



*International Civil Aviation Organization*

**The Fifth Meeting of the Regional ATM Contingency Plan Task Force  
(RACP/TF/5)**

Bangkok, Thailand, 1 – 4 December 2015

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**Agenda Item 4: Asia/Pacific Regional ATM Contingency Plan**

**VOLCANIC ASH CONTINGENCY PLANNING**

(Presented by the SECRETARIAT)

**SUMMARY**

This paper presents proposed inclusions in the Regional ATM Contingency Plan for response to Volcanic Ash Cloud and similar contingency events.

**1. INTRODUCTION**

1.1 The Terms of Reference (TOR) of the Regional ATM Contingency Plan specify that the Task Force shall develop a Regional ATM Contingency Plan that inter alia details recommended Regional contingency practices to events such as severe meteorological and geological phenomena, health emergencies (pandemics, etc), military conflicts and industrial relations issues.

1.2 A significant number of Flight Information Regions (FIR)s in the Asia/Pacific Region are affected by volcanic eruption activity.

1.3 The ICAO Air Traffic Management Volcanic Ash Contingency Plan Template, available on the ICAO Asia/Pacific Regional Office website, sets out standardized guidelines and procedures for the provision of information to airlines and en-route aircraft before and during a volcanic eruption.

1.4 The Asia/Pacific Region Volcanic Ash Exercises Steering Group is conducting a series of volcanic ash exercises in the Region. The first exercise, VOLPHIN 15/01, held in the Philippines in August 2015, highlighted issues to be considered by States in ensuring their preparedness for managing volcanic ash contingency events.

1.5 Among the issues highlighted were the need for States to ensure adherence to ICAO Standards and Recommended Practices (SARPS) relating to volcanic ash, contained in Annexes 3, 11 and 15 to the Convention on International Civil Aviation and in ICAO Doc 4444 *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM).

1.6 The following sections of this paper provide relevant information from the Template, outcomes from VOLCEX/SG meetings and VOLPHIN 15/01, and proposed inclusions in the Regional ATM Contingency Plan.

## 2. DISCUSSION

### 2.1 ICAO Air Traffic Management Volcanic Ash Contingency Plan Template

2.2 The following key items from the Template should be considered for inclusion in the Regional ATM Contingency Plan.

- 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. The guidelines provided in the Template assume that the ICAO requirements regarding safety management systems have been implemented by the operators. 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).
- It is imperative that information on the volcanic activity is disseminated as soon as possible. In order to assist staff in expediting the process of originating and issuing relevant AIS and MET messages, a series of templates should be available for different stages of the volcanic activity. A list of ICAO registered volcanoes — see the *Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds* (ICAO Doc 9691) Appendix F — should be available at the State's International NOTAM office with volcano name, number and nominal position. In order to ensure the smooth implementation and effectiveness of the contingency plan in case of an actual volcanic eruption, volcanic ash exercises (VOLCEX) should be conducted at a frequency determined by the ICAO Region concerned.
- The Template provides information on terminology related to volcanic ash contingency responses, and the *pre-eruption, start of eruption, on-going eruption* and *recovery* phases of volcanic ash cloud events. Information is also provided on air traffic services procedures, and on air traffic flow management procedures.
- The template provides appendices that should be included in Regional ATM Contingency Plans:
  - APPENDIX A General guidance for the development of an ATM volcanic ash contingency plan;
  - APPENDIX B Anticipated flight crew issues when encountering volcanic ash; and
  - APPENDIX C Communication and dissemination of pilots' reports of volcanic activity.

### VOLCEX/SG Outcomes

2.3 Outcomes from the VOLCEX/SG/2 meeting included lessons learned in the VOLPHIN 15/01 exercise, and recommendations for States. It is anticipated that further recommendations will arise from the ongoing series of volcanic ash exercises being conducted by VOLCEX/SG.

2.4 The consolidated list of recommendations arising from VOLCEX/SG/2 included recommendations relating to the preparation and conduct of volcanic exercises, and the following recommendations relevant to regional ATM contingency planning:

**Recommendation 4: Regulatory provisions for response to volcanic ash contingency events**

States' regulatory provisions and arrangements should be reviewed to ensure that (in accordance with the guidance provided in ICAO Doc 9974 – *Flight Safety and Volcanic Ash*):

- a) Aircraft operators are required to include in their safety management system (SMS) an identifiable safety risk assessment for operations into airspace forecast to be, or at aerodromes known to be, contaminated with volcanic ash
- b) Safety oversight procedures are used for the evaluation of operators' capability to conduct flight operations safely into airspace forecast to be, or aerodromes known to be, contaminated with volcanic ash

**Recommendation 5: Airspace and airport management in response to volcanic eruption and volcanic ash cloud**

States' airspace and airport management policies and procedures should be reviewed to ensure that (in accordance with the guidance provided in ICAO Doc 9974 – *Flight Safety and Volcanic Ash* and the provisions of ICAO Doc 4444 – *PANS-ATM*, 15.8.1c and Note 2):

- a) Airspace affected by volcanic ash cloud should not be 'closed'
- b) Specification in NOTAM of alternate routing or other air traffic flow management (ATFM) measures to manage airspace constraints arising from volcanic ash cloud should be solely for the purpose of ensuring the predictability and regularity of air traffic, and should be based on an assessment of capacity and demand in airspace affected by volcanic ash and/or or by aircraft avoiding the volcanic ash cloud
- c) NOTAM specifying alternate routing or other ATFM measures related to a volcanic eruption or volcanic ash cloud should be issued separately from the ASHTAM/NOTAM issued in accordance with Annex 15, 5.1.1.1, r and u
- d) Aerodromes should only be closed by NOTAM for periods of observed volcanic ash contamination of the surface of the aerodrome movement area
- e) Airport capacity limitations of alternate aerodromes, including apron capacity, should be considered, and recommendations for the use of other alternates considered for inclusion in NOTAM (in c, above)
- f) If required by State regulations, any declaration of a Danger Area or Restricted Area should be confined to the pre-eruptive or erupting volcano and the area containing its forecast or observed ejecta

### **Recommendation 6: Regular updates of volcanic ash information**

The Regional ATM Contingency Plan should be reviewed and, where necessary, amended to promote the principles adopted by APANPIRG/26 in *Conclusion 26/19 – Volcanic Ash Information Coordination and Collaboration*

#### APANPIRG Conclusion 26/19 – Volcanic Ash Information Coordination and Collaboration

2.5 IATA had presented information discussing the importance of timely and ongoing information sharing during a volcanic event to the 3<sup>rd</sup> Meeting of the ATM Sub-Group of APANPIRG (ATM/SG/3, Bangkok, Thailand, 3 – 7 August 2015). It was noted that the first information received by operators following a volcanic eruption was usually a NOTAM issued by the State. That NOTAM typically indicated that an eruption was in progress and sometimes included actions (such as aerodrome closures) taken by the State to ensure safety of operations. Frequently, that was the only communication operators would receive from the State until the NOTAM was cancelled.

2.6 ICAO Doc 9974 - *Information for Regulators and operators on operations in airspace potentially contaminate by volcanic ash* included a provision that an operator should not be prevented from operating through, under or over airspace forecast to be affected by a VAA, VAG or SIGMET provided it has demonstrated in its SMS the capability to do so safely.

3.2.1 From an airspace perspective, the Doc 9974 reference left the decision on whether to operate or not in the hands of the operator. However, Doc 9691- *Hazards of operating in airspace and aerodromes contaminated by VA* contained the following, somewhat contradictory, statement: *A decision has to be taken by the airport authority regarding the feasibility or necessity to continue aircraft operations at the airport.* Given the significant disruptive and economic potential of an aerodrome closure, the State concerned should take a proactive approach to collaboratively work with stakeholders (including other States) in ensuring information is shared regularly.

3.2.2 IATA proposed that States with either potential or regularly occurring volcanic activity urgently implement a communications mechanism that would provide regular and timely information sharing before, during and after an event, which would facilitate consultation with the airspace users.

3.2.3 APANPIRG/26 agreed to the following Conclusion:

#### ***Conclusion APANPIRG/26-15: Volcanic Ash Information Coordination and Collaboration***

*That, States are urged to:*

- a) *establish a mechanism to provide regular and timely updates of information during a volcanic eruption and/or ash cloud event to ensure all stakeholders are up to date with current information, situation reports and contingency planning;*
- b) *participate in volcanic ash exercises; and*
- c) *consider establishing an internal crisis management centre where applicable to support the collaborative and timely sharing of information such as volcanic eruptions, or other crises that will have a significant impact on airport and/or airspace management.*

*Note: This is supplemental to the provisions of Annex 3 and Annex 15.*

### Regional ATM Contingency Plan Inclusions

2.7 The following items are proposed for inclusion in the Asia/Pacific Regional ATM Contingency Plan.

#### *Background Information Section*

2.8 The ICAO *Air Traffic Management Volcanic Ash Contingency Plan Template* provides information on terminology related to volcanic ash contingency responses, and the *pre-eruption, start of eruption, on-going eruption* and *recovery* phases of volcanic ash cloud events. Information is also provided on air traffic services procedures, and on air traffic flow management procedures.

2.9 The phases of volcanic eruption activity may be summarized as follows:

**Pre-Eruption Phase:** a volcanic eruption is expected.

**Start of Eruption Phase:** commences with the outbreak of the volcanic eruption and entrance of volcanic ash into the atmosphere.

**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.

**Recovery Phase:** commences with the issuance of the first VAA containing a statement that no volcanic ash is expected.

2.10 Appendix X summarizes the actions to be taken by relevant Volcanic Observatories, Volcanic Ash Advisory Centres, MWOs, AIS Units and ACCs<sup>1</sup>.

2.11 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. This document assumes that ICAO requirements regarding safety management systems have been implemented by all States and aircraft operators. 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)

2.12 States' regulatory provisions and arrangements should be reviewed to ensure that, in accordance with the guidance provided in ICAO Doc 9974:

- a) Aircraft operators are required to include in their safety management system (SMS) an identifiable safety risk assessment for operations into airspace forecast to be, or at aerodromes known to be, contaminated with volcanic ash
- b) Safety oversight procedures are used for the evaluation of operators' capability to conduct flight operations safely into airspace forecast to be, or aerodromes known to be, contaminated with volcanic ash.

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<sup>1</sup> Actions to be taken by the relevant organizations and units are currently being examined by the Volcanic Ash Exercises Steering Group.

2.13 States' airspace and airport management policies and procedures should be reviewed to ensure that (in accordance with the guidance provided in ICAO Doc 9974 – *Flight Safety and Volcanic Ash* and the provisions of ICAO Doc 4444 – *PANS-ATM*, 15.8.1c and Note 2):

- a) Airspace affected by volcanic ash cloud should not be 'closed'
- b) Specification in NOTAM of alternate routing or other air traffic flow management (ATFM)<sup>1</sup> measures to manage airspace constraints arising from volcanic ash cloud should be solely for the purpose of ensuring the predictability and regularity of air traffic, and should be based on an assessment of capacity and demand in airspace affected by volcanic ash and/or or by aircraft avoiding the volcanic ash cloud
- c) NOTAM specifying alternate routing or other ATFM measures related to a volcanic eruption or volcanic ash cloud should be issued separately from the ASHTAM/NOTAM issued in accordance with Annex 15, 5.1.1.1, r and u;
- d) Aerodromes should only be closed by NOTAM for periods of observed volcanic ash contamination of the surface of the aerodrome movement area;
- e) Airport capacity limitations of alternate aerodromes, including apron capacity, should be considered, and recommendations for the use of other alternates considered for inclusion in NOTAM (in c, above);
- f) If required by State regulations, any declaration of a Danger Area or Restricted Area should be confined to the pre-eruptive or erupting volcano and the area containing its forecast or observed ejecta.

2.14 AIS units are required under the provisions of Annex 15 to issue information relating to volcanic ash cloud. Information may be issued in either NOTAM or ASHTAM format. Annex 15 specifies that ASHTAM shall include *Item E — Colour code for level of alert indicating volcanic activity*. As colour-coded activity levels for volcanic ash cloud are not in use in volcanic observatories in the Asia/Pacific Region. NOTAM format should be used to disseminate volcanic ash cloud information.

#### *Principles*

2.15 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.

2.16 Airspace affected by volcanic ash cloud should not be closed to international civil aviation.

2.17 Amended ATS routes, whether published or promulgated ad-hoc, may be prescribed as part of the air traffic flow management (ATFM) response to expected demand and capacity imbalance caused by aircraft avoiding volcanic ash cloud.

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<sup>1</sup> ATFM capability for the Asia/Pacific Region is expected to be implemented under the provisions of the Asia/Pacific Region Manual for Collaborative ATFM.

2.18 Aerodromes should only be closed by NOTAM for periods of observed volcanic ash contamination of the surface of the aerodrome movement area;

2.19 Closure of airports affected by volcanic ash deposition should be supported by a safety assessment conducted in collaboration between airport operator, aircraft operators and the air navigation service provider.

*Performance Objectives.*

2.20 States' regulatory provisions and arrangements should be reviewed to ensure that, in accordance with the guidance provided in ICAO Doc 9974 – *Flight Safety and Volcanic Ash* :

- c) Aircraft operators are required to include in their safety management system (SMS) an identifiable safety risk assessment for operations into airspace forecast to be, or at aerodromes known to be, contaminated with volcanic ash
- d) Safety oversight procedures are used for the evaluation of operators' capability to conduct flight operations safely into airspace forecast to be, or aerodromes known to be, contaminated with volcanic ash.

2.21 States' airspace and airport management policies and procedures should be reviewed to ensure that, in accordance with the guidance provided in ICAO Doc 9974 – *Flight Safety and Volcanic Ash* and the provisions of ICAO Doc 4444 – *PANS-ATM*, 15.8.1c and Note 2:

- g) Airspace affected by volcanic ash cloud should not be 'closed'
- h) Specification in NOTAM of alternate routing or other air traffic flow management (ATFM)<sup>1</sup> measures to manage airspace constraints arising from volcanic ash cloud should be solely for the purpose of ensuring the predictability and regularity of air traffic, and should be based on an assessment of capacity and demand in airspace affected by volcanic ash and/or or by aircraft avoiding the volcanic ash cloud
- i) NOTAM specifying alternate routing or other ATFM measures related to a volcanic eruption or volcanic ash cloud should be issued separately from the ASHTAM/NOTAM issued in accordance with Annex 15, 5.1.1.1, r and u
- j) Aerodromes should only be closed by NOTAM for periods of observed volcanic ash contamination of the surface of the aerodrome movement area
- k) Airport capacity limitations of alternate aerodromes, including apron capacity, should be considered, and recommendations for the use of other alternates considered for inclusion in NOTAM (in c, above)
- l) If required by State regulations, any declaration of a Danger Area or Restricted Area should be confined to the pre-eruptive or erupting volcano and the area containing its forecast or observed ejecta.

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<sup>1</sup> ATFM capability for the Asia/Pacific Region is expected to be implemented under the provisions of the Asia/Pacific Region Manual for Collaborative ATFM.

2.23 Each State should ensure that a list of ICAO registered volcanoes relevant to the State, drawn from ICAO Doc 9691 - *Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds* Appendix F, is maintained at all International NOTAM Offices, with volcano name, number and nominal position

2.24 A series of templates should be available for different stages of volcanic activity to assist Meteorological Watch Office (MWO) and Aeronautical Information Service (AIS) staff in expediting the process of originating and issuing relevant MET and AIS messages.

2.25 Multi-lateral Volcanic Ash Cloud Exercises should be conducted by each State at least annually. Internal desktop contingency plan exercises should include volcanic ash cloud scenarios.

2.26 States should establish a mechanism to provide regular and timely updates of information during a volcanic eruption and/or ash cloud event to ensure all stakeholders are up to date with current information, situation reports and contingency planning;

2.27 States should establish an internal crisis management centre to support the collaborative and timely sharing of information such as volcanic eruptions, or other crises that will have a significant impact on airport and/or airspace management.

*Note 1: This information sharing process is supplemental to the mandatory provisions of Annex 3 and Annex 15 relating to the dissemination of volcanic eruption and ash cloud information.*

*Note 2: Information relating to volcanic eruption and ash cloud should be collaboratively shared through the State's CDM/ATFM processes, where established.*

### **3. ACTION BY THE MEETING**

3.1 The meeting is invited to:

- a) note the information contained in this paper;
- b) discuss and agree to the items in paragraphs 2.8 to 2.27 proposed for inclusion in the Regional ATM Contingency Plan; and
- c) discuss any relevant matters as appropriate.

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