Contaminated and Closed

BY DAVID THOMAS

Will U.K. airports be ready for another winter onslaught?

Last winter's unusually heavy snowfall caused major disruptions at most U.K. airports. Many scheduled airlines were obliged to cancel services, while charter airlines continued to fly, albeit with substantial delays. The financial implications for the airlines and airport operators are still difficult to gauge. However, with the benefit of hindsight, could the current U.K. practices regarding operations with contaminated runways be improved?

The U.K. Civil Aviation Authority (CAA) currently complies with International Civil Aviation Organization (ICAO) recommendations that operations on contaminated runways should be the exception and not the norm. U.K. airports have a "back to black" policy, which means that contaminated runways must be cleared and then treated with deicing/anti-icing fluid to prevent further contamination. However, this may not always be practical; tactical decisions on runway closure are not taken lightly and are difficult to predict. Traditionally, our benign winters and maritime airflow have rarely put this policy to the test.

Uncertainty

So, what information can pilots rely on when making decisions about operating on runways that are not dry? Currently, U.K. Civil Aviation Publication (CAP) 493, *Manual of Air Traffic Services*, states that braking action reports must be issued in plain language for compacted snow and ice — for example, as "good," "medium" or "poor." This is derived from a matrix based on friction measuring devices first developed in 1959 by the Nordic countries and later adopted by ICAO (Table 1, p. 12).[1] CAP 493 also says that friction measuring

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devices can produce inaccurate readings in conditions of slush and thin deposits of wet snow — a phenomenon highlighted by an operators' bulletin issued by the U.K. CAA in 2006.[2]

It has been known for some years that readings by friction measuring devices do not necessarily reflect the braking performance of a modern airliner and that the devices can produce differing results. The Norwegian Accident Investigation Board has found that measurements can vary by 0.10 with dry contaminants and by 0.20 with wet contaminants. These issues are currently being addressed by research committees formed by ICAO, the European Aviation Safety Agency, the U.S. Federal Aviation Administration (FAA) and others.

So, where do we stand with regard to braking action reports if the runway is contaminated with something other than compacted snow or ice? The answer lies in CAP 493: "In conditions of slush or thin deposits of wet snow, friction measuring devices can produce inaccurate readings. [Therefore,] no plain language estimates of braking action derived from those readings shall be passed to pilots." Does this matter if the airport always clears the runway surface? The answer is yes. There can be a period of uncertainty from the time the runway begins to become contaminated to the time the airport decides to close it. Likewise, when the runway is reopened, it probably will be wet with deicing/anti-icing fluid, which should equate to a braking action of "good." However, under certain narrow temperature-dew point splits at or below freezing, ice can form when the deicing/anti-icing fluid starts to break down, which may reduce the braking action to "poor." In these scenarios, the crew will have to make an assessment of the likely runway braking action without any meaningful data. Snow notice to airmen (SNOWTAM) code "9" and European aviation routine weather report (METAR) codes "//" and "99" indicate that runway friction measurements are "unreliable."

Consequently, should we ask the regulator to rewrite CAP 493 to allow braking reports to be passed to pilots under *all* conditions? The Norwegian CAA already has done this by adapting the ICAO recommendations to the Norwegian winter climate. This has enabled the Norwegian airport operator Avinor to develop a reporting matrix for its own environmental conditions. Airport personnel are trained to make an assessment based on a visual inspection of the runway to measure the contaminant, friction measurements (which cannot be solely relied upon), current weather conditions and runway maintenance activities such as treatment with deicing/anti-icing fluid, sand, etc. After the results of the assessment are interpreted using the matrix, a braking action report is produced for pilots. This has not solved the problem completely; Norway still has runway excursions. However, Avinor continues to develop tools to deal with this complex subject, the most recent being the Integrated Runway Information System, a computer program that will aid airport personnel in assessing the runway state and braking action, based on automatic meteorological measurements.

Runway Friction Measurements

Measured or Calculated Coefficient of Friction	Estimated Braking Action	MOTNE METAR Code
0.40 and above	Good	95
0.39–0.36	Medium/ good	94
0.35–0.30	Medium	93
0.29–0.26	Medium/ poor	92
0.25 and below	Poor	91
If for any reason the reading is considered unreliable	—	99

MOTNE = Meteorological Operational Telecommunication Network Europe; METAR = aviation routine weather report

Source: U.K. Civil Aviation Publication 493

Table 1

Across the Pond

On the other side of the ocean, the philosophy with regard to braking action reports differs between the FAA and Transport Canada (TC). The FAA recognizes the difficulty of assessing the surface condition of contaminated runways and reporting the information to pilots. It also acknowledges that the data provided by friction measuring devices do not necessarily represent aircraft braking performance. Consequently, the FAA recently recommended that airport operators no longer provide Mu readings (measured friction coefficients) to pilots. It believes that pilot weather reports (PIREPs) are an invaluable source of information for pilots and should be used in support of runway condition reports. After the Chicago Midway runway excursion in 2005 (*ASW*, 2/08, p. 28), the FAA set up a workshop on runway condition reporting. Participants developed a table that correlates braking action reports with estimated runway surface conditions (Table 2). The table has been provided to pilots by Boeing and is now used by a number of U.K. airlines.

TC has eliminated some of the issues caused by conflicting readings from friction measuring devices by using only decelerometers. The measurements conform to Canadian Runway Friction Index (CRFI) values comprising mostly fractions from 0 to

Braking Action Correlations*

Braking Action		Estimated Correlations		
			ICAO	
Term	Definition	Runway Surface Condition	Code	Mu
Good	Braking deceleration is normal for the wheel braking effort applied. Directional control is normal.	Water depth of 1/8 in or less Dry snow less than 3/4 in depth Compacted snow with OAT at or below –15° C	5	40 and above
Good to Medium	—		4	39–36
Medium (Fair)	Braking deceleration is noticeably reduced for the wheel braking effort applied. Directional control may be slightly reduced.	Dry snow 3/4 in or greater in depth Sanded snow Sanded ice Compacted snow with OAT above –15° C	3	35 –30
Medium to Poor	—		2	29–26
Poor	Braking deceleration is significantly reduced for the wheel braking effort applied. Potential for hydroplaning exists. Directional control may be significantly reduced.	Wet snow Slush Water depth more than 1/8 in Ice (not melting)	1	25–21
Nil	Braking deceleration is minimal to non-existent for the wheel braking effort applied. Directional control may be uncertain. **Note:** *Taxi, takeoff and landing operations in nil conditions are prohibited.*	Ice (melting) Wet ice	—	20 and below

ICAO = International Civil Aviation Organization; OAT = outside air temperature

*The correlations are estimates, only. Mu values — reported runway friction coefficients — can vary significantly.

Source: Boeing Commercial Airplanes

Table 2

1, with 1 being theoretically equivalent to maximum friction on a dry runway. Although TC has considerable confidence in this system, some contaminants, including slush and loose snow, remain outside the system's capabilities. The Transportation Safety Board of Canada (TSB) forwarded an aviation safety advisory to TC after a runway excursion in 2002.[3] As a result of the recommendations made in the advisory, TC now highlights the limitations of runway surface condition reports and CRFI reports, particularly when ambient temperatures are near freezing.

Contaminated runway operations will always be the exception in the United Kingdom due to our climate, and clearing should be the first option. However, when operating under SNOWTAM code 9 or METAR codes // or 99, crews should be provided with a similar level of safety from the airport operator as would be expected under normal conditions. This is something British crews are likely to receive when operating at airfields with traditionally harsher winters. Unless the regulator changes its policy on when braking action reports can be issued, airport operators are unlikely to invest in new tools to help assess braking action. The easy option is to continue with the status quo and hope last winter was one in a million. However, if it was not and next winter we have a serious runway excursion, who will be accountable?

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Notes

1. Friction measuring devices include continuous friction measuring equipment and spot measuring equipment (decelerometers).
2. U.K. CAA. Flight Operations Division Communication (FODCOM) 19/2006, *Winter Operations*. Oct. 30, 2006.
3. TSB Aviation Investigation Report A02A0038. *Runway Excursion: Air Canada Regional Airlines (Jazz) Fokker F-26 MK-1000, C-FCRK, Saint John, New Brunswick, 27 March 2002.*

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