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A Communication from the
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Winter Operations

*T F During some winter operations, such as snow removal, there is a need for extra caution. The potential for danger must be recognized, and the need for positive control cannot be overemphasized. Those involved in snow removal may be unaware of certain hazards inherent to airport operations. The following are offered as some suggestions to help stay out of difficulty during winter operations.

- Do not base runway separation on an assumption that the truck driver or snowplow operator has the same understanding of control instructions as a pilot. Phrases and words in common use by us such as "hold short," "expedite," and "proceed across" may sound like a foreign language to someone else not involved in air traffic communications regularly.

- Keep in mind that the visibility you have from the tower may be different from that of the snow crew. Removal operations such as plowing, sweeping, and snow blowing can reduce visibility to near zero in the immediate area. Make sure that any visual reference you use in your instructions is something you both can see. Just as important, ensure that you and the equipment operators are using the same reference.

- Remember that the noise level inside a snow removal machine may be high. Make sure your microphone technique enhances positive communications.

- Runway contaminants such as snow and ice, can make the surface slippery. You can provide an additional margin of safety by giving ground equipment operations sufficient time to comply with your instructions.

- Review the winter operations plan applicable to your operations. These are normally contained in facility directives.

- Remember, ANY communications can be misunderstood. Do not contribute to that possibility.

- Lastly, and most importantly, know the provisions of FAA Order 7110.65, Chapter 3, Section 3, Airport Conditions, which contain procedures applicable to ground operations.

Planning

*FTER Good planning can go a long way toward ensuring safe and efficient air traffic operations during winter weather conditions. If it has not already been completed, now is the time to review and update all local directives that specifically relate to winter operations. Additionally, ensure contact information

and procedures for coordination with airport operators are up to date. If possible, ensure infrequent ground operators involved during winter snow removal operations are aware of the local procedures and communications with tower positions and runway condition reporting.

Facility managers should participate on airport committees engaged in planning for winter airport operations, but only in an advisory capacity. Remember that FAA personnel are not the decisionmakers on runway conditions or if an airport should be closed because of weather. Airport management must make these decisions.

Where appropriate, managers should discuss gate-hold procedures that may be implemented during the winter including local de-icing procedures. Ensure there is a clear understanding of how and when these procedures apply.

And Now for the Icing

*FTER Aircraft icing is one of the hazards we have been talking about that can be with us all year but gets extra attention during the winter. Ice, including frost, can be a hazard because of the way it affects airframes and power plants. Accumulations of ice on the outside of aircraft impair wing lift and propeller thrust. Ice can reduce engine performance to dangerous levels. In the most severe cases, it can cause engine failure. The danger is that while lift and power are being reduced, icing is also increasing the weight of the aircraft resulting in a dangerous situation.

There are several forecasts that contain warnings of icing. However, pilot weather reports (PIREPs) are the only source of actual icing reports. PIREPs of icing are more than just nice-to-know information.

Because of their importance, procedures for soliciting PIREPs are contained in FAA Order 7110.65, Paragraph 2-6-3, PIREP Information, and FAA Order 7110.10, Paragraphs 9-2-5, Soliciting PIREPs, 9-2-7, Data to be Included in PIREPs, 9-2-9, Reporting Icing Conditions in PIREPs, 9-2-10, Means to Solicit PIREPs, 9-2-11, PIREP Classification, and 9-2-15, PIREP Format, specifically paragraph k. The briefing and broadcast paragraphs of these directives also contain PIREP handling procedures.

The arrival of the winter season is a good time for all operational personnel to review PIREP procedures, especially those concerning icing.

You Really Ought to Know

*FTER As aviation professionals, we must all be knowledgeable about the basic conditions which are most likely to produce winter flying problems. It does not take much time for a problem in the cockpit to become a problem in the air traffic facility.

Aircraft icing can occur either in the air or on the ground. A common condition for icing is when an aircraft taxis through slush or water at or near freezing. It can also occur when aircraft fly through precipitation and the air temperature is near or below freezing. The most severe icing occurs with a free air temperature between 0 and -10 degrees Celsius. However, icing is not uncommon at much colder temperatures, all the way down to -40 degrees Celsius.

Cumuliform clouds are more likely to produce serious ice formation than other clouds, particularly if freezing rain is present. However, at altitudes above the freezing level, any layer of air with a narrow temperature dew point spread is a potential icing zone. Remember that ice can form by sublimation, water going directly from a gaseous state to a solid state. In this case, changing directly from water vapor (always present in the atmosphere) to solid ice. Types of aircraft icing include clear, rime, and mixed.

Clear Ice

*FTER Clear ice forms when, after initial impact, the remaining liquid portion of the water drop flows out over the aircraft surface, gradually freezing as a smooth sheet of solid ice. This type forms when drops are large as in rain or in cumuliform clouds.

Clear ice is hard, heavy, and tenacious. Its removal by deicing equipment is especially difficult.

Rime Ice

*FTER Rime ice forms when water drops are small, such as those in stratified clouds or light drizzle. The liquid portion remaining after initial impact freezes rapidly before the drop has time to spread over the

aircraft surface. The small frozen droplets trap air between them giving the ice a white appearance.

Rime ice is lighter in weight than clear ice and its weight is of little significance. However, its irregular shape and rough surface make it very effective in decreasing aerodynamic efficiency of airfoils, thus reducing lift and increasing drag. Rime ice is brittle and more easily removed than clear ice.

Mixed Clear and Rime Icing

*FTER Mixed clear and rime icing forms when water drops vary in size or when liquid drops are intermingled with snow or ice particles. It can form rapidly. Ice particles become imbedded in clear ice, building a very rough accumulation, sometimes in a mushroom shape on leading edges.

Icing-related problems that air traffic personnel should be alert to include intermittent, and sometimes total, loss of communications. This problem can be created when aircraft antennae become ice coated and sometimes fail.

Another situation to be alert for is false flight instrument indications that may be caused by pitot-tube icing. If an aircraft climb rate seems abnormally high, you may want the aircraft to verify the Mode C readout.

Points to Remember

TER*F Base your advice to pilots concerning icing on forecasts and PIREP's. Forecasts delineate general areas of icing potential; PIREP's pinpoint actual encounters. In using PIREP's, remember that conflicting reports of type or intensity may be due to different types of aircraft. By piecing together several reports, you frequently can get a more comprehensive picture of icing potential.

An area forecast always contains a section on icing. It specifies freezing levels, expected changes in freezing level, and altitudes where icing is most likely to occur. Significant meteorological and airman's meteorological information are also excellent sources of icing information.

Always pass on any icing reports to the forecaster, and do not hesitate to ask for his/her help when needed. He/she is in an excellent position to integrate PIREPs, and the latest analyses and observations, into a current picture of expected icing.

Remember the following points.

- In stratiform clouds, rime icing may be very extensive horizontally. An altitude change of the aircraft to either a flight level with above-freezing temperatures, or one colder than -5 degrees Celsius, likely will alleviate icing conditions. An altitude change also may take the flight out of clouds.

- In cumuliform clouds, clear ice usually is encountered with brief, heavy accumulations from 0 to -10 degrees Celsius, and lesser amounts at lower temperatures. Any flight path change to get out of the clouds and into visual conditions is in order.

- In freezing rain due to frontal overrunning, a climb into the warmer air aloft is in order. Above-freezing temperatures may be found at a lower level in some cases; however, terrain must then be considered.

- Many small aircraft do not have deicing equipment, especially those based in warm climates. Never assume that an aircraft has deicing equipment.

- During icing or potential icing conditions, PIREP's are especially valuable to the entire aviation community and should be collected and transmitted into the system.

- Ground icing, frost, and carburetor icing are generally considered operational problems. However, you can sometimes alert a pilot to ground icing or frost potential when you know conditions are favorable.

Forecasting the Icing Hazard

TER*F What do National Aviation Weather Advisory Unit (NAWAU) meteorologists look at when trying to determine if an icing hazard exists? How do they determine where the hazard will be during the valid time of the upcoming area aviation forecast?

In a nutshell, NAWAU meteorologists try to determine where there will be enough moisture to form

clouds above the freezing level. If they look at the moisture too far above the freezing level, they find they are tracking ice crystals instead of liquid water droplets.

That brings up an important question. Why is there liquid water above the freezing level? Liquid cloud droplets in an environment of rising air can rise a substantial distance above the freezing level, becoming colder and colder, without freezing as long as they remain undisturbed. What is meant by "undisturbed"? If an aircraft would happen to fly through these "supercooled" cloud droplets, the droplets would most likely freeze on impact with the aircraft. At least the smaller drops would freeze instantly into rime ice. If the clouds happened to be made up of larger drops, it might take a few seconds for the drops to freeze into a glaze of clear ice.

Generally speaking, the stronger the upward motion of the droplets within the cloud, the greater the vertical distance the droplets will rise before changing into ice crystals. However, meteorologists studying clouds have learned that 95 percent of the cloud droplets at the -16-degree-Celsius level have changed into ice crystals already, and at the -25-degree-C level, 99.9 percent of the droplets have changed to ice crystals. Therefore, we should expect occurrences of aircraft icing to be scarce at temperatures around -16 degrees Celsius, and essentially nil at -25 degrees Celsius or colder.

In addition to forecasting the horizontal and vertical extent of cloud formations above the freezing level, the NAWAU meteorologist must determine which cloud areas will most likely contain significant amounts of super-cooled water droplets during a specific 12-18-hour period. Needless to say, this is no easy task.

A Seasonal Reminder About Braking Action Advisories and PIREPs

*FTER Runway braking action reports are furnished by the pilot or airport management. These reports require categorization using the terms "good," "fair," "poor," "nil," or a combination of these terms.

When braking action advisories are in effect, and the braking action report affects only a portion of a runway, describe the braking action for that portion of the runway and issue it in descriptive terms to each arriving and departing aircraft.

When a braking action report includes the terms "poor" or "nil," or whenever conditions are conducive to deteriorating or rapidly changing runway conditions, terminal facilities are required to broadcast the statement, "Braking action advisories are in effect" on the Automatic Terminal Information System.

Furnish information as received from the airport management to pilots on the ATIS at locations where friction-measuring devices, such as MU-Meter, Saab Friction Tester (SFT) and Skiddometer are in use only when the MU values are 40 or less. Use the runway followed by the MU number for each of the three runway segments, time of report, and a word describing the cause of the runway friction problem.. Example "Runway two-seven, MU forty-two, forty-one, twenty-eight at one zero one eight Zulu, ice". Do not issue MU values when all three segments are greater than 40, or translate these reading into the braking action reporting categories.

Braking action pilot reports should be solicited when braking action advisories are in effect or when requested. These pilot reports should be solicited far enough in advance to allow the pilot time to adequately evaluate the situation and render a meaningful braking action report.

Remember, it is not only our responsibility to solicit these reports when required, but also to issue this information in time for it to be useful to the pilot. Procedures concerning this subject are in FAA Order 7110.65, paragraphs 3-3-3 and 3-3-4, and FAA Order 7110.10, paragraphs 4-4-1, 4-6-6, and 14-1-21.

Just a Reminder

*FTER Portions of Federal Aviation Regulations 91 and 135 prohibit visual flight rules flight into areas of known light icing under some conditions. In addition, some military aircraft are extremely sensitive to airframe icing of any degree. Therefore, it is important that all icing reports from pilots be processed in accordance with established procedures. Soliciting and relaying PIREPs of light icing is also required.

Forewarned is Forearmed

*FTER The thought that we have been trying to convey throughout this issue of this article is the importance of communications. While the focus of this issue is winter operations, there really is not anything new about winter operations. Certainly, snow and ice on the ground are unlikely in the warmer months, but hazardous weather conditions of one kind or another are not unique.

Weather-related information, such as PIREPs, SIGMETs, meteorological impact statements, Center Weather Advisories (CWA), and other advisories always require special attention and handling. This information will always be an important factor that pilots must consider. No matter what time of year, timely action is important.

Do not be fooled into thinking that winter weather replaces hazards that exist during the rest of the year. Icing, turbulence, low-level wind shear, restricted visibility, and even thunderstorms can and do exist during the winter season.

Weather, as it pertains to aviation, has been around for a long time (at least since the beginning of aviation, right?). Advisory Circular 00-6A has been around since 1975 under its present title and dates back to 1943 under other titles. However, it still remains an excellent source of information on winter weather and hazards.

Winter Operations and Runway Incursions

ER*FT Several factors that occur during winter months deserve our attention in our quest to further reduce runway incursions. Personnel at stations that provide Airport Advisory Service (AAS), as well as those in towers, should keep the following factors in mind.

- Snow removal vehicle operations on the runways and other movement areas.
- Aircraft taxiing slower because of surface conditions.
- Aircraft needing and using more time to exit or cross runways because of surface conditions.
- Various forms of precipitation reducing controller and pilot visibility.
- Plowed snow drifts causing blindspots for taxiing aircraft.
- Glare caused by bright sunlight reflecting off snow (and ice) on the ground.

The above factors are just a few of the important items we must consider as we approach winter operations.

In this publication, the option(s) for which a briefing is required are indicated by an asterisk (*) followed by one or more letter designators, i.e., ****T*** *= Tower, combined tower/approach control,* ****R*** *= TRACON,* ****E*** *= ARTCC (En Route), or* ****F*** *= AFSS/FSS. (Reference 7210.3, para. 2-2-8.)*

This table lists bulletins published since 2000. They can also be found on the Internet at www.faa.gov/atpubs

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