



AIR NAVIGATION SERVICES IMPLEMENTATION PLAN – 1 VOLUME III

VOLCANIC ASH CLOUD CONTINGENCY

CIVIL AVIATION AUTHORITY OF MALAYSIA

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Introduction

This Volcanic Ash Cloud (VAC) Contingency is one of a series of Air Navigation Services Implementation Plan (ANSIP) issued by the Air Navigation Services Divisions (ANSI). It contributes to the national contingency planning for Malaysia in alignment with the provisions of Annex 11 / Civil Aviation Authority Malaysia (CAAM) Civil Aviation Directives (CAD) 11 to the Convention on Civil Aviation, International Civil Aviation Organisation (ICAO) DOC 9426 Air Traffic Service (ATS) Planning Manual and DOC 9673 Asia and Pacific Regions Air Navigation Plan, and the Asia/Pacific Region Air Traffic Management (ATM) Contingency Plan.

This VAC Contingency (herewith designated as ANSIP 1 Volume III - VAC or simply VAC Plan) has been developed in close cooperation and collaboration with Meteorological Department Malaysia (MET Malaysia) for Kuala Lumpur (KL) Flight Information Region (FIR), Kota Kinabalu (KK) FIR and/or airspace where ATS is provided by Malaysia (see ENR 2.1). This VAC Plan provides the ATS procedures that will allow domestic and/or overflight international flight operations within the jurisdiction of the KL FIR, KK FIR and/or airspace where ATS is provided by Malaysia (see ENR 2.1).



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Chief Executive Officer
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1 General

1.1 Objective

- 1.1.1 This VAC Plan on the occurrence VAC sets out standardised guidelines and procedures for the provision of information to operators and en-route aircraft before, during, and after the volcanic eruption in adjacent FIRs.
- 1.1.2 In the case of VAC, the hazard to jet transport aircraft is greatest within the first few hours following an eruption; hence speed of notification between all links in the chain of communication is critical. During an eruption, volcanic contamination can reach and exceed the cruising altitudes of turbine-powered aircraft within minutes and spread over vast geographical areas within a few days.
- 1.1.3 Malaysia has no volcanic activities, however, the eruption of volcano from neighbouring states particularly in Sulawesi, Indonesia within Jakarta FIR may cause the movement of volcanic ash clouds into KK FIR.
- 1.1.4 This VAC Plan relates to area control service (i.e. air traffic control service for controlled flights in control areas) to cater domestic and overflight flight operations within the jurisdiction of the KL and/or KK FIR.
- 1.1.5 This VAC Plan provides the ATS procedures that will provide expeditious dissemination of VAC movement information and advisory information to aircraft operators to operate within KL FIR, KK FIR and/or airspace where ATS is provide by Malaysia.

1.2 Terminology

- 1.2.1 Areas of Contamination
 - 1.2.1.1 Information on areas of observed and/or forecast volcanic ash in the atmosphere is provided by means of appropriate MET messages in accordance with CAD 3 - Meteorological Service for International Air Navigation.
- 1.2.2 Danger Areas
 - 1.2.2.1 If it is considered that the volcanic event could pose a hazard to aviation, a danger area may be declared through NOTAM by the originating Area Control Centre (ACC); however, this option should only be applied over and in the proximity of the volcanic source. Normally, clearances will not be issued through the danger area unless explicitly requested by the flight crew. In this context, it should be noted that the final responsibility for aircraft safety rests with the flight crew. Therefore, the final decision regarding route, whether it will be to avoid or proceed through an area of volcanic activity, is the flight crew's responsibility.

- 1.2.2.2 Although it is the prerogative of CAAM to promulgate a danger area in airspace over the high seas, it should be recognized that restrictions to the freedom of flight cannot be imposed in accordance with the United Nations Convention on the Law of the Sea (Montego Bay 1982).
- 1.2.3 Phases of an Event
- 1.2.3.1 The response to a volcanic event that affects air traffic has been divided into four distinct phases in this document:
- a) Pre-Eruption Phase: a volcanic eruption is expected;
 - b) Start of Eruption Phase: commences with the outbreak of the volcanic eruption and entrance of volcanic ash into atmosphere;
 - c) On-Going Eruption Phase: commences with the issuance of the first volcanic ash advisory (VAA) containing information on the extent and movement of the volcanic ash cloud; and
 - d) Recovery Phase: commences with the issuance of the first VAA containing a statement that no volcanic ash expected.
- 1.2.3.2 Since there is no active volcano in Malaysia, distinct phases that are applicable in KL FIR and KK FIR are On-going Eruption Phase and Recovery Phase.
- 1.2.3.3 Flight crews are required to report observations of volcanic activity by means of a special air-report (Special AIREP). Arrangements should be put in place to ensure that such information is transferred without delay to KL ACC, KK ACC and/or KCH ACC for subsequent action. The communication and dissemination of pilot reports on volcanic activity are described in CAD 3 - Meteorological Service for International Air Navigation.
- 1.2.3.4 Aircraft operators are required by ICAO Annex 6 - Operation of Aircraft to implement appropriate mitigation measures for volcanic ash in accordance with their safety management system (SMS), as approved by the State of the Operator/Registry. Detailed guidance on Safety Risk Assessments (SRAs) for flight operations with regard to volcanic ash contamination can be found in the manual on Flight Safety and Volcanic Ash - Risk Management of Flight Operations with Known or Forecast Volcanic Ash Contamination (ICAO DOC 9974).

1.3 Definition of Terms

Air Traffic Controller or simply Controller is variously used to mean all Air Traffic Control Officers, Assistant Air Traffic Control Officers and Trainee Air Traffic Controllers.

ASHTAM is a specialized series of NOTAMs designed to inform aircraft operators of significant changes in volcanic activity, including eruptions and volcanic ash clouds, through a specific format.

SIGMET (Significant Meteorological Information) is a weather advisory issued by meteorological authorities to provide critical information about significant weather phenomena that could affect aviation safety. It typically includes details about severe turbulence, thunderstorms, volcanic ash, and other hazardous conditions over a specified area. SIGMETs are essential for pilots and air traffic control to ensure safe flight operations.

1.4 Acronyms and Abbreviations

ACC	= Area Control Centre
ACG	= ATM Contingency Group
AIREP	= Air Report
AIS	= Aeronautical Information Service
ANSD	= Air Navigation Services Division
ANSDP	= Air Navigation Services Division Publication
ATC	= Air Traffic Control
ATCC	= Air Traffic Control Centre
ATM	= Air Traffic Management
ATS	= Air Traffic Services
CAAM	= Civil Aviation Authority Malaysia
CAD	= Civil Aviation Directives
FIR	= Flight Information Region
ICAO	= International Civil Aviation Organisation
KCH	= Kuching
KK	= Kota Kinabalu
KL	= Kuala Lumpur
MET	= Meteorology
NOTAM	= Notice to Air Men
VAA	= Volcanic Ash Advisory
VAC	= Volcanic Ash Cloud
VAG	= Volcanic Ash Graphics

2 Phases of Event

2.1 On-Going Eruption Phase

2.1.1 The on-going eruption phase commences with the issuance of the first by Volcanic Ash Advisory Centre (VAAC) Darwin which contains information on the extent and movement of the volcanic ash cloud in accordance with CAD 3 and Annex 3 provisions.

Note. - Volcanic ash advisory information in graphical format, Volcanic Ash Graphics (VAG) may also be issued by the VAAC, containing the same information as its text-based VAA equivalent.

2.1.2 The VAAs and VAGs should be used by affected ACCs to:

- a) Prepare appropriate Aeronautical Information Service (AIS) and MET messages in accordance with CAD 15 and CAD 3 provisions respectively; and
- b) Plan and apply appropriate ATM measures.

2.1.3 During the on-going eruption phase, KL ACC, KK ACC and/or KCH ACC should carry out the following measures but it should not be considered mandatory or exhaustive:

- a) Appropriate ACC should ensure that appropriate AIS messages are originated in accordance with CAD 15. Related ACCs should continue to publish details on measures taken to ensure dissemination to all concerned;
- b) Appropriate ATCC should be aware that for the purposes of flight planning, operators could treat the horizontal and vertical extent of the volcanic ash contaminated area to be over-flown as if it were mountainous terrain; and
- c) Any reported differences between published information and observations (pilot reports, airborne measurements, etc.) should be forwarded as soon as possible to MET Malaysia via ATM Contingency Group (ACG).

2.2 Recovery Phase

2.2.1 The recovery phase commences with the issuance of the first VAA/VAG containing a statement that “NO VA EXP” (i.e. “no volcanic ash expected”) — which normally occurs when it is determined that the volcanic activity has reverted to its pre-eruption state and the airspace is no longer affected by volcanic ash contamination. Consequently, appropriate AIS messages should be issued in accordance with CAD 15.

2.2.2 The FIR that has been affected should revert to normal operations as soon as practicable.

3 Procedures

3.1 Actions to be taken by ATS units

3.1.1 General procedures for ATS units when a volcanic ash cloud is reported, or forecast can be found in CAD1101 - Air Traffic Management (Paragraph 15.8 Procedures for ATS units when a volcanic ash cloud is reported or forecast).

3.1.2 The following actions should be taken as a complement to the procedures outlined in CAD1101.

3.1.3 Upon receiving the information on VAC through SIGMET, ASHTAM and/or advised by MET Malaysia, ATCC Watch Manager should be able to:

- a) Advise controllers on which flight levels are affected by the volcanic ash;
- b) Suggest possible alternative routes that aircraft can fly, and if time permitted, advise AIS to produce NOTAM to inform the suggested alternative routes due to movement of VAC;
- c) Shall inform relevant tower manager to ensure information is disseminated to pending departures;
- d) Advise AIS to produce and disseminate NOTAM, when necessary, to limit access to the airspace affected by the volcanic ash;
- e) Impose restrictions to the inbound flights and/or pending departures to regulate the air traffic flow density within the effected FIR;
- f) If modelled ash concentration charts are available from MET Malaysia showing Areas of Low, Medium and High Contamination, effected ATCC may establish Danger/Restricted Areas; and/or
- g) In the absence of ash concentration guidance, the entire area of forecast volcanic ash should be considered as an Area of High Contamination, for the purposes of applying air traffic control (ATC) procedures, until ash concentration guidance is available.

3.1.4 Air Traffic Control Officer

- a) Relay all pertinent information immediately to flight crews whose aircraft could be affected to ensure that they are aware of the ash cloud's position and levels affected;
- b) Request the intention of the flight crew and endeavour to accommodate requests for re-routing or level changes;
- c) Suggest appropriate re-routing to the flight crew to avoid an area of reported or forecast ash clouds;
- d) When appropriate, remind pilots that volcanic ash may not be detected by ATC radar systems;

- e) Request a special AIREP when the route of flight takes the aircraft into or near the forecast ash cloud and provide such AIREP to the appropriate agencies e.g. MET Malaysia office.

Note1. - The recommended escape manoeuvre for an aircraft which has encountered an ash cloud is to reverse its course and begin a descent if terrain permits.

Note2. - The final authority as to the disposition of the aircraft, whether it be to avoid or proceed through a reported or forecast volcanic ash cloud, rests with the flight crew.

- f) When advised by the flight crew that the aircraft has inadvertently entered a volcanic ash cloud, controller should:
- 1) take such action applicable to an aircraft in an emergency situation;
 - 2) not attempt to provide vectors without pilot concurrence; and
 - 3) not initiate modifications of route or level assigned unless requested by the flight crew or necessitated by airspace requirements or traffic conditions.

Note. - General procedures to be applied when a pilot reports an emergency situation are contained in Procedures for Air Navigation Services - Air Traffic Management (PANS-ATM, DOC 4444) Chapter 15, 15.1.1 and 15.1.2.

- g) Controller should be aware that flight crews will be immediately dealing with some of the following issues when they encounter volcanic ash and may have reported the following:
- 1) Smoke or dust appearing in the cockpit which may prompt the flight crew to don oxygen masks (could interfere with the clarity of voice communications);
 - 2) Acrid odour similar to electrical smoke;
 - 3) Multiple engine malfunctions, such as stalls, increasing exhaust gas temperature, torching, flameout, and thrust loss causing an immediate departure from assigned altitude;
 - 4) On engine restart attempts, engines may accelerate to idle very slowly, especially at high altitudes (could result in inability to maintain altitude or Mach number);
 - 5) At night, St. Elmo's fire/static discharges may be observed around the windshield, accompanied by a bright orange glow in the engine inlet(s);
 - 6) Possible loss of visibility due to cockpit windows becoming cracked or discoloured, due to the sandblast effect of the ash;
 - 7) Cockpit windows could be rendered completely opaque; and/or
 - 8) Sharp distinct shadows cast by landing lights as compared to the diffused shadows observed in clouds (this affects visual perception of objects outside the aircraft).
- h) Simultaneously, controller can expect flight crews to be executing contingency procedures such as the following:



- 1) if possible, the flight crew may immediately reduce thrust to idle;
- 2) exit volcanic ash cloud as quickly as possible. The shortest distance/time out of the ash may require an immediate, descending 180-degree turn (terrain permitting);
- 3) don flight crew oxygen masks at 100 per cent (if required);
- 4) monitor airspeed and pitch attitude. If unreliable airspeed is suspected, or a complete loss of airspeed indication occurs (volcanic ash may block the pitot system), the flight crew will establish the appropriate pitch attitude;
- 5) land at the nearest suitable aerodrome; and
- 6) upon landing, thrust reversers may be used as lightly as feasible.



4 NOTAM Specimens

4.1 Examples of NOTAM

4.1.1 NOTAM establishing Danger/Restricted Area to include Area of High [or High/Medium or High/Medium/Low] Contamination:

(A0503/10 NOTAMN
Q) WBFX/QWWXX/IV/NBO/AE/000/350
A) WBPX B) 2405182300 C) 2405190500
E) TEMPORARY DANGER AREA HAS BEEN ESTABLISHED FOR
VOLCANIC ASH AREA OF HIGH CONTAMINATION IN AREA
0704N11750E 0639N11554E 0506N11528E 0359N12008E
F) SFC
G) FL350)

4.1.2 NOTAM to define Area of Medium Contamination for which a Danger/Restricted Area has not been established:

(A0207/10 NOTAMN
Q) EUEC/QWWXX/IV/AE/000/200
A) EIAA B) 2405190700 C) 2405191300
E) VOLCANIC ASH AREA OF MEDIUM CONCENTRATION REPORTED
IN AREA 0704N11750E 0639N11554E 0506N11528E
0359N12008E
F) SFC
G) FL200)

4.1.3 NOTAM to suggest alternative routes to avoid contaminated area:

(A0207/10 NOTAMN
Q) WBFX/QWWXX/IV/AE/000/200
A) WBPX B) 2405190700 C) 2405191300
E) DUE TO VOLCANIC ASH AREA OF MEDIUM CONCENTRATION
REPORTED IN AREA 0704N11750E 0639N11554E 0506N11528E
0359N12008E, THE ATS ROUTES AFFECTED ARE:
M522 - MAY REROUTE VIA MAMOK M768 BRU M754 VINIK
M646 - MAY REROUTE VIA VINIK M754 BRU M768 MAMOK
A341 - MAY REROUTE VIA VINIK M754 ADLEX Y446 ASISU
F) SFC
G) FL350)



5 Appendices

5.1 Appendix A - VAC Contingency Form Sample

CONTINGENCY FORM			
<input type="checkbox"/> Kuala Lumpur ACC		<input checked="" type="checkbox"/> Kota Kinabalu ACC	
<input checked="" type="checkbox"/> Kuching ACC			
<input type="checkbox"/> Playbook 1 <input checked="" type="checkbox"/> Playbook 2 <input type="checkbox"/> Playbook 3 <input type="checkbox"/> Playbook 4 <input type="checkbox"/> Playbook 5 <input type="checkbox"/> Playbook 6			
Name:		Date:	Time:
Contingency Type:			
<input type="checkbox"/> Communication		<input type="checkbox"/> Facility	
<input checked="" type="checkbox"/> Natural Disaster		<input type="checkbox"/> Surveillance	
<input type="checkbox"/> Others		<input type="checkbox"/> Staffing	
Contingency Events:			
<input type="checkbox"/> ATM system failure		<input checked="" type="checkbox"/> Volcanic Ash	
<input type="checkbox"/> Facility incidents		<input type="checkbox"/> Industrial action	
<input type="checkbox"/> Adverse weather		<input type="checkbox"/> Pandemic	
<input type="checkbox"/> Others (specify) _____		<input type="checkbox"/> Military activity	
		<input type="checkbox"/> Nuclear emergency	
		<input type="checkbox"/> Cyber attack	
		<input type="checkbox"/> GNSS spoofing/interference	
Details:			
Eruption of MT Ruang. Volcanic Ash Cloud (VAC) to FL63 moving West at 15 KTS and intensify.			
Contingency Level:			
<input checked="" type="checkbox"/> Level 1 – National Level (Business Continuity Plan)			
<input type="checkbox"/> Level 2 – Regional Level			
<input type="checkbox"/> Level 3 – Regional Level			
States Involved:			
<input checked="" type="checkbox"/> WSJC		<input type="checkbox"/> VTBB	
<input checked="" type="checkbox"/> WAAF		<input type="checkbox"/> VOMF	
		<input type="checkbox"/> VVHM	
		<input type="checkbox"/> WIIF	
		<input checked="" type="checkbox"/> Brunei TMA	
		<input type="checkbox"/> _____	
		<input type="checkbox"/> _____	
Notification		Actions	
States/organisation	PIC	Status	Details
WSJC	ACG	Yes / No	NOTAM XXXX Notified via DCS/IDD
VTBB		Yes / No	Not applicable (N/A)
VOMF		Yes / No	N/A
VVHM		Yes / No	N/A
WIIF		Yes / No	N/A
WAAF		Yes / No	Originator
RPHI		Yes / No	N/A



Brunei TMA		Yes / No	NOTAM XXXX Notified via DCS/IDD
ICAO APAC RO	State CCT	Yes / No	Notified by email
CCT	Representative	Yes / No	Notified by email
ATS Operational procedure and flow/capacity management mitigation			
Action(s) taken		Details	
Issuing NOTAM	<input checked="" type="checkbox"/>	NOTAM XXXX	
Re-routing	<input checked="" type="checkbox"/>	Impacted routes: M646, M522, M754 Traffic to be reroute to the east around the ash cloud.	
Separation - Miles-in-trail (MIT)	<input checked="" type="checkbox"/>	Extended longitudinal separation. 50NM to 10 mins MNT procedural separation on ATS route L649, M772	
Separation - Minutes-in-trail (MINIT)	<input type="checkbox"/>	Normal procedure	
Level Restrictions	<input type="checkbox"/>	N/A	
Airborne Holding	<input type="checkbox"/>	N/A	
Ground Stop (GS)	<input checked="" type="checkbox"/>	Subject to Operator Operational requirement	
Ground Delay Program (GDP)	<input type="checkbox"/>	N/A	
Tunnelling	<input type="checkbox"/>	N/A	
Fix Balancing	<input type="checkbox"/>	N/A	
Airspace Classification	<input type="checkbox"/>	N/A	
Others (specify)	<input type="checkbox"/>	N/A	
TRANSFER OF CONTROL			
Action(s) taken		Details (if applicable)	
Position Reporting	<input type="checkbox"/>	Normal Procedure	
Instructions for Overflying traffic	<input type="checkbox"/>	Normal Procedure	
Procedures for flights to/from airports within Kuala Lumpur FIR/ Kota Kinabalu FIR	<input type="checkbox"/>	Normal Procedure	
Filing of flight plans	<input type="checkbox"/>	Normal Procedure	
Pilot operating procedures	<input type="checkbox"/>	Normal Procedure	
Collision Avoidance	<input type="checkbox"/>	Normal Procedure	
OVERFLIGHT PERMISSION			
Prior Permission Required (PPR) if any	<input type="checkbox"/>	Normal Procedure	
INTERCEPTION OF CIVIL AIRCRAFT		<input type="checkbox"/>	Normal Procedure
SEARCH AND RESCUE		<input type="checkbox"/>	Normal Procedure



5.2 Appendix B - Sample Checklist

5.2.1 This sample checklist can serve as a helpful guide for respective ATS Units looking to develop their own VAC contingency checklist.

5.2.2 Activation (On-Going Eruption) Phase

VAC CONTINGENCY ACTIVATION CHECKLIST								
Date of occurrence:								
No.	Items	Time (UTC)						
A	Action by Duty Watch Manager							
1	Advise controllers of effected flight levels by the volcanic ash							
2	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; text-align: center;">Notification</td> <td>Tower supervisors - to ensure information is disseminated to pending departures</td> </tr> <tr> <td></td> <td>ACG (ATM Contingency Group)</td> </tr> <tr> <td></td> <td>CCC (Central Coordinating Committee)</td> </tr> </table>	Notification	Tower supervisors - to ensure information is disseminated to pending departures		ACG (ATM Contingency Group)		CCC (Central Coordinating Committee)	
Notification	Tower supervisors - to ensure information is disseminated to pending departures							
	ACG (ATM Contingency Group)							
	CCC (Central Coordinating Committee)							
3	Issuance of NOTAM (i.e to notify alternative routes etc)							
4	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 45%;"> Flow/capacity management mitigation: <input type="checkbox"/> Re-routing <input type="checkbox"/> Miles-in-trail (MIT) <input type="checkbox"/> Minutes-in-trail (MINIT) <input type="checkbox"/> Level Restrictions <input type="checkbox"/> Airborne Holding <input type="checkbox"/> Ground Stop (GS) <input type="checkbox"/> Ground Delay Program (GDP) <input type="checkbox"/> Tunnelling <input type="checkbox"/> Fix Balancing <input type="checkbox"/> Airspace Classification <input type="checkbox"/> Others:..... </td> <td style="width: 55%;"> Details: </td> </tr> </table>	Flow/capacity management mitigation: <input type="checkbox"/> Re-routing <input type="checkbox"/> Miles-in-trail (MIT) <input type="checkbox"/> Minutes-in-trail (MINIT) <input type="checkbox"/> Level Restrictions <input type="checkbox"/> Airborne Holding <input type="checkbox"/> Ground Stop (GS) <input type="checkbox"/> Ground Delay Program (GDP) <input type="checkbox"/> Tunnelling <input type="checkbox"/> Fix Balancing <input type="checkbox"/> Airspace Classification <input type="checkbox"/> Others:.....	Details:					
Flow/capacity management mitigation: <input type="checkbox"/> Re-routing <input type="checkbox"/> Miles-in-trail (MIT) <input type="checkbox"/> Minutes-in-trail (MINIT) <input type="checkbox"/> Level Restrictions <input type="checkbox"/> Airborne Holding <input type="checkbox"/> Ground Stop (GS) <input type="checkbox"/> Ground Delay Program (GDP) <input type="checkbox"/> Tunnelling <input type="checkbox"/> Fix Balancing <input type="checkbox"/> Airspace Classification <input type="checkbox"/> Others:.....	Details:							
5	Establish Danger/Restricted Areas (if ash concentration chart available)							
6	Other Information:							
B	Action by Controller							
1	Relay pertinent information to potentially effected flights							
2	Accommodate flight crew needs (i.e level change, reroute etc.)							
3	Provide alternate route as planned by ACG.							
4	Request AIREP							



5.2.3 Recovery Phase

VAC CONTINGENCY RECOVERY CHECKLIST		
Date:		
No.	Items	Time (UTC)
A	Action by Duty Watch Manager	
1	Check VAA/VAG – “NO VA EXP”	
2	Notification	Tower supervisors
		ACG (ATM Contingency Group)
		CCC (Central Coordinating Committee)
4	Issuance of NOTAM cancellation	
Other Information:		