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Aircraft Design & Operation
Briefing Leaflet

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Bombardier Volcanic Ash Guidance for CRJ series aircraft

The guidance below is taken from the Supplementary Procedures sections of the CRJ Pilot's Operating Handbook (POH) (Vol 2 07-16-1 Rev 57 Apr 05/04 for the CRJ100/200 and Vol 2 07-16-1 Rev 8 Mar 12/04 for the CRJ700/900/1000).

Operation in Volcanic Ash/Dust

1 General

Flight operations in areas of know volcanic activity should be avoided. This consideration is most important during hours of darkness or daytime instrument meteological conditions when volcanic ash/dust clouds may not be visible.
Flight planning considerations should include the review of pertinent NOTAMs, PIREPs and other directives concerning the status of volcanic activity when a flight is planned into areas of possible volcanic activity. When volcanic activity is currently reported, remain well clear of the area, or if possible stay on the upwind side of the volcanic ash.

2 Detection

The aeroplane's weather radar is not capable of detecting volcanic ash/dust clouds and is therefore not reliable under these circumstances. The presence of volcanic ash/dust may be indicated by:

- Smoke or dust appearing in the flight compartment
- An acrid odour similar to electrical smoke
- Multiple engine malfunctions such as power loss, fluctuating RPM, stalls, increasing ITT's flameouts, etc.
- At night, static discharges (also known as St. Elmo's fire or St. Elmo's light) can be observed around the windshield and/or windows, accompanied by a bright orange glow in the engine inlets.

3 Effects

Flight into volcanic ash/dust clouds can result in the degradation of aeroplane and engine performance. The adverse effects of volcanic ash/dust encounter are as follows:

- Rapid erosion and damage to the internal components of the engines
- Ash/dust build up and blockages of the guide vanes and cooling holes, which can cause surge, loss of thrust and or high ITT.
- Ash/dust blockage of the pitot system which can result in erratic airspeed indications.
- The abrasive nature of volcanic material can cause serious damage to the engines, wing and tail leading edge surfaces, windshields, landing lights, etc.
- Volcanic ash/dust can also cause the windshield to become translucent, effectively reducing visibility.

4 Corrective Actions

The best course of action to take is still avoidance. However, if volcanic ash/clouds may sometimes extend for hundreds of miles and an encounter could be unavoidable. As previously stated, volcanic ash/dust can cause engine malfunctions and the need to exit the area as quickly as possible cannot be over emphasised.

If an inadvertent encounter is experienced, the following procedures are recommended:

1 Thrust — Reduce

If altitude permits, engine thrust should be reduced to idle to maximise the engine stall margin and lower the ITT. This action would also reduce the build up of volcanic material on the turbine vanes.

2 Engine and wing anti ice — Activate

This action will increase bleed air extraction from the engines and further improve the engine stall margin.

3 ITT — Monitor

Closely monitor the ITT and ensure that the limits are not exceeded

If the ITT should still increase even though the engine thrust is at idle:

4 Affected engine — Shutdown

If it becomes necessary to shutdown an engine to prevent exceeding ITT limits. Restart engine once it has cooled down. If the engine fails to start, repeated attempts should be made immediately. (Adhere to starter cranking limits as per LIMITATIONS, POWER PLANT – Starter Cranking Limits (Ground and Air)).

Note: A successful start may not be possible until the aeroplane is clear of the volcanic ash/dust, and the airspeed and altitude is within the air start envelope. Take note that engines can be very slow to accelerate to idle at high altitude and this could be interpreted as a failure to start or as an engine malfunction.

After exiting the area of volcanic ash/dust cloud and the engine(s) restarted restore systems to normal operation. Inform ATC of encounter.