Chapter 10
Weather Information and Analysis

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Flight Planning

"Aviation in itself is not inherently dangerous. But to an even greater degree than the sea, it is terribly unforgiving of any carelessness, incapacity or neglect."

Captain A. G. Lamplugh, British Aviation Insurance Group, London, circa early 1930s.

General

All Bridgewater State College aircraft must be dispatched (released) by a Dispatcher. Flight crews are not permitted to dispatch their own aircraft. The Pilot-In-Command and the Dispatcher must agree that the flight can be conducted in accordance with the information on the flight schedule (flight lesson, aircraft, time sequence), the applicable FARs, and Bridgewater State College procedures and policies.

For every flight, the Pilot-In-Command must have reviewed and be thoroughly familiar with reported and forecast weather conditions along the intended route of flight. Dispatch will attempt to provide the Pilot-In-Command with any current reports or information on airport conditions, flight restrictions, irregularities of navigation facilities, and/or any weather developments that may affect the safety of the flight or the ability to complete the event.

NOTE

The assistance of and any guidance received from Dispatch in no way relieves the PIC of his/her responsibility for proper flight planning and for making an appropriate Go/No-Go decision.

The Pilot-In-Command shall ensure that the flight is accurately planned and that all pertinent weather information is obtained and analyzed prior to flight. This includes consideration of adverse weather conditions during takeoff, en route, and landing, and any other appropriate information. After analyzing all available information, the Pilot-In-Command must be satisfied that the flight can be completed safely.

Weather Services

All Bridgewater State College flight crews shall obtain the most up-to-date weather data (including NOTAMs) available at the time of departure and during flight, and may use any approved source to do so. Those sources include:

Dispatch - May be contacted on the appropriate dispatch 123.50 when within range or by telephone from any ground station.

Flight Service Station – Available on 122.2 or as depicted on navigational charts. En Route Flight Advisory Service (Flight Watch) on frequency 122.0 provides current radar weather or other reports. Flight crews are strongly encouraged to use these resources anytime updated weather information is desired. Flight Service can also be reached via telephone at (1-800-WX-BRIEF or local telephone number), and may be used to file and obtain an IFR clearance if the local ATC facility is closed or unable to accommodate a pop-up clearance.

PIREPs - Flight crews are strongly encouraged to provide pilot reports (PIREPs) on all flights, whether for more lengthy routes or to develop practice and comfort. Utilizing FSS and Flight Watch provides other flight crews with access to actual en route weather conditions: PIREPs are the best source of immediate and accurate in-flight weather information. A PIREP may also aid in the issuance or modification of other weather reports (e.g. AIRMETs).

Weather Analysis in Flight Planning

No flight in a Bridgewater State College aircraft may depart unless the takeoff, en route, and landing phases of flight can be conducted in accordance with the weather requirements described in the Bridgewater State College Safety Procedures & Practices. The Pilot-In-Command will ensure that the appropriate weather reports or forecasts or any combination thereof indicate that the weather conditions at the estimated time of arrival (ETA) meet the weather requirements as described in this Manual.

The Dispatcher and the Pilot-In-Command must agree that weather reports or forecasts or any combination thereof indicate that the weather will be at or above landing minimums and winds will be within designated Bridgewater State College limitations at the ETA. If Dispatch and the PIC are in agreement that the weather conditions will be within the approved limitations, then the flight may be released.

Weather Minimums

Weather minimums, including alternate airport weather requirements, shall not be less than the minimums specified in the Bridgewater State College Safety Procedures & Practices. When approach minimums published on the applicable IAP are higher than the minimums specified in the Safety Procedures & Practices, the published higher minimums shall apply.

Operating At or Near Minimums

- Turbulence – significantly increases difficulty of completing a satisfactory approach procedure, especially if conditions exist at the lower levels. Increased wind velocities associated with turbulence often contribute to serious errors on the approach or missed approach.

- Precipitation – of any type (rain, freezing rain, sleet or snow) under the overcast reduces visibility when landing or circling for an approach to a landing, and therefore decreases the likelihood of a successful approach and landing.

- Depth of Overcast – presents a significant factor due to icing. Possible scenarios include:
  - Having to climb back into the overcast while executing a missed approach procedure while carrying airframe ice that accumulated during the descent.
  - Possible residual airframe ice, especially tail icing, that may affect landing characteristics.

Required Reports to Dispatch

The Pilot-In-Command shall ensure that Dispatch is immediately notified any time unforecast or hazardous weather conditions are encountered that will or may affect the safety of the flight and/or other Bridgewater State College flight events. Contact Dispatch as soon as practical via radio or telephone.

Extreme Turbulence

If any Bridgewater State College flight encounters extreme turbulence, the Pilot-In-Command shall, upon landing, notify Dispatch and make an aircraft maintenance Squawk. Dispatch will ground the aircraft for inspection, and notify Maintenance that the aircraft encountered extreme turbulence.

Unforecast Severe Icing

Flight crews encountering unforecast severe icing shall inform Dispatch as soon as practical. The report shall include the nature and location (including altitude and position) of the conditions and any actions taken by the flight crew.

Hydroplaning

This section of the manual is referenced from the FAA Airplane Flying Handbook (Chap. 8 – 33). Hydroplaning is a condition that can exist when an airplane is landed on a runway surface contaminated with standing water, slush, and/or wet snow. Whether it occurs depends on numerous factors including aircraft speed, tire tread depth, tire air pressure, depth and consistency of the runway contaminant, type of runway surface, etc.

Dynamic - standing water is not displaced fast enough to allow tire to make complete contact with pavement and the tire rides on a thin film of water instead of making contact with the runway. Brake effectiveness can be reduced to nil.

NOTE

The pilot can calculate the speed at which dynamic hydroplaning is likely to occur by multiplying the square root of the main gear tire pressure (p.s.i.), by nine (9) (e.g. main gear tire pressure is 36 psi, the airplane will begin hydroplaning at 54 knots).

Viscous - Viscous hydroplaning can occur at much lower speeds than dynamic hydroplaning, but requires a smooth or smooth acting surface such as asphalt or a touchdown area coated with the accumulated rubber of past landings.

CAUTION

Such a surface can have the same friction coefficient as wet ice.

Reverted Rubber - Reverted rubber (steam) hydroplaning occurs during heavy braking that results in a prolonged locked-wheel skid. Only a thin film of water on the runway is required to facilitate this type of hydroplaning, where enough heat is generated by the skidding tire(s) to cause the rubber in contact with the runway to revert to its original uncured state. It then acts as a seal between the tire and the runway, and delays water exit from the tire footprint area. The heated water turns to steam, which then lifts and supports the tire off the runway.

Preventive Measures

- Land at minimum possible speed.
- Maintain directional control and runway alignment (on approach and flare).
- Brakes judiciously and only after the landing gear tires have spun up to rolling speed. Do NOT lock the brakes.
- Touchdown firmly to plant the wheels on the runway surface.
- Touch down near the threshold to assure maximum runway length.

Thunderstorm Avoidance Policy and Procedure

This section of the manual references AIM Chapter 7 Safety of Flight, Section 1. No Bridgewater State College aircraft shall attempt takeoff or landing when a thunderstorm is over or in the vicinity of the airport, or is on the departure path or final approach path.

WARNING

There is no such thing as a harmless thunderstorm, and there is no reason to fly through a thunderstorm.

WARNING

The Pilot-In-Command of any Bridgewater State College flight shall delay takeoff or landing until such time as the flight will clear any thunderstorm and remain clear of any associated hazards (e.g. significant turbulence, wind shear, microbursts, etc.).

Thunderstorm Hazards

Squall Lines - The single most intense weather hazard to aircraft. A squall line is a narrow band of active (often steady-state) thunderstorms located on or ahead of a cold front in moist, unstable air. Squall lines can also develop in areas independent from any front. They usually form rapidly, generally reaching maximum intensity during late afternoon and the first few hours of darkness.

Tornadoes - Tornadoes occur with both isolated and squall line thunderstorms. Reports for forecasts of tornadoes indicate that atmospheric conditions are favorable for violent turbulence. Any aircraft inadvertently caught in IMC in a severe thunderstorm could encounter a hidden vortex.

CAUTION

Numerous aircraft accidents involving in-flight break-up have occurred near but not in the immediate vicinity of thunderstorms. It is believed that these aircraft were lost to clear-air tornado vortices. Maintain maximum available distance from thunderstorms whenever possible.

Turbulence - Turbulence is a fact of life in any and all thunderstorms, and a severe thunderstorm can destroy an aircraft. Strongest turbulence within the cloud occurs with shear between updrafts and down drafts. It is almost impossible to hold a constant altitude in a thunderstorm, and maneuvering in an attempt to do so produces greatly increased stress on the airframe. Stresses are least if the aircraft is held in a constant attitude and allowed to "ride the waves".

CAUTION

Turbulence beneath a thunderstorm should not be minimized, especially in areas with low relative humidity. Strong out flowing winds and severe turbulence may be present in these areas.

Microbursts

A microburst is a small-scale but very intense downdraft that, upon reaching the surface, spreads out in all directions from the center of the downdraft. This creates a vertical and horizontal shear. Microbursts are typically associated with thunderstorms during the heavy rain portion of a thunderstorm. However, microbursts can and have also occurred in areas with no visible surface precipitation, making visible detection very difficult. They can be found (and their presence anticipated) anywhere there is convective activity.

WARNING

Microbursts are extremely hazardous to all types of aircraft, especially because they occur at low altitudes during the takeoff or approach and landing phase when the aircraft performance – to- vulnerability margin is minimized. Downdrafts have been recorded at strengths of 6,000 FPM, with horizontal winds near the surface reaching speeds of 45 knots (meaning a 90 knot shear from headwind to tailwind for aircraft transiting the shear zone).

Icing - Thunderstorm icing can be extremely hazardous. Super cooled water freezes on impact with an aircraft. The abundance of large, super cooled water droplets makes clear icing very rapid between 0°C and -15°C and encounters can be frequent in a cluster of cells.

CAUTION

Flight in a Bridgewater State College aircraft in any area of known icing is PROHIBITED.

Hail - Rain at the surface does not mean the absence of hail at altitude. Anticipate possible hail with or near any thunderstorm. Hailstones larger than ½" diameter can significantly and rapidly damage an aircraft. Hail may be encountered in clear air several miles from dark thunderstorm clouds, and have been encountered more than 10 miles from storm center.

Lightning - Nearby lightning can blind a flight crew and render them momentarily unable to see and therefore navigate. Nearby lightning can also induce permanent errors in the magnetic compass and electrical components. Distant discharges can disrupt radio communications on low and medium frequencies (the ADF is particularly susceptible). A lightning strike can puncture the skin of an aircraft and can damage communications and electronic navigational equipment.

Engine Water Ingestion – By definition, thunderstorms contain areas of high water concentration that could result in engine roughness or stoppage, particularly in small general aviation aircraft. The best means of preventing this problem is *avoidance* of severe storm systems.

Low Ceiling And Visibility - The difficulties of low ceilings and restricted visibility, when associated with other thunderstorm hazards (turbulence, hail, lightning, etc.) make precision instrument flying virtually impossible. Again, avoidance is the best policy.

Thunderstorm Do's and Don'ts
This section of the manual is referenced from AIM Chapter 7 Safety of Flight, Section 1-29. Most importantly, *never regard any thunderstorm lightly.* Avoidance is the best policy.

Below is a partial list of suggestions for operation in areas of thunderstorm activity.

Avoidance

- Do not attempt to fly under a thunderstorm even if one can see through to the other side. Turbulence and wind shear under the storm could be disastrous.
- Avoid severe or intense thunderstorms by at least 20 miles. This is especially true under the anvil of a large cumulonimbus cloud.

Before Unavoidable Thunderstorm Penetration

- Tighten seatbelts and shoulder harnesses, and secure all loose objects.
- Plan and hold course to take the aircraft through the storm in a minimum time.
- Do not turn back once in the thunderstorm. A straight course will most likely get the aircraft out of the hazard most quickly, and turning maneuvers increase stress on the airframe.
- Establish a penetration altitude below the freezing level or above the level of -15°C to avoid the most critical icing.
- Establish power settings for turbulence penetration airspeed per the aircraft FSM.
- Turn up cockpit lighting to highest intensity to lessen temporary blindness from lightning.

If a Thunderstorm Penetration Is Unavoidable

- Keep eyes on the instruments: Looking outside increases the danger of temporary blindness.
- Do not change power settings; hold settings for recommended turbulence penetration speed.

Winter Operations

Bridgewater State College will not dispatch an aircraft, continue to operate an aircraft en route, or land an aircraft when, in the opinion of the Pilot-In-Command or Dispatch, icing conditions are expected or encountered that could adversely affect the safety of the flight.

De-Icing/Anti-Icing

Refer to the Aircraft De-icing / Cold Weather Operations Manual in the aircraft-specific Flight Standards Manual.

Pre-Flight Inspection

Pre-flights conducted during winter operations in the New England are critical to flight safety and shall not be rushed or neglected for any reason. Flight crews are expected to dress appropriately for the prevalent weather conditions.

WARNING

Hurrying or abbreviating the published pre-flight inspection of any Bridgewater State College aircraft is PROHIBITED.

Braking Action

Braking Action Reports

When available, ATC furnishes pilots with braking action information received from other pilots or airport management. The quality of braking action is described using the terms "good," "fair," "poor," and "nil," or a combination of these terms (e.g. "fair to poor" or "poor to nil"). When providing a braking action report, use proper phraseology and appropriate descriptive terms, e.g. "Braking action good on the first half of the runway, decreasing to fair past the intersection of RWY 5/23 and 14/32," together with the particular type of aircraft.

For NOTAM purposes, braking action reports are classified according to the most critical term ("fair," "poor," or "nil") used and issued as a NOTAM (D). If tower controllers receive runway braking action reports that include the terms "poor" or "nil," or whenever weather conditions are conducive to deteriorating or rapidly changing runway braking conditions, the ATIS broadcast will indicate "braking action advisories are in effect."

WARNING

Bridgewater State College aircraft are not permitted to attempt to takeoff or land when braking action is reported as "nil." A "nil" braking report is rendered invalid when meteorological conditions improve or when ground personnel take action to improve the braking conditions.

Braking action reports can vary depending upon aircraft performance characteristics, type, weight, and current weather conditions, and must be considered when deciding how a particular braking report may affect aircraft braking performance. ATC will issue the latest braking action report for the runway in use to each arriving and departing aircraft when braking advisories are in effect.

- Request current runway condition information if not volunteered by controllers.
- Be prepared for deteriorating conditions.
- Provide ATC with an updated runway condition report after landing.

Standing Water, Slush and Snow

In the KEWB flying environment, flight crews are likely to encounter standing water, slush, or snow on the runway at their home or other airport. CFIs must use good judgment and common sense in dealing with this issue:

- Note performance reductions expected of the aircraft. Refer to appropriate performance data as necessary. Know what to expect.
- Prior to engine start, ensure that all runway lighting systems are available (e.g. HIRL, etc.).
- Verify that all engine inlet covers, pitot covers and tie-downs are removed and properly stowed.
- Remember that tires can freeze to the ramp surface. If the aircraft cannot be moved under normal power, do not apply more power to dislodge the tires. The aircraft may break free, but is likely doing so onto an equally frozen surface where it will then move rapidly forward and endanger other aircraft and personnel.
- Increase taxi spacing/distance behind other aircraft when ramps and taxiways are contaminated, to allow greater time to bring the aircraft to a stop. If taxiing behind turbine aircraft, keep in mind that their exhaust can cause dry snow to melt and freeze on aircraft surfaces, and may cause ice and sand to be blown onto the trailing aircraft.
- As a final safety check after engine run-up, verify that flight controls have full freedom of movement prior to takeoff.
- If landing on an iced runway, touch down firmly at the aiming point, without allowing the aircraft to float. Land at the minimum safe speed. Avoid the temptation to “grease it on.”
- On ice-covered ramps the aircraft will likely creep forward even with chocks installed.
- Ensure that the parking brake is released to prevent frozen brakes on the next departure.

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