Operations within areas of possible presence of volcanic ash

Ed. 25/5/2011 Rev. 2

1. Background

Following Iceland's Eyjafjallajökull volcano eruption occurred in April and May 2010, the European States, after the prudential initial reaction to reduce the risk to an absolute minimum, recognised the need of an harmonised European approach on this matter.

During the volcano's activity, different evaluations and considerations have been outlined by several organisations involved in the Aeronautical community. In this frame:

- EASA has decided to issue the Safety Information Bulletin (SIB) no. 2010-17R4 dated 24 May 2011, containing a set of recommendations to be followed by all the EU member States;
- The ICAO Volcanic Ash European Task Force has revisited the EUR DOC 019 - Volcanic Ash Contingency Plan EUR and NAT Regions (2nd Edition).
- EASA Ex.Dir. letter, 2011 FCO/kle/C.0 2011(D)52569 dated 23 May, indicates that the operators could be allowed to fly in the airspace under the jurisdiction of their State of registry, after having a Safety Risk Assessment accepted by the relevant competent Authority, as per the criteria expressed in ICAO draft DOC "Management of flight operations with known or forecast volcanic cloud contamination" draft version 3.1.

2. Applicability

All turbine engine powered aircraft under ENAC oversight, operating into airspace that is known or suspected to be contaminated by volcanic ash.

All the maintenance organisations under ENAC oversight, charged for inspections of aircraft involved in contaminated area flying operations.

In addition the recommendations included in this document should be followed also by all the foreign aircraft operating into the Italian air space.

3. Description

Flight in Airspace with a low contamination of Volcanic Ash may have medium and long term consequences for the airworthiness of aircraft. It is therefore essential that priority be given to maintain the continuing airworthiness of aircraft in order to support the continuation of safe operations in airspace contaminated with volcanic ash.

Aircraft and Engine TC-Holders are being requested by EASA to develop the instructions necessary for continued safe flight, such as specific pre- and post-flight inspections, and those for continued airworthiness, taking into account the effects of operation of aircraft in airspace with low contamination volcanic ash. Special emphasis is requested for those systems that are most sensitive to any exposure to volcanic ash.

The sensitive systems are known to be, but may not be limited to, engine compressors and turbines, engine oil systems, aircraft pitot and air data systems, aircraft environmental control systems, and those aircraft systems that provide cooling air for computer systems installed on the aircraft.

The Meteorological Office associated to Volcanic Ash Advisory Centres (VAACs, London and Toulouse are competent for the EUR/NAT region) in accordance with international regulations, produce volcanic ash concentration charts that predict and depict areas of contamination with volcanic ash. The charts show forecast ash concentration levels in different altitude bands and in different zones. The zones are defined here below in accordance with the relevant EASA documentation:

Area of Low Contamination (to be displayed in cyan): an airspace of defined dimensions where volcanic ash may be encountered at concentrations greater than $0.2x10^{-3}$ g/m^3 but less than $2x10^{-3}$ g/m^3.

In this zone flight operations are allowed without restrictions, provided the operator follows either the recommendations for flights into airspace with a low contamination of volcanic ash produced by the aircraft and engine manufacturers, or the inspections recommended by ENAC, as detailed in this document.

Area of Medium Contamination (to be displayed in gray): An airspace of defined dimensions where volcanic ash may be encountered at concentrations greater than $2x10^{-3}$ g/m^3, but less than $4x10^{-3}$ g/m^3.

In this zone, flight operations can be authorised by ENAC under certain conditions, and provided they are manageable by the National Air Traffic Management Organisation (or Air Traffic Management Service Provider). Flight in the this zone may be limited by operational and/or technical restrictions.

Area of High Contamination (to be displayed in red): An airspace of defined dimensions where volcanic ash may be encountered at concentrations equal to or greater than $4x10^{-3}$ g/m^3, or areas of contaminated airspace where no ash concentration guidance is available.

4. Recommendations

When operating in airspace or areas that is known or suspected to be contaminated with volcanic ash the following should apply:

- unless specific pre- and post-flight inspections and Instructions for Continued Airworthiness (ICA) have been defined by the aircraft and engine TC holders, and until those instructions have been made available, the operators and owners should accomplish the following visual inspections on a daily basis, performed by a Certifying Staff, to detect any erosion, accumulation of volcanic ash, or aircraft and engine damage and/or system degradation:
  - wing leading edges;
  - navigation and landing lights, radomes;
  - landing gear;
  - horizontal stabiliser;
  - all extruding structure;
  - aircraft painting
  - pitot tubes and static ports;
  - windows and windshields;
  - engine oil filter;
  - engine compressors and turbines;

- engine inlets and nacelles;
- rotor blades.

Based on the results of the above inspections, more detailed inspections may be necessary.

- The above inspections should also be performed after each flight, whenever the following phenomena are observed or detected or experienced during flight:
  - Acrid smell similar to electric smoke;
  - Abnormal engine parameters variations;
  - St. Elmo's fire;
  - Bright white/orange glow appearing at the engine inlets;
  - Dust in the cockpit or cabin;
  - Sudden (unexpected) outside darkness;
  - Airspeed fluctuations;
  - Landings lights casting sharp, distinctly visible beam.

- Aircraft that are parked in areas that may be contaminated by the fall out or settling of volcanic ash, should be protected and covered in accordance with the Aircraft and Engine TC holders advice. Any volcanic residues must be removed prior to operations in accordance with the TC holder's recommendations where available.

In addition to the above mentioned recommendations, Air Operators may be authorised by ENAC to resume flight operations in areas of Medium or High contamination by presenting to ENAC an acceptable safety case.

The safety case should contain, but is not limited to, the following:

(i) An assessment of the risks for flight operations, per aircraft type, in the Area of Medium or High contamination prior to the planned operations (as per the criteria expressed in ICAO draft DOC "Management of flight operations with known or forecast volcanic cloud contamination" draft version 3.1").

(ii) Data from the engine and aircraft TC Holders that support flight operations, per aircraft type, in this zone and, when applicable, the limitations that may apply.

(iii) Engines health trend monitoring carried out in real time where possible and, in any case, before next flight after operations conducted in a Medium or High contamination Area.

In any case flights in the Area of Medium and High Contamination may then be carried out at the operators discretion provided flight into visible ash is avoided.

Air Operators should develop and implement any necessary enhanced operational procedures which should include:

- a briefing to pilots on the concept of flights in the Medium Contamination Area;
- additional fuel as a contingency to allow re-routing once airborne due to the changing environmental conditions, as applicable;
- the selection of en-route and/or destination alternates and/or ETOPS requirements considering special circumstances, and
- consideration to engine-out service ceiling and decompression before overflying areas containing volcanic ash.

Operations in airspace with any contamination of volcanic ash may result in degradation of aircraft and engine components or systems which is higher than normal. Piston engine aircraft and gliders may be less susceptible to volcanic ash.

5. Reporting procedures

The operators should report to the Engine and Aircraft TC holders, the National State of Registry of the aircraft, the National Authority of the State through which flight was conducted, the National State of the Operator and EASA, any encounter with volcanic ash or any other relevant findings. Two types of reports are expected, namely “in-flight reports” and “maintenance reports”:

5.1 In-flight Reports

During the flight these reports are provided as a standard pilot report to the air traffic control centre that is controlling the flight. The local Air Navigation Service Provider (ANSP) will provide the information, together with the current location of the aircraft relative to the nearest reporting point on the airway, the altitude of the flight and the type of encounter (ash cloud, sulphur smell etc.), to the ENAC Crisis Room, filling a Volcanic Ash Irregularity Report Form 1 (see attachment 1).

5.2 Maintenance Reports

In the event that post flight inspection reveals damages or ash build up, a maintenance inspection is required whose result shall be forwarded to ENAC Crisis Room using Volcanic Ash Irregularity Report Form 2 (see attachment 2).

Report	When	What	Who	Reporting
Report Form 1	On occurrence of the irregularity	In-flight observed phenomena as above listed	Pilots to Air Traffic Control Operator (ATCO) on VHF frequency	ATCO fills in Report Form 1 and ANSP sends it to ENAC Crisis Room(1)
Report Form 1	On occurrence of the irregularity	In-flight observed phenomena as above listed	Pilots after landing	Air Operator sends Report Form 1 to ENAC Crisis Room and ENAV-AIR(1)
Report Form 2	Maintenance inspections reveal damages	According to checklist on Report Form 2	Maintenance personnel	Air Operator fills in Report Form 2 and sends it to ENAC Crisis Room(1)

(1) All Report Forms have to be sent also to the other Organisations listed in the above “Reporting Procedures” section.

6. Data Management

All data collected shall be analysed immediately by the Working Group and reported daily to ENAC responsible Management to confirm the objectives of safety analysis that has been developed to allow operation on the areas with possible light contamination of volcanic ash cloud.

Depending on the analysis results, ENAC could review the present situation to ensure safe conditions of operation.

7. Responsibilities

7.1. Aircraft Operator

The Operator is responsible for the safety of its operations, including:

- the development and implementation of an acceptable Safety Case;

- the decision to plan a flight through airspace for which a Volcanic Ash Advisory is in effect, provided that the airspace is not closed;
- the operating procedures which are to be followed by the pilots when encountering volcanic ash conditions. In particular, the airline shall instruct their crews to stay clear of visible clouds and ash contamination. Pilots shall be briefed and made aware that their route is planned through a Contaminated Area. Crews have to report the presence of ash clouds to the ATC;
- the inspections, after completion of the flight in a contaminated area, of aircraft for possible damage or dirt build-up;
- specific maintenance instructions to monitor the continuous airworthiness of aircraft flying in potential contaminated areas.

7.2 ANSP

The ANSP shall support crews that fly through the contaminated area by providing briefing material. Additionally ATIS messages could be used to inform the flight crews of the current limitations to IFR operations. Controllers will inform flights under their control if previous flights have reported the presence of ash or have diverted from their route.
The ANSP is also responsible for NOTAM's reporting the Areas of low, medium and high concentration.

7.3 ENAC

ENAC is responsible for:

- the decision to close or open airspace under its jurisdiction. In case of known or unknown safety threats ENAC may decide to close an airspace or part thereof;
- the acceptance of the Safety Case proposed by the Air Operator;
- the authorization of the Air Operators to resume flight operations in areas of Medium or High contamination.

8. Contacts

ENAC Sala Crisi (Crisis Room):
fax +39-06-44596-538 or salacrisi@enac.gov.it

ENAV-AIR:
air@enav.it or fax +39-06-8166-2473

ICAO Customer Services Unit:
telephone +1 514-954-8022, fax +1 514-954-6769, e-mail sales@icao.int

Attachment 1: format to be used for reporting ash-related in flights events

Volcanic Ash Irregularity Report Form 1

In-flight reports

☐ ATCO _____ Sector:_____

☐ Pilot _____

ACFT details

REG. MARKS	ACFT TYPE
DATE	TIME (UTC)
Position	FL or altitude

Description of irregularity

Remarks

Compiled by_____ Signature _____

Completed form to be sent to:
ENAC - Sala Crisi (Crisis Room), Fax no. +39-06-44596-538, salacrisi@enac.gov.it
This Report has to be sent also to the other Organisations listed in the procedure Operations within areas of possible presence of volcanic ash Ed. 25/5/2011 Rev. 2

Attachment 2 Form for filing results of maintenance inspections

Volcanic Ash Irregularity Report Form 2

Maintenance inspections report

Date	Operator
A/C reg. marks	Landing Time (utc)
Flight no.	

ACFT Inspection

Observed damage or irregularity	Findings (Yes or No) If Yes, details in remarks field
- wing leading edges	
- navigation and landing lights, radomes	
- landing gear	
- horizontal stabiliser	
- all extruding structure	
- aircraft painting	
- pitot tubes and static ports	
- windows and windshields	
- engine oil filter	
- engine compressors and turbines	
- engine inlets and nacelles	
- rotor blades	

Any other observations

Remarks

Compiled by_____ Signature _____

Completed form to be sent to:
ENAC – Sala Crisi (Crisis Room), Fax no. +39-06-44596-538, salacrisi@enac.gov.it
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