO issued the AFD at 0421 AKDT which was as follows:

FXAK69 PAFG 201221 CCA
AFDAFG

Northern Alaska Forecast Discussion...CORRECTED
National Weather Service Fairbanks AK
421 AM AKDT Thu Jul 20 2023

.SYNOPSIS...

The Interior will see isolated thunderstorms Today and Friday. Very warm temperatures are anticipated for the weekend in the Interior, including Fairbanks, which will see highs in the mid to upper 80s. Areas along the west coast along with the eastern Arctic coast will continue to see fog and low stratus tonight. A weather front will bring rain to the west coast Thursday into Friday.

.DISCUSSION...

Upper Levels and Analysis...

A trough over eastern Russia will start to push to the south on Thursday as a ridge starts to build into the eastern Interior. For the weekend we expect a strong ridge to stretch from the eastern Interior into the Yukon Territory, with a persistent low over the Bering Sea. Models in good agreement with a strong ridge in place over much of the state over the weekend. The ECMWF slightly stronger with the ridge and warmer temps Sunday and Monday. GFS slightly cooler with the temps.

Central and Eastern Interior...

Thunderstorm activity becomes more isolated Thursday and Friday. Chances for thunderstorms will decrease for Thursday and Friday, with thunderstorms mainly confined to areas to the north and east of Fairbanks. Widespread temperatures in the 80s are expected across the Interior this weekend. Highs will be in the mid 80s on Saturday, while Sunday looks to be warmer, with many locations, including Fairbanks, seeing highs in the upper 80s and possibly some 90s over the Yukon Flats.

Smoke associated with wildfires in Canada will make its way into the Interior over the next few days. Most of this will be at high levels; however, areas along the border could see some smoke at lower levels.

The potential for more thunderstorms returns on Sunday the Interior and Western Interior.

West Coast and Western Interior...

A front will bring rain to the west coast on Thursday and to the western Interior Thursday night. Rainfall will taper off on Friday and most of the area will remain dry Temperatures

cool a bit for Thursday and Friday. Models point to a warming trend in temperatures for the weekend.

North Slope and Brooks Range...

Onshore winds will keep fog and stratus along the coast this evening over the eastern Arctic, while from Utqiagvik west southerly winds have brought record high temperatures today. Temperatures will warm up for the eastern Arctic coast for Thursday and Friday as winds become more southerly.

Coastal Hazard Potential Days 3 and 4...None.

7.5 Winds and Temperature Aloft Forecast

The NWS Winds and Temperatures Aloft Forecast current for the period is included below. The closest forecast point was for Barrows (BRW) or the departure location.

FBAK KWN0 201400

FDAK1

DATA BASED ON 201200Z

VALID 201800Z FOR USE 1700-2100Z. TEMPS NEG ABV 24000

FT 3000 6000 9000 12000 18000 24000 30000 34000 39000

BRW 1614 1811+08 1910+02 2010-02 1819-15 1720-27 161543 990050 290649

The forecast for BRW valid for 1000 AKDT and for use between 0900 through 1300 AKDT for 3,000 ft msl expected a wind from 160° at 14 knots.

8.0 Astronomical Conditions

The United States Naval Observatory's website¹⁷ provided the following astronomical conditions over the departure site of Utqiagvik on the date of the accident. The time of the accident has been added in bold type for reference.

<u>SUN</u>	<u>Time (AKDT)</u>
Begin civil twilight	Continuously above the Horizon
Sunrise	Continuously above the Twilight Limit
Lower Transit	0233
Accident	1105
Upper Transit	1433
Sunset	Continuously above the Twilight Limit
End civil twilight	Continuously above the Horizon

¹⁷ <https://aa.usno.navy.mil/data/index>

<u>Moon</u>	<u>Time (AKDT)</u>
Set	0346
Rise	0757
Upper Transit	1802

At the time of the accident the Sun was 26° above the horizon at an azimuth of 256°.

9.0 Preflight Planning

The FAA Barrow Flight Service Station (FSS) indicated that the pilot of N311MH received a weather briefing in person prior to departing, there was no audio recording of the briefing. After the briefing the accident pilot requested a special VFR departure¹⁸ at approximately 1000 AKDT. At that time the PATQ Automated Terminal Information System (ATIS) broadcast indicated that information Hotel was current, at 0953 AKDT, with wind from 110° at 9 knots, visibility 1 mile in mist, ceiling overcast at 200 ft, temperature 12° C, dew point 11° C, altimeter 29.92 inHg, and that AIRMET for IFR conditions was current for the Arctic coastal region. A copy of the weather conditions available and used in the FSS briefing are included in attachment 1.

A separate search of ForeFlight indicated that no flight plans had been filed for N311MH on the day of the accident or in the days prior to July 20th. ForeFlight did have several accounts with the accident aircraft registration number N311MH on them; however, none matched the pilot's name.

E. ATTACHMENTS

1. Barrow's FSS Weather products available and used in the verbal weather briefing to the pilot of N311MH prior to the time of departure.

Submitted by:

Donald Eick
NTSB Senior Meteorologist

¹⁸ Special VFR operations for airplanes may only be conducted with an ATC clearance when the visibility is at least 1 mile, and there is a reasonable expectation that the aircraft can remain clear of clouds. A special VFR clearance can get you out of or into airports. The operations must be conducted under Part 91.