Irish Aviation Authority The Times Building 11–12 D'Olier Street Dublin 2, Ireland www.iaa.ie **Safety Regulation Division**	**Údarás Eitlíochta na hÉireann** Foirgneamh na hAmanna 11–12 Sráid D'Olier Baile Átha Cliath 2, Éire **Rannán na Rialachán Sábháilteachta**	No. OAM 01 Revision: 0 Date: 08.08.17	

Title: VOLCANIC ASH - Revised Guidance for Contaminated Airspace

1. INTRODUCTION

The purpose of this advisory memorandum is to inform aircraft operators of updated guidance on the use of airspace predicted to be contaminated by various levels of ash concentration in the event of Volcanic Ash.

2. REFERENCES

The information below concerning operations in Volcanic Ash contaminated airspace is based on:

- EUR Doc 019, **Volcanic Ash Contingency Plan**,
- Commission Regulation (EU) **No: 965/2012**
- ICAO Doc 9974, **Flight Safety and Volcanic Ash**
- EASA **SIB No: 2010-17R7,** 24 June 2015, **Flight in Airspace with Contamination of Volcanic Ash**
- ASD **ASAM. No: 026/10** Issue 6 Date: 9th December 2016 **Guidance regarding ATS Provision in the Vicinity of Volcanic Ash**
- ICAO Doc 9859 **Safety Management Manual**

This OAM replaces OAM 02/11, VOLCANIC ASH – Revised Guidance for Contaminated Airspace and OAM 13/10 - Volcanic Ash – Guidance for the General Aviation Community.

3. International Arrangements for Monitoring Volcanic Ash Activity

In order to ensure the aviation community is expeditiously informed, an initial advisory NOTAM may be promulgated by the IAA advising of the eruption. See the Initial Notification NOTAM Template:

Initial Notification NOTAM Template

A) EISN B) YYMMDDHHMM C) YYMMDDHHMM
E) VOLCANIC ERUPTION IN VOLCANO VOLCANONAME 373030 COORDSCOUNTRY.
BIRD AREAS OF ASH CONTAMINATION ARE PUBLISHED BY SIGMET.
SEE FOLLOWING WEBSITES FOR FURTHER INFORMATION:
HTTP://WWW.IAA.IE/WWW.METOFFICE.GOV.UK/AVIATION/VAAC (USE LOWER CASE)
HTTP://WWW.EUROCONTROL.INT/NETWORK-OPERATIONS (USE LOWER CASE AND SELECT NOP PUBLIC PORTAL) F) SFC G) UNL)

ICAO have established the International Airways Volcano Watch (IAVW) to provide near real-time information on the largest possible number of volcanic events that affect aviation. Volcanic Ash Advisory Centres (VAAC) have been established in London and Toulouse serving the eastern part of the NAT and most of Europe.

VAACs detect the existence and extent of discernible volcanic ash in the atmosphere in their area of responsibility and issue advisory information regarding the extent and forecast movement of the volcanic ash cloud via Volcanic Ash Advisories in alphanumeric (VAA) and graphic (VAG) forms. This information may be supplemented by charts issued by Met Éireann (the Irish Met Office) in conjunction with the Geological Survey of Ireland (GSI) and the IAA.

Information for the use of operators on the extent and levels of ash concentration will be prepared by the appropriate VAAC through the use of VAA/VAG's and published as AIS and MET messages.

ATS providers will also use the VAA/VAG information to plan for the provision of ATFM measures. ATS providers may also solicit special air-reports from operators to ensure the revision of any incorrect information and its dissemination to all concerned.
ICAO have also developed a Volcanic Ash Contingency Plan (EUR DOC 019) for the EUR and NAT Regions which may be considered a key reference document for Irish ANSPs and other aviation stakeholders when dealing with the impact of a volcanic eruption on aviation.

4. Response by an Aircraft Operator to a Volcanic Ash Event

It is the responsibility of the operator to ensure that flights can be carried out safely. Operation through or within any area where volcanic ash is forecast is at the discretion of the aircraft operator and subject to the regulation of the operator by the State of Registry and the State of the Operator.

All aeroplane AOC holders, including helicopter AOC holders, are required to carry out a safety risk assessment prior to planned operations in areas affected by Volcanic Ash:

> "Whereas Danger Areas traditionally were absolutely avoided by aircraft, current safety management practices might allow the operation of (certain) aircraft in accordance with an appropriate Safety Risk Assessment (SRA). Although ATM normally expects aircraft to avoid Danger Areas established in connection to a volcanic ash event, the final decision regarding the route to be flown, whether it will be to avoid or proceed through an area of volcanic ash or activity, is the flight crew's responsibility." EUR Doc 019, 2.4.3.

ICAO Doc 9974 provides detailed guidance, including the implementation of the operator's SMS (Safety Management System) and the development of procedures following a volcanic ash event.

ICAO EUR Doc 019 defines four phases when considering actions to be taken when dealing with an event (pre-eruption, start of eruption, on-going eruption, and recovery) while also recognising actual eruptions may not always conform precisely (e.g. an eruption may occur without any pre-eruptive activity). Initial awareness of an event may lead to the promulgation of an initial SIGMET, VAA/VAG and NOTAM.

4.1. Pre-Eruption Phase

During the pre-eruption phase, operators should gain and maintain awareness of the affected area(s) as well as ensuring that pilots who may be affected by the potential hazard are provided with accurate and up-to-date information.

4.2. Start of Eruption Phase

At the start of an eruption phase AIS NOTAMS, SIGMETS and MET messages will be issued as a warning to pilots. As appropriate, danger areas may be declared. EUR Doc 019 (Ref. Attachment X4) refers to the use of precautionary danger areas over and in proximity to a volcanic eruption (the initial danger area will always be a stationary circle around the volcano). EUR Doc 019 also states "When the respective VAAC or local Met Office issues the first area of forecasted ash, Danger Areas should normally be deactivated."

4.3. Ongoing Eruption Phase

For ongoing eruptions the first complete (i.e. including forecasts) volcanic ash advisory (VAA) will be issued by the responsible VAAC. This will contain information on the extent and expected movement of the volcanic ash cloud.
Note: It may take up to 3 hours after the start of an eruption to issue this first complete VAA/VAG.

The VAA/VAG will be used to prepare appropriate AIS and MET messages for aircraft operators and to plan for the provision of air traffic services.

4.4. Recovery Phase

The recovery phase commences with the issuance of the first VAA/VAG containing the statement "NO VA EXP" (i.e. "no volcanic ash expected"). This normally occurs when it is determined that the volcanic activity has reverted to its non-eruptive state and the airspace is no longer affected by volcanic ash. Appropriate MET and AIS messages will be issued for the advice of aircraft operators.

5. VOLCANIC ASH ENCOUNTER

The presence of volcanic ash may be indicated by some of the following phenomena:

i) An acrid smell within the cockpit/cabin.
ii) The presence of St. Elmo's Fire.
iii) A possible "Orange Glow" at engine nacelles (Turbine engine aircraft).
iv) Unreliable or erratic airspeed indication.
v) Other visual clues such as ash build up on surfaces.

Increased haze may indicate a high concentration of volcanic ash. Below the top of the haze layer, dust concentration levels are usually high and discrimination between normal dust and any volcanic ash will be extremely difficult.

Above any haze tops, variations in the normally good visibility may be apparent. However, in anticyclonic conditions air at medium to upper levels, which may have been affected by a volcanic eruption, is slowly descending. Air from the surface rises with convection during the day and descends very slowly during the night therefore the highest concentration of any volcanic ash may well end up at the top of the anticyclonic haze layer. Climbs and descents through the levels around the haze tops should be flown at the maximum rate possible, as should those through possible high humidity areas if carburettor hot air is to be used.

Deliberate flight in or close to cloud formations should be avoided. Cloud, particularly cumuliform cloud, can form where particles are present in the atmosphere and volcanic ash particles provide an ideal nuclei for the formation of cloud and/or ice.

It may also be prudent to avoid flight over geographic areas where the choice of potential landing area in the event of an engine failure is limited, even in a twin-engine aircraft.

Any airborne encounter with volcanic ash should be reported to Air Traffic Control immediately.

6. POTENTIAL AIRCRAFT DAMAGE:

Should a pilot become aware of any damage occurring to the aircraft during flight, for example blurring of windscreens or erosion on the wing leading edge, then an attempt to vacate the environment either by reversing course or descending (where safe to do so) or both should be carried out.

Engine damage is a particular concern for aircraft fitted with turbine engines. This is probably less so for aircraft fitted with internal combustion engines where the air used for combustion can be filtered, however, in some piston engine aircraft both fixed-wing and rotary-wing, the use of carburettor hot air will bypass the air intake filter and therefore pilots should be aware of the potential of any contaminant in the air to reach the engine cylinders. It is advisable, therefore, to avoid conditions such as cloud, drizzle, mist and any other known areas of high humidity that may require the prolonged use of carburettor hot air.

Potential airframe, propeller, rotor and intake damage depends on volcanic ash impacting surfaces. The extent of any damage depends on the concentration of volcanic ash, the composition of the volcanic ash and the energy of impact, which is proportional to the square of impact speed. Operating airspeeds should therefore be chosen carefully, taking into account the rate at which any possible damage is likely to occur. However, aircraft should not be flown so slowly that they cannot be manoeuvred safely in the event that an emergency occurs.

Volcanic ash may also find its way into pitot/static systems, or affect the lubrication of exposed moving parts such as rotor heads, gearboxes, hinges and other bearings.

7. PRE-FLIGHT AND POST-FLIGHT ACTIONS

Any aircraft that is to be parked in an area that may be contaminated by the fallout or settling of volcanic ash should be suitably protected in accordance with the aircraft Type Certificate Holder's advice and covered where possible.
Clouds, especially cumuliform clouds, may produce precipitation, which may be dirty if volcanic ash is present. Any volcanic ash residue must be removed prior to operations by following the appropriate manufacturer's recommendations.

Even if no volcanic ash damage or contamination is apparent, it is advisable for areas that could be affected to be checked (if necessary by a qualified engineer) on a more frequent basis than is called for in most maintenance schedules. The latest information from the manufacturer for both airframe and engine should specify any particular areas of concern or any additional requirements that need to be observed.

Engine and airframe Type Certificate Holders are continuing to review the effect of volcanic ash deposits their products and may offer further recommendations and/or directives on the subject in the future.

Insurance policies may also contain relevant clauses and in some cases specific exclusions concerning operations being carried out in a volcanic ash environment.

In the absence of any specific information from a manufacturer, there is some generic guidance available in Safety Information Bulletin No. 2010-17R7 which is available from the European Aviation Safety Agency (EASA) website www.easa.eu .

In the event of any volcanic ash being encountered, whether or not damage occurs, it should be reported to the operator and/or to the IAA on an occurrence report form, IAA SOTS FORM 1 available on the IAA website www.iaa.ie . Engineering action will be required prior to subsequent flight. The Aircraft Maintenance

Aircraft manuals should be consulted and advice sought from the aircraft Type Certificate Holder where necessary.

RECOMMENDATION

All Pilots should carefully consider the advice given in this OAM prior to flying in areas where concentrations of volcanic ash may be present.

Should a pilot have any question regarding the content of this memorandum or wish to seek clarification or guidance on volcanic ash encounter they should contact the IAA.