

# **A Pilot's Guide to Aviation Weather Services in Alaska**

United States Department of Commerce  
National Oceanic and Atmospheric Administration  
National Weather Service  
Alaska Aviation Weather Unit  
Anchorage, Alaska



## ***INTRODUCTION***

This publication is designed to help you make the best use of weather resources in Alaska. The information services described here are available from the National Weather Service (NWS) and the Federal Aviation Administration (FAA). It also contains a brief description of the geographic regions of Alaska and a summary of significant aviation weather hazards.

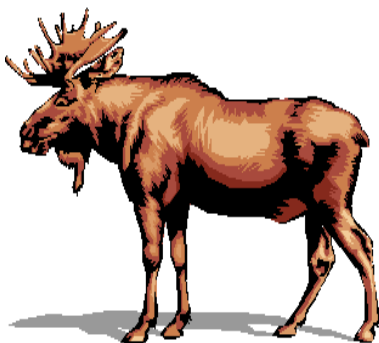
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## ALASKA - THE GREAT LAND

Alaska is characterized by extremes. Its 586,412 square miles vary from the flatlands of the Yukon-Kuskokwim Delta to the highest mountain in North America - Mt. McKinley, elevation 20,320 feet. The climate is as varied as its landscape. Temperatures have dropped to -80°F at Prospect Creek during the long winters and have risen to 100°F at Fort Yukon during the warm interior summers. Annual precipitation has ranged from less than five inches at Barrow to nearly 225 inches at Little Port Walter. These geographic and climatic influences combine to produce wide variations in Alaska's weather. In turn, Alaska can be divided into six climatic and topographic regions for aviation weather purposes.



**1. Arctic Coast North of the Brooks Range** is characterized by cool summers and cold, dry winters with occasional prolonged periods of strong gusty winds. IFR conditions frequent the coast in the summer and early fall due to fog and stratus, with blowing snow in the winter.

**2. Interior Alaska - the Brooks Range to the Alaska Range** - is dry with cold winters and warm summers. Weather is generally VFR with light winds. In winter, local ice fog may persist for days.

**3. Southeast Alaska and the North Gulf Coast** has wet, cool summers and wet, mild winters with periods of moderate to strong winds. Winter snowfall can be very heavy. For example, Thompson Pass received 974 inches in one season. Frequent MVFR weather conditions occur.

**4. Cook Inlet, Susitna Valley and the Copper River Basin** are the home for a large number of Alaskans. This area encircles some of the highest mountains in North America. Summers are mild and winters are cool with moderate snowfall. Although winds are generally light to moderate, wind speeds reaching over 100 miles an hour occur infrequently. Frequent VFR weather conditions occur in the lowlands with frequent MVFR/IFR conditions in the adjacent mountain passes.

**5. Aleutian Islands and the Alaska Peninsula** have cool, wet summers and winters often accompanied by high wind. Very strong storms move through this area. Occasional prolonged periods of IFR conditions occur both summer and winter. Frequent MVFR weather conditions also occur.

**6. Bering Sea Coast** has cool summers and moderately cold winters with generally light precipitation. Occasional prolonged periods of strong, gusty winds occur during winter. Weather conditions are generally VFR or MVFR.

## **SERVICES PROVIDED TO THE ALASKAN AVIATOR**

In Alaska, some weather services that are available in the “Lower 48” are either not available or available in a different form. There is no Flight Watch or HIWAS available in Alaska, although there are many remote communications outlets around the state and communications with Flight Service Stations (FSS) are good in most areas. The FSS does provide TWEB; however, there are no route forecasts in Alaska. The Area Forecast (FA) product replaces the route forecasts and contains all needed meteorological information for the en route portion of your flight. The number of Automated Surface Observing Systems (ASOS) and Automated Weather Observing Systems (AWOS) is growing; locations and frequencies can be found in the Alaska Supplement. The following are products and services available to you.

### **Aviation Weather Observations**

Observations in Alaska are taken at several different kinds of stations. Observations are taken by NWS/FAA certified weather observers, military weather observers, AWOS and ASOS units, Supplementary Aviation Weather Reporting Stations (SAWRS), private companies at oil platforms, and at ocean buoys. Because of Alaska’s size, this extensive list does not approach complete coverage, especially during weekends and nights. There are vast areas in the state without any weather observations available.

Observations at NWS and some FAA stations are taken by Federal government employees. Contract observations are taken by private individuals certified to take weather observations and paid by the NWS on a per observation basis. Some contract observers are certified by the NWS and paid by the FAA. Observations at SAWRS are taken by NWS certified observers and are normally taken irregularly to serve the needs of an airline, air taxi operation, etc. Military observations are taken by qualified military observers either certified by their own service or by NWS. All manned observations are subject to curtailed hours.

At AWOS sites where aviation terminal forecasts (TAF) are prepared, manual augmentation is required for at least a portion of the day. At manned ASOS locations, augmentation will be conducted to provide locally important weather information not reported by the automated system, i.e., mountain obscurement, thunderstorms, hail, volcanic ash, sector visibility, low-level wind information, etc.



Example of an ASOS site.

## National Weather Service Aviation Forecasts in Alaska

The National Weather Service prepares four major products for domestic and international aviation users in Alaska:

Area Forecasts (FA)

Aviation In-Flight Advisories (AIRMET, SIGMET, CWA)

Aviation Terminal Forecasts (TAF)

Winds and Temperatures Aloft (FD)

All products can be found on-line on the National Weather Service Alaska Region homepage or by going directly to the Alaska Aviation Weather Unit (AAWU) or Center Weather Service Unit (CWSU) homepage. The URL addresses are as follows:

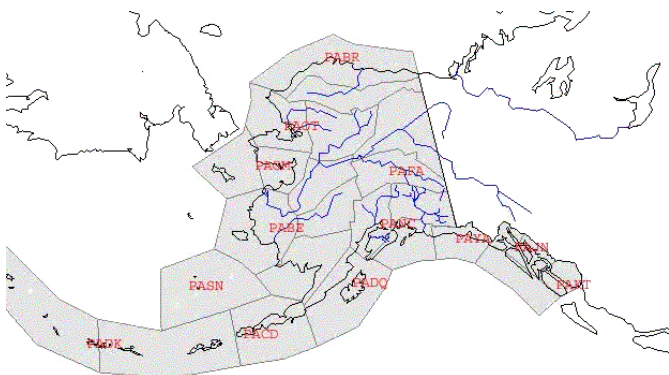
<http://www.arh.noaa.gov>

<http://aawu.arh.noaa.gov>

<http://cwsu.arh.noaa.gov>

### AREA FORECAST (FA)

FAs are routinely issued for the entire state of Alaska including coastal waters (to 100 miles offshore) except for the Aleutian Islands west of Attu. All Alaskan FAs are produced by the AAWU located at the Weather Service Forecast Office in Anchorage. The figure below shows a map of the areas referred to in the FA and several TAF locations.



The FA is a 12-hour forecast of expected large scale weather conditions. In addition, the FA includes an outlook in categorical terms for the 18-hour period following the valid time of the forecast. Since the FA primarily deals with widespread significant weather features, it may not include localized situations which affect aircraft operations. This is particularly true in areas where weather observations are sparse. The FA serves as a flight planning and pilot weather briefing aid for general aviation pilots, civil and military aviation operations, and FAA briefers.

In Alaska, FAs are issued four times daily. The times below are in Universal Coordinated Time represented by Z: 0145Z, 0745Z, 1345Z, and 1945Z during Alaska Daylight Time and 0245Z, 0845Z, 1445Z, and 2045Z during Alaska Standard Time. Those times translate to 5:45 and 11:45 AM and PM local time.

The FA is a product which includes a SYNOPSIS, all Flight Precautions (AIRman's METerological Information [AIRMETs]/SIGnificant METerological Information [SIGMETs]), IFR/VFR Clouds/Weather, designated mountain PASS forecasts, Icing, and Turbulence. The AIRMETs are included in the FA and are also computer "copied" and transmitted as a separate bulletin under the headers of AIRMET SIERRA, TANGO, or ZULU. SIGMETs are also included in the FA and transmitted as a stand alone product to domestic and international users.

The Alaska FAs consist of two sections which contain the SYNOPSIS and specific geographic sectors in one section and the remainder of the geographic sectors in the other. Each section will always begin with the following statements: AIRMETS VALID UNTIL ddt. TS IMPLY POSSIBLE SEV OR GREATER TURB SEV ICE LLWS AND IFR CONDS. NON MSL HEIGHTS NOTED BY AGL OR CIG.

Forecast Sections: Include the significant clouds/weather section for each geographic sector: AIRMETS/SIGMETs in effect, IFR/VFR clouds/weather, turbulence, icing and freezing level information. The turbulence and icing sections will always be included, even if the entry is NIL SIG.

The designated PASS forecasts are permanently assigned to one of the sectors that the pass connects, i.e., ATIGUN and ANAKTUVUK passes are assigned to the North Slopes of the Brooks Range Sector.

The Alaska Mountain PASS Forecast included in the FA are:

**Northern Alaska:** ATIGUN, ANAKTUVUK, MENTASTA, and ISABEL.  
**Southern Alaska:** PORTAGE, LAKE CLARK, MERRILL, RAINY, WINDY, and TAHNETA.  
**Southeast Alaska:** WHITE and CHILKOOT.

The PASS forecast will indicate whether the predominant conditions through the PASS are: VFR, MVFR, or IFR and if the ceiling or precipitation are the reason. The forecast will also indicate turbulence. For example: ATIGUN...IFR CIG BR PORTAGE...VFR TURB. The designator TURB is used when the turbulence is forecast to be moderate or greater through the pass.

Conditional terms to describe clouds and visibility will be limited to OCNL (temporary change) which is meant to confer a greater than 50% probability of the phenomena occurring from time to time. The term OCNL may be used to describe conditions in both cumuliform and stratiform precipitation. ISOL (isolated) may also be used when the clouds or visibility is expected to affect less than 3,000 square miles or to be widely dispersed.

The following terms will be used to indicate the areal coverage of thunderstorms or showers:

- ◆ **ISOL:** Phenomenon affects area less than 3,000 square miles and/or events are widely separated in time. (Usually single cells.)
- ◆ **WDLY SCT (Widely Scattered):** Less than 25% of area affected.
- ◆ **AREAS:** 25 to 50% of area affected.
- ◆ **WDSPR (Widespread) or NMRS (Numerous):** More than 50% of area affected.

The FA is amended when conditions change significantly. The appropriate flight precautions (AIRMETS/SIGMETs) will be amended when AIRMET/SIGMET criteria develops and was not forecast in the existing FA or the conditions are forecast and fail to develop or are no longer expected. An amended AIRMET Bulletin will also be transmitted when the FA is amended, and AIRMET criteria are met.

Below is a simplified example of an FA.

```
/D ANCH FA 302045

AK SRN HLF EXCP SE AK...
.
AIRMETS VALID UNTIL 310300
TS IMPLY POSSIBLE SEV OR GREATER TURB SEV ICE LLWS AND IFR
CONDS.
NON MSL HEIGHTS NOTED BY AGL OR CIG.
.
SYNOPSIS VALID UNTIL 311500
970 MB LOW 300 SW PAAP WL MOV TO 120 NM S PACV AT 15Z.
979 MB LOW 60 NM S PADQ WL RMN NRLY STNR AND MERGE WITH THE
FIRST LOW IN THE GLFALSK BY 15Z. 984 MB LOW WL DVLP 120 NM NW
PADU BY 15Z.
.
COOK INLET AND SUSITNA VLY AB...VALID UNTIL 310900
...CLOUDS/WX...
***AIRMET MT OBSC***S PAEN..MTS OCNL OBSC IN CLDS/PCPN. NC...
SCT020 BKN050 BKN100 SEPD LYRS ABV TOPS FL250.
S PAEN..OCNL BKN020 VIS 3SM -RASN.
NRN COOK INLET..ISOL -FZRA.
VCY PASSES/GAPS..SFC WND E 25G45 KT..STGST THRU TURNAGAIN
ARM.
OTLK VALID 310900-010300 S PAEN..MVFR CIG SHSN. ELSW..VFR.
PASSES...
    LK CLARK..MERRILL..RAINY IFR CIG SN. WINDY VFR.
    PORTAGE IFR CIG RA BR. ALL PASSES TURB.
...TURB...
***AIRMET TURB***OCNL MOD TURB BLW 100. COOK INLET..ISOL SEV
TURB WI 020 AGL. NC...
...ICE AND FZLVL...
***AIRMET ICE***OCNL MOD RIME ICEIC 020-120. NRN COOK
INLET..OCNL MOD CLA ICEIP SFC-010. NC...
.
```

## AIRMET (WA)

In Alaska, AIRMETS will be issued by the AAWU at the same times the FA is issued, with updates as necessary. The AIRMETS, which are also embedded in the FA, will be issued using the identifiers: S (SIERRA), T (TANGO), and Z (ZULU). The AIRMET SIERRA bulletin will contain information on IFR and mountain obscuration conditions. The AIRMET TANGO bulletin will contain information on turbulence, strong surface winds, and low level wind shear. The AIRMET ZULU bulletin will contain information on icing and freezing levels.

The AIRMETS will be issued when one or more of the following conditions occurs or is expected to occur and affect an area of at least 3,000 square miles:

- ◆ Moderate icing.
- ◆ Moderate turbulence.
- ◆ Sustained surface wind of 30 knots or more.
- ◆ Ceilings less than 1,000 feet and/or visibility less than three miles affecting over 50% of a 3,000 square mile area at any one time.
- ◆ Extensive mountain obscuration.

The detailed information contained in the individual AIRMETS/SIGMETs will be repeated in the FA.

Below is a simplified example of an AIRMET bulletin.

```
/D ANCS WA 302045
AIRMET SIERRA FOR IFR AND MT OBSC VALID UNTIL 310300
.
COOK INLET AND SUSITNA VLY AB
WRN MTS..TEMPO OBSC IN CLDS AND PCPN. NC.
.
_ANCT WA 302045
AIRMET TANGO FOR TURB/STG SFC WINDS VALID UNTIL 310300
.
COOK INLET AND SUSITNA VLY AB
TEMPO MOD TURB BLW 100.
COOK INLET..ISOL SEV TURB WI 020 AGL. NC.
.
CNTRL GLF CST AD
SUSTAINED SFC WINDS 30 KTS OR GTR. NC.
.
_ANCZ WA 302045
AIRMET ZULU FOR ICING VALID UNTIL 310300
.
COOK INLET AND SUSITNA VLY AB
LGT OCNL MOD RIME ICEIC 020-120.
NRN COOK INLET..OCNL MOD CLA ICEIP SFC-010.
FZLVL SFC N SLOPING 020 S. NC.
.
```

## SIGMET (WS)

SIGMETs issued by the AAWU are in the ICAO format, and therefore differ in structure from domestic SIGMETs. SIGMETs are valid for up to four hours from time of issuance and are issued for the following:

- ◆ Tornadoes.
- ◆ Lines of thunderstorms.
- ◆ Thunderstorms when embedded in other phenomena such as rain or restricted visibilities.
- ◆ Hail of 3/4" or greater diameter.
- ◆ Severe or extreme turbulence.
- ◆ Severe icing.
- ◆ Volcanic eruption.
- ◆ Volcanic ash, dust storms, sandstorms.

Below is a simplified example of a SIGMET.

```
/D JNUF WS 180451
PAZA SIGMET INDIA 1 VALID 180450/180850 PAJN-

OCNL SEV TURB FL320-FL370 60 NM EITHER SIDE OF A LINE FM 90
NM NW YAK TO 90 NM SE YAK. MOV E. NC.

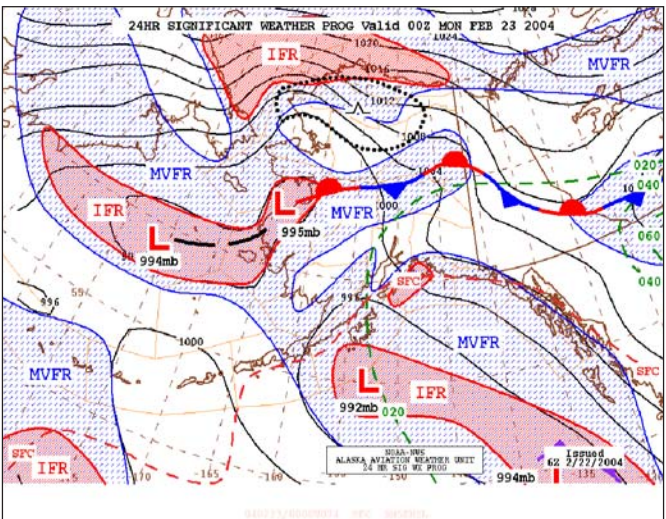
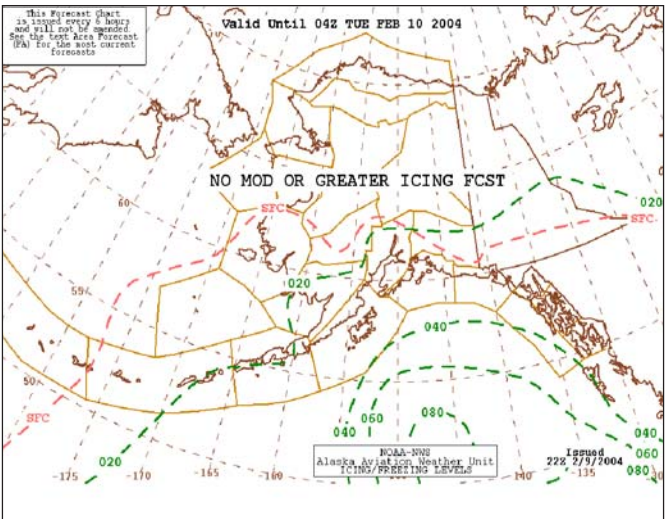
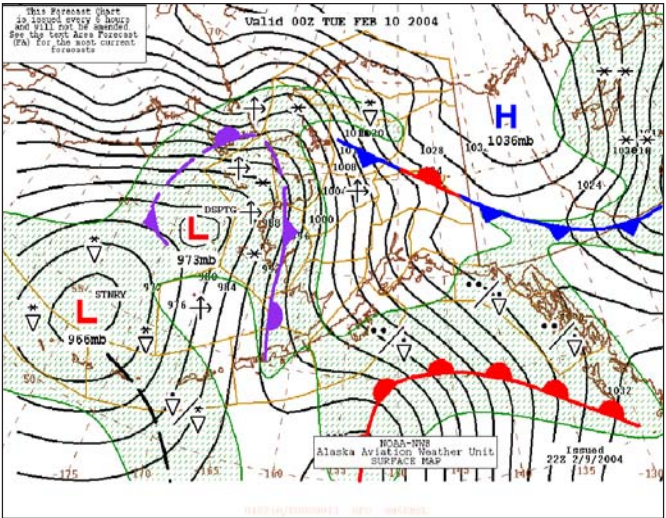
ABC DEC 03
```

## GRAPHICAL PRODUCTS

A four chart graphical FA is produced four times a day by the AAWU in conjunction with the text FA. The package consists of a surface chart, icing and freezing level chart, turbulence chart, and a chart showing areas of IFR, MVFR and strong surface winds. Also being produced twice a day is a graphic 24, 36 and 48 hour significant weather forecast. This displays forecast areas of IFR/MVFR, moderate or greater turbulence below FL250, and freezing levels. Many additional graphics geared to aviation interests are on our web page. Be sure to check them out.

Below is an example of a graphical surface chart, icing and freezing level chart, and 24 hour significant weather chart. These products, in addition to days 3, 4 and 5 outlook charts, upper winds charts, North Pacific high level chart, and more can be found on the AAWU homepage.

<http://aawu.arh.noaa.gov>





### Volcanic Ash Advisory Center (VAAC)

The AAWU has been designated as a VAAC. The unit is responsible for warning and advising aviation interests on hazards from volcanic eruptions and airborne volcanic ash. The VAACs issue a forecast of the ash plume at 6, 12, and 18 hours. This is included in a Volcanic Ash Advisory. Other VAACs with responsibility for the Pacific rim are located at Darwin, Australia; Tokyo, Japan; and Washington, D.C.

### Terminal Aerodrome Forecast (TAF)

A TAF is a description of the aviation weather conditions expected to occur at an airport or within a 5 nautical mile radius. Anchorage, Fairbanks, and Juneau Forecast Offices produce TAFs. TAFs are issued only when routine aviation surface observations are available. At stations where the routine aviation surface observations are available, TAFs are issued four times daily for a 24-hour period. TAFs are amended whenever significant changes in the weather at the terminal occur unless otherwise noted on the TAF.

Below is an example of a TAF.

```
PADQ 021135Z 021212 06015KT P6SM -RA SCT020 OVC035
      TEMPO 1218 2SM -RA BR BKN020
FM1800 0615G25KT 3SM -RA SCT005 OVC015
      TEMPO 1824 1SM RA BR OVC005

FM0000 15015KT P6SM SCT025 BKN045
      PROB30 0008 5SM -SHRA BKN025=
```

### Winds and Temperatures Aloft Forecasts (FD)

Computer produced forecasts of winds and temperatures aloft are prepared twice daily for various Alaska locations.

Below is an example of Winds and Temperatures Aloft Forecasts (FD) for Barrow.

DATA BASED ON 021200Z					
VALID 0218000Z FOR USE 1700-2100Z. TEMPS NEG ABV 24000					
FT		3000		6000	9000
				12000	18000
BRW	0915		1205-15	2307-16	2417-21 2428-30
		24000	30000	34000	39000
		2538-43	245458	244960	233858

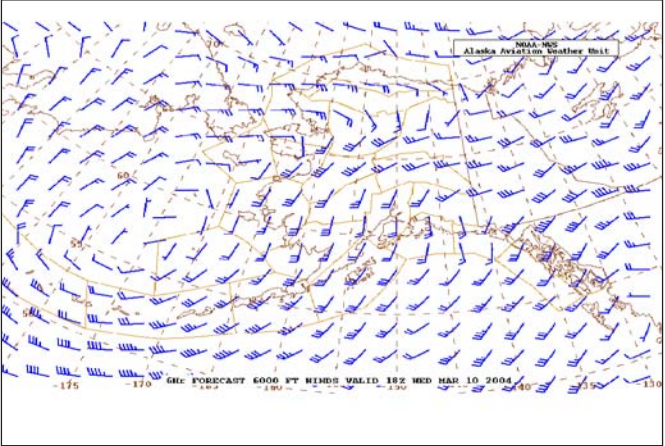
Text forecasts are issued for the following levels above mean sea level: 3, 6, 9, 12, 18, 24, 30, 34, and 39 thousand feet. However, no wind forecasts are issued for levels within 1,500 feet of a station's elevation and no temperature forecasts are issued for the 3,000-foot level or any other level within 2,500 feet of the station's elevation. Issuance times and valid periods for FDs are listed below:

**Transmission time** 0440Z (based on 0000Z data)  
Valid 05-09Z, 09-18Z, 18-05Z

**Transmission time** 1640Z (based on 1200Z data)  
Valid 17-21Z, 21-06Z, 06-17Z

## Upper Level Wind Images

These graphic wind fields are from the Weather Research and Forecast (WRF) Model at the following levels above mean sea level: 6, 9, 12, 14, 18, 24, 30 and 34 thousand feet. The times are valid for 6 or 12 hours past the initial time of the model run, i.e. 00Z or 12Z daily. Below is an example of the 6,000 foot upper level wind image. These products are also available on the AAWU home-page.



## AVIATION HAZARDS OF PARTICULAR IMPORTANCE IN ALASKA

**Icing** - Icing can occur anywhere in Alaska during any season. However, it is most common and severe along the higher terrain bordering the Gulf of Alaska, over the Alaska Peninsula and in Southeast Alaska. The relatively warm water of the North Pacific is a readily available moisture source and the mountains provide a lifting mechanism necessary to produce precipitation and icing.

Icing should always be considered a threat when flying in clouds at or above the freezing level. Often the most valuable tool in determining whether icing conditions exist is the pilot report (PIREP). When icing conditions are suspected, always ask your briefer for available PIREPs. Remember to always report icing as well as other in-flight weather conditions to the FSS.

## AIRFRAME ICING REPORTING

INTENSITY	ICE ACCUMULATION
<b>Trace</b>	Ice becomes perceptible. Rate of accumulation slightly greater than rate of sublimation. It is not hazardous even though deicing/anti-icing equipment is not utilized, unless encountered for an extended period of time — over one hour.
<b>Light</b>	The rate of accumulation may create a problem if flight is prolonged in this environment (over one hour). Occasional use of deicing/anti-icing equipment removes/prevents accumulation. It does not present a problem if the deicing/anti-icing equipment is used.
<b>Moderate</b>	The rate of accumulation is such that even short encounters become potentially hazardous and use of deicing/anti-icing equipment or diversion is necessary.
<b>Severe</b>	The rate of accumulation is such that deicing/anti-icing equipment fails to reduce or control the hazard. Immediate diversion is necessary.

**Types Of Ice**

**Rime Ice:** Rough, milky, opaque ice formed by the instantaneous freezing of small supercooled water droplets.

**Clear Ice:** A glossy, clear or translucent ice formed by the relatively slow freezing of large supercooled water droplets.



**Rime Ice covering a building.  
This would be similar to its appearance on an aircraft.**

**Turbulence** - Mechanical turbulence, generated by strong low level winds blowing across rugged terrain, occurs frequently in Alaska, mostly during winter. The Alaska-Aleutian Range and the mountains bordering the Gulf of Alaska are particularly prone to this type of turbulence; however, any range of hills or mountains which may seem insignificant on a terrain map can cause severe low level turbulence under strong low level wind conditions. During the warmer months, turbulence is usually limited to that associated with thunderstorms or convective showers.

**TURBULENCE REPORTING CRITERIA TABLE**

<b>INTENSITY</b>	<b>Aircraft Reaction</b>
<b>Light</b>	Turbulence that momentarily causes slight, erratic changes in altitude and/or attitude (pitch, roll, yaw). Report as Light Turbulence.*
	<b>OR</b>
	Turbulence that causes slight, rapid and somewhat rhythmic bumpiness without appreciable changes in altitude/attitude. Report as Light Chop.
<b>Moderate</b>	Turbulence that is similar to Light Turbulence but of greater intensity. Changes in altitude and/or attitude occur but the aircraft remains in positive control at all times. It usually causes variations in indicated airspeed. Report as Moderate Turbulence.*
	<b>OR</b>
	Turbulence that is similar to Light Chop but of greater intensity. It causes rapid bumps or jolts without appreciable changes in aircraft altitude or attitude. Report as Moderate Chop.
<b>Severe</b>	Turbulence that causes large, abrupt changes in altitude and/or attitude. It usually causes large variations in indicated airspeed. Aircraft may be momentarily out of control. Report as Severe Turbulence.*
<b>Extreme</b>	Turbulence in which the aircraft is violently tossed about and is practically impossible to control. It may cause structural damage. Report as Extreme Turbulence.*
* High level turbulence, usually above 15,000 feet ASL, not associated with cumuliform clouds, including thunderstorms, should be reported as Clear Air Turbulence (CAT) preceded by the appropriate intensity or light to moderate chop.	

**Flat Light** - Flat light is an optical illusion. It is not as severe as “white out” but the condition causes pilots to lose their depth-of-field and contrast in vision. This phenomenon occurs when a layer of cloud of uniform thickness overlays snow- or ice-covered terrain. Light rays are diffused when they pass through the cloud layer so that they strike the surface from all angles. This light is then reflected back and forth between the surface and cloud eliminating all shadows. The horizon becomes impossible to discern and dark objects seem to be floating in a field of white. Numerous accidents have occurred under such conditions.

**White Out** - As defined in meteorological terms, white out is when a person becomes engulfed in a uniformly white glow. The glow is a result of being surrounded by blowing snow, dust, sand, mud or water. There are no shadows, no horizon or clouds and all depth-of-field and orientation are lost. A white out situation is severe in that there aren't any visual references. Flying is not recommended in any white out situation. Flat light conditions can lead to a white out environment quite rapidly, and both atmospheric conditions can sneak up on you as your visual references slowly begin to disappear. White out has been the cause of several aviation accidents in snow-covered areas.

**Self-Induced White Out** - This effect typically occurs when a helicopter takes off or lands on a snow-covered area. The rotor down wash picks up particles and re-circulates them through the rotor system. The effect can vary in intensity depending upon the amount of light on the surface. When it happens, there can be a complete loss of visual clues.

### **How You Can Help**

**Pilot Reports (PIREPS)** - A picture is worth a thousand words. You have the best picture of current weather conditions right out your window. PIREPS are an important data source for the meteorologists forecasting your flight. PIREPS should be relayed to the FSS or the Anchorage Air Route Traffic Control Center whenever possible. Since weather observations are so sparse in Alaska, your PIREP will fill a gap in the data. Please submit them as often as possible!

**Flight Plans** - While not a meteorological concern, filing a flight plan is always a good idea. It is very convenient to file a flight plan while checking the weather. Do not forget to submit a PIREP when you close the flight plan at your destination.



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National Weather Service  
NOAA PA 98052  
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