EFFECT OF WEATHER CONDITIONS ON AIRPORT OPERATIONS

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Ladies and gentlemen, thank you for inviting me to this important workshop on Meteorological and Environmental Impacts to Aviation Systems. I sincerely appreciate the opportunity to speak and discuss with you the effect of weather conditions on airport operations,

We in airport management feel that the aviation system commences and terminates on the ground, from the point at which the airplane first starts to move, completes its mission and comes to a stop on the ramp. Our aim, as is yours, is to find ways to insure that the entire operation will be accomplished safely and with minimum inconvenience to the travelling public.

We fully realize that we cannot hope to control Mother Nature, but we must discover ways to live in peaceful coexistence with her.

We are continuously confronted with new developments in aircraft design. We now have the equipment and techniques to insure the rapid and safe movement of these aircraft around the world, and it has been proven technically feasible to bring an aircraft into a safe landing without human hands. The runway condition during- inclement weather is the one remaining limitation to all-weather operating capability.

We in airport management are aware of this and are learning through intensive programs of scientific and technical research, as well as through exchanges in information regarding operational viewpoints, to shape our environment and truly learn to live in peaceful coexistence with good old Mother Nature in her various moods.

There are basically three areas of adverse weather conditions with which we are concerned: rain, snow/slush, and icing. Let me discuss these one at a time.

Rain. The problem of wet runways can be stated simply with one word--hydroplaning. This situation occurs when surface water collects on the runway. Hydrostatic pressure can then build up in the form of water under the aircraft's tires and reduce or even eliminate the tire-pavement contact at speeds in excess of 120 knots. When this happens the pilot loses braking and directional control.

This condition has all but been eliminated by safety grooving. This process is achieved by cutting transverse grooves the full length and width of the runway. The recommended dimensions of the grooves are

1/4" deep, 1/4" wide, with 1 1/2" spacing between groove centers. This grooving increases the surface water runoff and gives the pilots the best possible braking on a wet surface. In addition to this, grooving has helped to impede ice formation on the runway, and slush appears to dissipate faster.

At PCIA we grooved both of our main runways of 10,700 ft and 6,000 ft last year and highly recommend the process as a valuable maintenance and safety improvement.

Snow/Slush. Airports in the Northern Hemisphere, and in other parts of the world where the climate is similar, are subject to problems resulting from snow/slush and wind. At one time it was possible to accept major snowstorms and high winds as a part of the hazards of flying and we in the industry learned to live with the changing elements and adjust to them. Modern transportation systems, however, with ever increasing numbers of travellers, larger and faster planes, intricate passenger services, busy access routes and constant reminders of safety, can no longer rely on skillful navigation alone, but must have assurance of safe, accurate and functional procedures.

Weather factors are ever present, and simply cannot be discounted at any time. Snow and slush control is a major consideration at many airports and is not attained without expensive and elaborate equipment as well as large numbers of personnel.

A good timely detailed weather forecast can give us time to muster our equipment and personnel and to prepare our plan of action for that particular operation.

Every experienced manager knows that the biggest problem we face is the fact that almost every snow removal operation is different than the one before it. As conditions change so do the methods.

A meteorologist friend of mine once told me that forecasting the time of snowfall; the type of snow, wet or dry; the total accumulation; the wind velocity and the wind direction during and after the storm is probably the most inexact art in the mystical science of weather forecasting. However, the state of the art of weather predictions has steadily moved forward and the improved performance of computer forecasting is encouraging.

The above information is extremely important and must be known and thoroughly thought out if we hope to complete the snow removal operation as expeditiously and economically as possible. At PCIA we are fortunate to have a National Weather Service Station located on the airport, and the communication between the forecasters and my personnel is excellent. The only time I really get worried is when they forecast "snow flurries." On many occasions we have had to plow three or four inches of flurries. The airport manager's feeling for snow is well expressed by my son's poem illustrated in Figure 1. However,

I do keep a copy of the current year "Farmers Almanac" in my desk as a backup.

Seriously though, let me explain why the above information is important prior to commencing the actual snow removal operation. While snowstorms may be the primary reason for the problem situation, it is really the wind that poses the greatest threat, as the wind following the snowstorm will often emanate from a direction completely opposite from that of the snowstorm. Close coordination with the duty forecaster dictates how best to carry out the operation at that time.

Various alternatives relative to wind change, type of snow, etc., result in a need for total coordination between those responsible for snow removal, the local weather service, the traffic controllers and the airport users. At PCIA we establish this working rapport through the formation of a snow committee. We meet prior to every snow season, and as required during the season, to monitor ourselves and our activities, promptly making changes when needed.

Icing. The third adverse condition is ice, and of course I refer to ice forming on the pavement as opposed to ice on the aircraft. Here again we stress the close coordination required between those responsible for snow and ice control and the National Weather Service.

At the present time the most economical and effective method of ice control is by chemical means. One of the first chemicals to be used was urea. This material comes in a pellet from and is distributed on the pavement surface by means of a sand spreader attached to the back of a truck. In order to reduce costs, for many years we used to use a 50/50 mixture of urea and warm sand. The air carriers, however, discovered that the large jet turbines were ingesting the sand when they developed high speeds on the runway for takeoff and landing. This resulted in excessive wear on turbine blades and caused impact damage in other exposed areas such as landing gear and air conditioning openings. As a result we now apply straight urea on the runways when it is used. Another restriction in the use of this material is that it is effective only down to about 20°F at best.

The most effective tool we have for deicing or anti-icing today is a material developed by the Union Carbide Co. called UCAR Runway Deicer. This is a glycol-based liquid which is effective to 0°F that is sprayed on the pavements either prior to or after the ice has formed.

The important feature of this material is its anti-icing capability. It stands to reason that if you have to use it as a deicer you have already lost the runway. You then have to apply the material to break the bond between the ice and the runway surface and then sweep or blow the ice away. This process could take as long as one hour or more on our 10,700 ft runway. Runway closings for this period of time could well require aircraft to divert to another airport, and this is very costly.

We find that with close coordination and communications between our snow removal coordinator and the duty forecaster we have been able to use the UCAR material as an anti-icer. It is applied to the pavement prior to the forecasted freezing rain and prevents the bond from forming between the ice and the runway surface. The judgement in timing of this application is very critical. If it is applied too soon it could be carried away in water runoff and totally lose its effectiveness. We would also have let about $1,000 run down the drain. Another important reason to use this material as an anti-icer rather than a deicer is, once again, cost. The cost of deicing this same runway would have been $4,000.

In summary, I might say we in airport management are striving to achieve better and faster snow and ice control at our airports. We do not want runway conditions to be the one remaining limitation to all-weather operating capability. I feel through workshops such as this and with better communication between all of us involved we will attain our goal.

Ladies and gentlemen, I want to express my thanks for letting me participate in your program. It has been my pleasure.

FIGURE 1. SNOW FLURRIES.