	Aeronautical Services Advisory Memorandum (ASAM) Focal Point: ANSD	ASAM No: 26 Issue10 Date 18.11.2024
Title	**Guidance Regarding ATM/ANS Provision in the Vicinity of Volcanic Ash**	

1. Introduction

1.1 This advisory memorandum provides guidance to Air Traffic Management/Air Navigation Service (ATM/ANS) Service Providers in respect of flights operating in the vicinity of volcanic ash.

2. Purpose

2.1 The purpose of this memorandum is to ensure that ATM/ANS Service Providers, certified by the Irish Competent Authority, are aware of the service provision considerations to be afforded to flights that are operating in the vicinity of airspace which is predicted to be contaminated by Volcanic Ash.

3. Scope

3.1 This advisory memorandum is addressed to responsible managers and air traffic controllers at all ATM/ANS Service Providers within the State and becomes effective from **0000 hrs UTC on 16th November 2021.**

3.2 The ATM/ANS procedures detailed herein apply in the following airspace;

3.2.1 Shannon Flight Information Region/Upper Flight Information Region

3.2.2 All airspaces assigned to Ireland by ICAO or within which the provision of ATS has been delegated to Ireland, including Northern Oceanic Transition Area (NOTA) and Shannon Oceanic Transition Area (SOTA);

Note 1. NOTA / SOTA consist of that portion of the Shanwick Flight Information Region/Oceanic Control Area with lateral and vertical limits specified in the Aeronautical Information Publication – Ireland (ENR 2.2.)

Note 2. The procedures herein apply in that portion of the Shannon FIR/UIR where the provision of ATM/ANS is delegated to UK ATM/ANS Service Providers

4. International Arrangements for Monitoring Volcanic Ash Activity

4.1 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 ICAO NAT Region and most of Europe.

4.2 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}.

4.3 ICAO have also developed a Volcanic Ash Contingency Plan (EUR DOC 019 Edition 2.0.1 June 2021) for the ICAO EUR and NAT Regions which may be considered a key reference document for Irish ATM/ANS Service Providers and other aviation stakeholders when dealing with the impact of a volcanic eruption on aviation.

5. Response to 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. Refer to Appendix 1 of this ASAM with respect to ash concentration levels) 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.

5.1 Pre-Eruption Phase

5.1.1 During the pre-eruption phase, ATM/ANS Service Providers should gain and maintain awareness of the affected area.

5.1.2 ATM/ANS Service Providers should inform pilots who may be affected by the potential hazard and continue to provide normal services {refer to EUR Doc 019 para 3.1.10 for detailed guidance on actions for adjacent ACC/FICs}.

5.2 Start of Eruption Phase

5.2.1 Major activities at the start of eruption phase are the issuance of relevant Aeronautical Information Services (AIS) and Meteorological Services (MET) messages in accordance with ICAO Annexes 15 and 3 respectively, as well as the provision of information and assistance to airborne traffic.

5.2.2 As appropriate, danger areas may be declared. EUR Doc 019 (Ref. Attachment X4) refers to the use of precautionary danger areas over and in the proximity of 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*."

5.2.3 Current practice with respect to air operations involves a Safety Risk Assessment (SRA) based approach:

"*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*."

5.2.4 EUR Doc 019 (para 3.2.10) provides guidance on adjacent Area Control Centre (ACC) / Flight Information Centre (FIC) actions (based on ensuring awareness and maintaining close liaison and co-ordination with the appropriate Air Traffic Flow Management (ATFM) units, aircraft operators and other ACC units).

5.2.5 In order to ensure the aviation community is expeditiously informed, an initial advisory NOTAM may be promulgated advising of the eruption (an example for guidance is included in Appendix 2 of this ASAM).

5.3. Ongoing Eruption Phase

5.3.1 The ongoing eruption phase commences with the issuance of the first complete volcanic ash advisory (VAA), by the responsible VAAC, which contains information on the extent and expected movement of the volcanic ash cloud in accordance with ICAO Annex 3. It should be noted that it may take up to 3 hours after the start of an eruption to issue this first complete VAA/VAG (see Appendix 1 of this ASAM for ash concentration levels).

5.3.2 The VAA/VAG should be used to prepare appropriate AIS and MET messages in accordance with ICAO Annex 15 and Annex 3 provisions respectively, and to plan for the provision of ATM/ANS services, including the application of appropriate ATFM measures.

5.3.3 EUR Doc 019 (section 3.3.3) provides detailed guidance on actions to be taken. ATM/ANS Service Providers should continue to act in accordance

with their contingency procedures. They may be requested to solicit special air-reports if requested by the VAAC.

5.4. Recovery Phase

5.4.1 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.

5.4.2 Appropriate MET and AIS messages should be issued in accordance with Annex 3 and Annex 15 respectively.

5.4.3 ACCs/FICs and ATFM units should revert to normal operations as soon as practical.

6. Overflight and Under flight of Volcanic Ash Clouds

6.1 Overflight and under flight of contaminated airspace is a decision undertaken and evaluated by the aircraft operator in accordance with any conditions set by its State of Registry and State of Operation through the use of the operator's Safety Risk Assessment and standard operating procedures or to avoid the affected area.

7. Communications by ATM/ANS Service Providers

7.1 ACCs, in conjunction with ATFM units, serve as the critical communication link between pilots, dispatchers and meteorologists during a volcanic eruption. Throughout episodes of volcanic ash contamination within the FIR, an ACC has two major communication roles

7.1.1 Based on the information provided in the volcanic ash SIGMETs and VAAs, air traffic controllers should advise the pilot of which flight levels are affected by the ash and the projected trajectory and drift of the contamination.

7.1.2 Through the use of radio communication, ACCs have the capability to coordinate with the pilot alternative routes which would keep the aircraft away from the volcanic ash.

7.2 ATM/ANS service providers should ensure that all relevant extant information is available to air traffic controllers.

8. Air Traffic Control Procedures

This paragraph applies to ATS provision in the Shannon FIR/UIR, NOTA and SOTA:

8.1 Within the various contamination areas, it is the responsibility of the aircraft operator and aircraft commander to determine that it is safe to operate the aircraft in such airspace. It is the aircraft operator's responsibility to comply with any required limitations as imposed by their State of Registry and State of Operation.

8.2 When appropriate, air traffic controllers should remind pilots that volcanic ash may not be detected by ATM/ANS Surveillance systems.

8.3 Pilots operating within an area of contamination may decline an instruction to

climb/descend and/or a vector, if following that instruction would take the aircraft into an area of higher contamination or if following that instruction would be contrary to the aircraft type and engine pairing tolerance level. A pilot may also request to leave an area if the aircraft is unable to sustain flight within the area. air traffic controllers should accommodate any such request as expeditiously as operational safety considerations allow.

8.4 If an air traffic controller has been advised by an aircraft that it has entered an area of ash contamination and indicates that a distress situation exists, the following step should be taken

8.4.1 consider the aircraft to be in an emergency situation;

8.4.2 do not initiate any climb clearances to turbine-powered aircraft until the aircraft has exited the area of ash contamination; and

8.4.3 do not attempt to provide vectors without pilot concurrence.

9. ATM/ANS Service Provider Personnel Competency and Capacity

ATM/ANS Service providers should ensure the following;

9.1 Before an air traffic controller or a flight information service officer assumes responsibility for an operational position, they are appropriately briefed on the potential pilot actions in the event of a significant Volcanic Ash encounter or flight within ash contaminated airspace. Appendix 3 of this ASAM reproduces an extract from ICAO DOC 019 in relation to anticipated pilot issues when encountering volcanic ash.

9.2 Air traffic controller or a flight information service officer workload are managed such that sufficient capacity is maintained at all times to react appropriately to a Volcanic Ash encounter in ash contaminated airspace or provide additional assistance to a pilot if required. This may include the application of flow control or limitations on the number of aircraft in a defined airspace block or sector.

9.3 Interface procedures with adjacent Air Traffic Services (ATS) sectors/units/control centres appropriately cater for aircraft that are likely to operate on non-standard routes and/or levels; and

9.4 Adequate resources are available to accommodate planned aircraft movements, including an unexpected emergency/diversion incident.

9.5 Air traffic controllers and flight information service officers are aware that should an aircraft unexpectedly encounter a significant concentration of Volcanic Ash, the pilot may, possibly without first advising ATC:

9.5.1 Execute a descending 180-degree turn;

9.5.2 Reduce engine power;

9.5.3 Disconnect auto-throttle.

9.6 ATM/ANS provision in areas of volcanic ash is considered to be an unusual circumstance and is therefore to be included in unit and continuation training.

10. Occurrence Reporting

10.1 ATM/ANS Service Providers shall ensure the reporting, through their Occurrence Reporting Schemes, of any encounters with, or experience of, volcanic ash reported by pilots.

11. European Standardised Rules of the Air – Specific Provisions Related to Reporting and Volcanic Ash

Post-flight reporting of volcanic activity

11.1 On arrival of a flight at an aerodrome, a completed report of volcanic activity shall be delivered by the aircraft operator or a flight crew member, without delay, to the aerodrome meteorological office, or if such office is not easily accessible to arriving flight crew members, the completed form shall be dealt with in accordance with local arrangements agreed upon between MET and ATS providers and the aircraft operator.

11.2 The completed report of volcanic activity received by an aerodrome meteorological office shall be transmitted without delay to the meteorological watch office responsible for the provision of meteorological watch for the flight information region in which the volcanic activity was observed.

References

- ICAO Doc 9691 AN/954 Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds
- ICAO Volcanic Ash Contingency Plan EUR and NAT Regions (EUR Doc 019).
- EASA Safety Information Bulletin No: 2010-17R7 Flight in Airspace with Contamination of Volcanic Ash
- Regulation (EU) 923/2012 Standardised European Rules of the Air

Appendix 1

Ash Contamination Levels

Contamination levels

As noted in EUR Doc 019 Volcanic Ash Concentration Charts are provided to predict the location of ash for three ash contamination levels (LOW; MEDIUM; HIGH) as follows;

'Low Contamination': Volcanic ash mass concentration may be encountered at concentrations greater than 0,2 x 10^{-3} gr/m^3 , but less than or equal to 2 x 10^{-3} gr/m^3

'Medium Contamination': Volcanic ash mass concentration may be encountered at concentrations greater than 2 x 10^{-3} gr/m^3, but less than 4 x 10^{-3} gr/m^3.

'High contamination': Volcanic ash mass concentration may be encountered at concentrations equal to or greater than 4 x 10^{-3} gr/m^3.

Areas of ash contamination will be displayed on the Volcanic Ash Charts (VAC) produced by the UK Met Office and available on the Eurocontrol website NOP portal. The colours used on the Ash Concentration Charts are:

- Cyan (Blue) = Low contamination
- Grey = Medium contamination
- Red = High contamination

Notes:

- *A three-dimensional volume of airspace should be understood where the word 'area' is used to depict areas shown on published Volcanic Ash Concentration Charts.*
- *All modelled ash concentrations are subject to a level of uncertainty.*
- *An example ash concentration chart is included in EUR Doc 019.*

Appendix 2:

Initial Notification NOTAM Template

A) EISN B) YYMMDDHHMM C) YYMMDDHHMM
E) VOLCANIC ERUPTION IN VOLCANO VOLCANONAME 373030
COORDS COUNTRY. AREAS OF ASH CONTAMINATION ARE PUBLISHED BY SIGMET.
SEE FOLLOWING WEBSITES FOR FURTHER INFORMATION:
HTTPS://WWW.METOFFICE.GOV.UK/SERVICES/TRANSPORT/AVIATION/REGULATED/INTERNATIONAL-AVIATION/VAAC/INDEX (USE LOWER CASE)
HTTPS://WWW.PUBLIC.NM.EUROCONTROL.INT/PUBPORTAL/
(USE LOWER CASE)
F) SFC G) UNL)

Appendix 3

Extract from ICAO Doc 019 Appendix 1 'Anticipated Pilot Issues When Encountering Volcanic Ash'

Air traffic controllers and flight information service officers should be aware that flight crews may be immediately dealing with some or all of the following issues when they encounter volcanic ash:

a) smoke, fumes or dust appearing in the cockpit which may prompt the flight crew to don oxygen masks (this interferes with the clarity of voice communications).

b) multiple engine malfunctions, such as stalls, overtemperature (EGT), and thrust loss or complete failure of one or more engines. Engines may have to be shut down and restarted.

c) because of the abrasive effects of volcanic ash on windshields and landing lights, visibility for approach and landing may be markedly reduced or even be lost completely.

d) should pitot tubes become blocked, airspeed indications may become unreliable. The pilots will probably disconnect the autopilot, set engine thrust to an appropriate value and maintain the aircraft's pitch attitude manually. This will keep the aircraft at a safe speed but will probably result in difficulty maintaining the assigned altitude. Increased separation is required (above and below).

e) ATS personnel should be aware that a volcanic ash encounter may create extreme workload for pilots.