

VOLCANIC ACTIVITIES

OPERATIONAL GUIDELINES

FOR

AIR TRAFFIC CONTROL CENTRES

TABLE OF CONTENTS

Page

1. ACTION TO BE TAKEN BY OAC/ACC's IN THE EVENT OF A VOLCANO ERUPTION	1
2. ACTION TO BE TAKEN BY THE MWO's IN THE EVENT OF VOLCANIC ERUPTION	1
3. ACTION TO BE TAKEN BY VAACs IN THE EVENT OF A VOLCANIC ERUPTION	2
4. VOLCANIC ACTIVITY, GUIDANCE MATERIAL FOR SHIFT MANAGERS AND SUPERVISORS.....	3
 APPENDIX A – ASHTAM Format and the Guidance for the completion of the ASHTAM Format	A-1
General	A-3
Abbreviated heading	A-3
Content of ASHTAM	A-4
 APPENDIX B – List of operational contact points for Volcanic Ash Advisory Centres.....	B-1

FOREWORD

Volcanic ash clouds are a serious hazard to aircraft. Because the North Atlantic Region includes areas of volcanic activity, the NAT SPG has developed standardised guidelines for alerting aircraft and ATC facilities when eruptions occur.

1. ACTION TO BE TAKEN BY OAC/ACC'S IN THE EVENT OF A VOLCANO ERUPTION

1.1 In the event of significant pre-eruption volcanic activity, a volcanic eruption occurring or a volcanic ash cloud being reported in areas which could affect ATS-routes used by domestic and international flights, Area Control Centres/Oceanic Area Controls (ACC/OAC), on receiving information of the occurrence, will take the following action:

- a) pass this information immediately to aircraft in flight which could be affected by the volcanic ash cloud and advise Area Control Centres (ACCs) in relevant adjacent Flight Information Regions (FIRs). Issue a NOTAM/ASHTAM in accordance with Annex 15, Chapter 5 giving full details of the pre-eruption activity, volcanic eruption and ash cloud, including the name and geographical co-ordinates of the volcano, the date and time of the eruption, the flight levels and routes which could be affected, the relevant ASHTAM colour code and, as necessary, routes temporarily closed to air traffic. The ACC/OAC's will include in the address list for NOTAMs/ASHTAMs concerning volcanic activity the associated Meteorological Watch Office (MWO), adjacent and relevant Volcanic Ash Advisory Centre (VAACs), the London World Area Forecast Centre (WAFC), the Washington WAFC, and Regional Area Forecast Centres (RAFCs) responsible for the issuance of significant weather (SIGWX) forecasts for the Flight Information/Control Area (FIR/CTA);
- b) activate ICAO Doc 7030 contingency arrangements including the implementation of alternative routes bypassing the area likely to be affected by the volcanic ash cloud, in co-ordination with ACCs and Flight Information Centres (FICs) responsible for adjacent FIRs;
- c) advise the MWO and associate VAAC of the volcanic eruption and/or the existence of volcanic ash cloud, and maintain continuous co-ordination with the MWO to ensure consistency in the issuance and content of NOTAMs/ASHTAMs and SIGMETs; and
- d) in co-operation with the WMO, cancel NOTAM/ASHTAM as soon as it is considered that the volcano has reverted to its normal state and the airspace is not contaminated by volcanic ash. Due consideration should be given to information derived from current reports.

2. ACTION TO BE TAKEN BY THE MWO'S IN THE EVENT OF VOLCANIC ERUPTION

2.1 On receipt of information of a volcanic eruption and/or the existence of a volcanic ash cloud from an ACC/OAC's, the MWO will take the following steps:

- a) notify the VAAC designated to provide advice on volcanic ash trajectories for the FIR format for which the ACC/OAC is responsible that a volcanic eruption and/or ash cloud has been reported, provide available relevant details and request advisory information on extent and trajectory of volcanic ash;
- b) as soon as practicable, advise the ACC/OAC whether or not the volcanic ash cloud is identifiable from satellite images/data and, if possible, provide regular information based on advice received from the VAAC on the horizontal and vertical extent of the cloud and the trajectory of the cloud; and

- c) issue a SIGMET message for volcanic ash for a validity period of 6 hours, to which is appended an "outlook" providing information for up to 12 hours beyond the initial 6-hour validity period concerning the trajectory of the ash cloud based on the advisory information provided by the VAAC concerned. Include in the SIGMET address all VAACs, the London WAFC, the Vienna international Operational Meteorological (OPMET) data bank and RAFCs responsible for the issuance of SIGWX forecasts for the FIR/CTA. Maintain continuous co-ordination with the ACC/OAC's to ensure consistency in the issuance and content of SIGMETs and NOTAMs.

2.2 In the event that the MWO becomes aware of the occurrence of pre-eruption activity, a volcanic eruption or ash cloud from any source other than the ACC/OAC's, the information will be passed immediately to the ACC/OAC's. The procedure in 2.1 above will thenceforth be followed.

2.3 In the event that any meteorological office becomes aware of the occurrence of pre-eruption activity, a volcanic eruption or ash cloud from any source, the information will be passed immediately to the MWO for onward transmission to the ACC/OAC's and appropriate VAAC.

3. ACTION TO BE TAKEN BY VAACS IN THE EVENT OF A VOLCANIC ERUPTION

3.1 On receipt of information from the MWO, or any other source of significant pre-eruptive activity, that a volcanic eruption has been reported, and/or a volcanic ash cloud observed in the FIR/CTA for which the MWO is responsible, the VAAC should:

- a) initiate the volcanic ash computer trajectory/dispersion model in order to provide advisory information on volcanic ash trajectory for MWOs, ACCs and airlines concerned;
- b) review satellite images/data and any available pilot reports of the area for the time of the event to ascertain whether a volcanic ash cloud is identifiable and, if so, its extent;
- c) prepare and issue advisory on the extent, and forecast trajectory, of the volcanic ash cloud in message and/or graphical format for transmission to the MWOs, ACCs and airlines concerned in the VAAC area of responsibility, to the London WAFC, to the Vienna international OPMET data bank to other VAACs and to RAFCs responsible for the issuance of SIGWX forecasts for the area concerned;
- d) monitor subsequent satellite information to assist in tracking the movement of volcanic ash cloud;
- e) continue to issue advisory information to MWOs, ACCs and airlines concerned at least at 6-hour intervals, and preferably more frequently, until such time as it is considered that the volcanic ash cloud is no longer identifiable from satellite data, no further reports of volcanic ash are received from the area, and no further eruptions of the volcano are reported;
- f) maintain regular contact with other VAACs, as necessary, and the Smithsonian Institute Global Volcanism Network, in order to keep up to date on the activity status of volcanoes in the VAAC area of responsibility.

4. VOLCANIC ACTIVITY, GUIDANCE MATERIAL FOR SHIFT MANAGERS AND SUPERVISORS

4.1 If it is likely that an eruption is to be expected or is starting or has started or that an Ash cloud has been reported in an area that can affect air traffic the ACC (Shift manager/supervisor) shall immediately:

- a) Ensure that this is reported to all aircraft that will be affected. Notify adjacent ACC's, and if the information has been reported by the VAAC and/or an aircraft then also to the appropriate meteorological office.
- b) Issue a NOTAM or ASHTAM. Give as precise information as available regarding the activity of the volcano, if there is an eruption and an ash cloud or precursory information indicating the imminent possibility of an eruption. The name, position, date and time when the eruption started, Altitudes and routes affected by the eruption. This NOTAM/ASHTAM shall be transmitted to the meteorological office and to EGRYMYX. Although very limited information is available, available information shall be transmitted, and additional information transmitted as it becomes available.

4.2 NOTAM/ASHTAM regarding increased volcanic activity which could give indication about imminent eruption shall include the following:

"INCREASED VOLCANIC ACTIVITY REPORTED FOR VOLCANO (NAME AND LAT/LONG) AIRCRAFT ADVISED TO EXERCISE CAUTION UNTIL FURTHER NOTICE AND MAINTAIN WATCH FOR NOTAM/SIGMET/ASHTAM FOR AREA"

or if an eruption has already started;

"VOLCANO (NAME AND LAT/LONG) ERUPTED (DATE/TIME UTC) BUT NO ASH CLOUD REPORTED, AIRCRAFT ADVISED TO AVOID FLYING WITHIN 60 NM OF THE VOLCANO UNTIL FURTHER NOTICE, MAINTAIN WATCH FOR NOTAM/SIGMET/ASHTAM / FOR AREA"

or

"VOLCANO (NAME AND LAT/LONG) ERUPTED (DATE/TIME UTC) ASH CLOUD REPORTED AT/ABOVE FLxxx(EXPECTED TO RISE TO/ABOVE FLxxx), AIRCRAFT ADVISED TO AVOID FLYING WITHIN xxxNM OF THE VOLCANO OR DISTRIBUTION OF ASH CLOUD (LAT/LONG) UNTIL FURTHER NOTICE, MAINTAIN WATCH FOR NOTAM/ASHTAM AND/OR SIGMET FOR AREA"

- a) The VAAC will issue a forecast for the distribution of the ash cloud.
- b) Each flight when notified, will have to decide on the separation it requires from the forecasted edge of the ash cloud.
- c) ACC shall notify the meteorological office about all changes in the activity of the volcano reported by aircraft.
- d) Issue a NOTAM or ASHTAM as soon as the volcanic activity has ceased to exist and the airspace is no longer contaminated by ashReference document, ICAO AN 10/18-97/83. This document contains guidance material, E-mail addresses, telephone and fax numbers of relevant agencies.

4.3 It is impossible to determine specific ATC procedures for all possible scenarios involving volcanoes and ash clouds. However the following general guidelines should be considered:

- a) Once an ash cloud has been reported, ATC facilities will attempt to establish a protected area of 60 Nautical Miles from the perimeter of the cloud. Aircraft will not be cleared to operate inside this area. Obviously, the location of the cloud will change both geographically and vertically and ATC will adjust the buffer as updated information becomes available.
- b) Aircraft should immediately advise ATC via PIREP with any information concerning the position of an ash cloud.
- c) If a pilot is concerned that the proximity of an ash cloud presents a hazard to the flight, he/she should immediately request a revised routing which clears the known edge of the cloud by at least 60NM.
- d) ATC will consider the height of the cloud when establishing routes. Therefore, depending on altitude, some aircraft may be rerouted while others may not. However, consideration will be given to the potential hazard involved in clearing aircraft above ash clouds. ETOPS aircraft may be particularly concerned with flying over an ash cloud.
- e) Track systems established after an eruption has occurred will be planned, to the extent possible, with the known and projected position of the ash cloud considered. If an eruption occurs after a daily track system has been established, ATC will attempt to modify the system if feasible.
- f) Standard contingency procedures should be used for turn-backs if they are required.

APPENDIX A

ASHTAM FORMAT

AND

THE GUIDANCE FOR THE

COMPLETION OF THE ASHTAM FORMAT

ASHTAM FORMAT

(COM heading)	(PRIORITY INDICATOR)	(ADDRESSEE INDICATOR(S) ¹											
	(DATE AND TIME OF FILING)				(ORIGINATOR'S INDICATOR)								
(Abbreviated heading)	(VA ^{*2} SERIAL NUMBER)				(LOCATION INDICATOR)		DATE/TIME OF ISSUANCE				(OPTIONAL GROUP)		
	V	A	* ²	* ²									

ASHTAM	(SERIAL NUMBER)
(FLIGHT INFORMATION REGION AFFECTED)	A)
(DATE/TIME (UTC) OF ERUPTION)	B)
(VOLCANO NAME AND NUMBER)	C)
(VOLCANO LATITUDE/LONGITUDE OR VOLCANO RADIAL AND DISTANCE FROM NAVAID)	D)
(VOLCANO LEVEL OF ALERT COLOUR CODE, INCLUDING ANY PRIOR LEVEL OF ALERT COLOUR CODE) ³	E)
(EXISTENCE AND HORIZONTAL/VERTICAL EXTENT OF VOLCANIC ASH CLOUD) ⁴	F)
(DIRECTION OF MOVEMENT OF ASH CLOUD) ⁴	G)
(AIR ROUTES OR PORTIONS OF AIR ROUTES AND FIGHT LEVELS AFFECTED)	H)
(CLOSURE OF AIRSPACE AND/OR AIR ROUTES OR PORTIONS OF AIR ROUTES, AND ALTERNATIVE AIR ROUTES AVAILABLE)	I)
(SOURCE OF INFORMATION)	J)
(PLAIN LANGUAGE REMARKS)	K)
<p>NOTES:</p> <p>1. See also Appendix 5 regarding addressee indicators used in predetermined distribution systems.</p> <p>2. *Enter ICAO nationality letter as given in ICAO Doc 7910, Part 2.</p> <p>3. See paragraph 3.5 below.</p> <p>4. Advice on the existence, extent and movement of volcanic ash cloud G) and H) may be obtained from the Volcanic Ash Advisory Centre(s) responsible for the FIR concerned.</p> <p>5. Item titles in brackets () not to be transmitted.</p>	

SIGNATURE OF ORIGINATOR (not for transmission)

GUIDANCE FOR THE COMPLETION OF THE ASHTAM FORMAT

1. *General*

1.1 The ASHTAM provides information on the status of activity of a volcano when a change in its activity is, or is expected to be of operational significance. This information is provided using the volcano level of alert colour code given in 3.5 below.

1.2 In the event of a volcanic eruption producing ash cloud of operational significance, the ASHTAM also provides information on the location, extent and movement of the ash cloud and the air routes and flight levels affected.

1.3 Issuance of an ASHTAM giving information on a volcanic eruption, in accordance with section 3 below, should **not** be delayed until complete information A) to K) is available but should be issued immediately following receipt of notification that an eruption has occurred or is expected to occur, or a change in the status of activity of a volcano of operational significance has occurred or is expected to occur, or an ash cloud is reported. In the case of an expected eruption, and hence no ash cloud evident at that time, items A) to E) should be completed and items F) to I) indicated as “not applicable”. Similarly, if a volcanic ash cloud is reported e.g. by special air-report, but the source volcano is not known at that time, the ASHTAM should be issued initially with items A) to E) indicated as “unknown”, and items F) to K) completed, as necessary, based on the special air-report, pending receipt of further information. In other circumstances, if information for a specific field A) to K) is not available indicate “NIL”.

1.4 The maximum period of validity of ASHTAM is 24 hours. New ASHTAM must be issued whenever there is a change in the level of alert.

2. *Abbreviated heading*

2.1 Following the usual AFTN communications header, the abbreviated heading “TT AAiiii CCCC MMYGGg (BBB)” is included to facilitate the automatic processing of ASHTAM messages in computer data banks. The explanation of these symbols is:

TT = data designator for ASHTAM = VA;

AA = geographical designator for States e.g. NZ = New Zealand (see *Location Indicators* (Doc 7910), Part 2, Index to Nationality Letters for Location Indicators);

iiii = ASHTAM serial number in a four-figure group;

CCCC = four-letter location indicator of the flight information region concerned (see *Location Indicators* (Doc 7910), Part 5, addresses of centres in charge of FIR/UIR);

MMYYGGg = date/time of report, whereby:

MM = month e.g. January = 01, December = 12

YY = day of the month

GGg = time in hours (GG) and minutes (gg) UTC;

(BBB) = Optional group for correction to an ASHTAM message previously disseminated with the same serial number = COR.

Note.— Brackets in (BBB) are used to indicate that this group is optional.

Example: Abbreviated heading of ASHTAM for Auckland Oceanic FIR, report on 7 November at 0620 UTC:

VANZ0001 NZZO 11070620

3. *Content of ASHTAM*

- **Item A -** Flight information region affected, plain language equivalent of the location indicator given in the abbreviated heading, in this example “Auckland Oceanic FIR”.
- **Item B -** Date and time (UTC) of first eruption.
- **Item C -** Name of volcano, and number of volcano as listed in the ICAO Manual on Volcanic Ash, Radioactive Material and Toxic Chemical “Clouds” (Doc 9691*), Appendix H, and on the World Map of Volcanoes and Principal Aeronautical Features.
- **Item D -** Latitude/Longitude of the volcano in whole degrees or radial and distance of volcano from NAVAID (as listed in the ICAO Manual on Volcanic Ash, Radioactive Material and Toxic Chemical “Clouds” (Doc 9691*), Appendix H, and on the World Map of Volcanoes and Principal Aeronautical Features).
*In preparation.
- **Item E -** Colour code for level of alert indicating volcanic activity, including any previous level of alert colour code as follows:

Level of alert colour code	Status of activity of volcano
RED ALERT	Volcanic eruption in progress. Ash plume/cloud reported above FL 250. <i>Or</i> Volcano dangerous, eruption likely, with ash plume/cloud expected to rise above FL 250.
ORANGE ALERT	Volcanic eruption in progress but ash plume/cloud not reaching nor expected to reach FL 250. <i>Or</i> Volcano dangerous, eruption likely but ash plume/cloud not expected to reach FL 250.
YELLOW	Volcano known to be active from time to time and volcanic activity has

Level of alert colour code	Status of activity of volcano
ALERT	recently increased significantly, volcano not currently considered dangerous but caution should be exercised.
	<i>Or</i>
	(After an eruption, i.e. change in alert to yellow from red or orange.) Volcanic activity has decreased significantly, volcano not currently considered dangerous but caution should be exercised.
GREEN ALERT	Volcanic activity considered to have ceased and volcano reverted to its normal state.
<p><i>Note.— The colour code for the level of alert indicating the status of activity of the volcano and any change from a previous status of activity should be provided to the area control centre by the responsible vulcanological agency in the State concerned, e.g. “RED ALERT FOLLOWING YELLOW” OR “GREEN ALERT FOLLOWING ORANGE”.</i></p>	

- **Item F -** If volcanic ash cloud of operational significance is reported, indicate the horizontal extent and base/top of the ash cloud using latitude/longitude (in whole degrees) and altitudes in thousands of metres (feet) and/or radial and distance from source volcano. Information initially may be based only on special air-report, but subsequent information may be more detailed based on advice from the responsible meteorological watch office and/or volcanic ash advisory centre.
- **Item G -** Indicate forecast direction of movement of the ash cloud at selected levels based on advice from the responsible meteorological watch office and/or volcanic ash advisory centre.
- **Item H -** Indicate air routes and portions of air routes and flight levels affected, or expected to become affected.
- **Item I -** Indicate closure of airspace, air routes or portions of air routes, and availability of alternative routes.
- **Item J -** Source of the information e.g. “special air-report” or “vulcanological agency” etc. The source of information should always be indicated, whether an eruption has actually occurred or ash cloud reported, or not.
- **Item K -** Include in plain language any operationally significant information additional to foregoing.

APPENDIX B**LIST OF OPERATIONAL CONTACT POINTS FOR
VOLCANIC ASH ADVISORY CENTRES**

Anchorage VAAC -	Tel:	00 1 907 266 5109/5110
	Fax:	00 1 907 266 5188
	E-mail*:	elliott.barske@noaa.gov
London VAAC -	Tel:	00 44 1344 85 6264
	Fax:	00 44 1344 85 4412/4919
	AFTN:	EGRRYMYX
	E-mail:	vaac@meto.gov.uk
Montreal VAAC -	Tel:	00 1 514 421 4635
	Fax:	00 1 514 421 4639
	AFTN:	CWAOYMYU
	E-mail:	cmcops@ec.gc.ca
Toulouse VAAC -	Tel:	00 33 5 61 07 82 20
	Fax:	00 33 5 61 07 82 32
	E-mail:	aero_exp@meteo.fr
Washington VAAC-	Tel:	00 1 301 763 8444
	Fax:	00 1 301 763 8333

*E-mail addresses are provided as back-up. Telephone/fax should always be used first.