



*International Civil Aviation Organization*

**SIXTH MEETING OF THE ASIA/PACIFIC METEOROLOGICAL SERVICES WORKING GROUP (MET/S WG/6)**

Bangkok, Thailand, 9 – 11 March 2016

**Agenda Item 4: Planning and implementation of meteorological services**

**REPORT ON APAC VOLCEX/SG/2**

(Presented by Chair of APAC VOLCEX/SG)

**SUMMARY**

This paper presents a summary of the second meeting of the Asia/Pacific Volcanic Ash Exercises Steering Group (APAC VOLCEX/SG/2) of the Meteorological Services Working Group (MET/S WG) of the Meteorology Sub Group (MET SG) of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG), held in Bangkok, Thailand, from 14 to 16 September 2015.

**1. INTRODUCTION**

1.1 The Second Meeting of the Asia/Pacific Volcanic Ash Exercises Steering Group (APAC VOLCEX/SG/2) was held at the ICAO Asia and Pacific Regional Office, Bangkok, Thailand, from 14 to 16 September 2015.

1.2 The meeting was attended by twenty-eight participants from seven States and three International Organizations, including Australia, Indonesia, Japan, Malaysia, Philippines, Singapore, Thailand, the International Air Transport Association (IATA), the International Federation of Air Line Pilots' Associations (IFALPA) and ICAO.

1.3 Mr. Koichiro Kakihara presided as Chair of the meeting and Mr. Peter Dunda, ICAO RO MET, and Mr. Shane Sumner, ICAO RO ATM, acted as the Secretariat and ICAO Coordinators for the meeting.

1.4 The full report of the APAC VOLCEX/SG/2 can be accessed at the following website: <http://www.icao.int/APAC/Meetings/Pages/2015-VOLCEX-SG2.aspx>

1.5 The second ICAO APAC volcanic ash exercise (VOLPHIN16/01) was conducted on 17 February 2016 in Indonesia and was successfully done.

## 2. DISCUSSION

### Review of VOLPHIN15/01

2.1 The first ICAO APAC volcanic ash exercise (VOLPHIN15/01) was held in Philippines on 11 August 2015. The VOLPHIN15/01 was conducted with a scenario in which an eruption of the Taal Volcano on the island of Luzon, Philippines, emitted a volcanic ash cloud that spread northwards and contaminated the Manila FIR.

2.2 The APAC VOLCEX/SG/2 reviewed results of the VOLPHIN15/01 and formulated recommendations contained in **Attachment B** of this paper.

2.3 The consolidated list of recommendations arising from the APAC VOLCEX/SG/2 includes the following recommendation related to relevant guidance material for the provision of volcanic ash information:

#### **Recommendation 3: Review and update guidance material for the provision of volcanic ash information**

Relevant guidance material for the provision of volcanic ash information should be reviewed and updated, as necessary, to ensure that:

- a) Guidance on the distribution of volcanic ash advisory information to MWO and ACC locations accurately reflects current, up-to-date requirements, e.g., in APAC FASID Table MET 3B and ICAO Doc 9766, Part 2 (Ref: WP02; par. 2.3)
- b) AFTN addresses and WMO headings used for special air-reports for volcanic ash (in States concerned) are up to date (Ref: WP02; par. 2.6)

2.4 Meanwhile, the recommendations 4, 5 and 6 arising from the APAC VOLCEX/SG/2 were provided to the Fifth Meeting of Regional ATM Contingency Plan Task Force (RACP/TF/5).

### Planning for Volcanic Ash Exercise in 2016

2.5 The APAC VOLCEX/SG/2 agreed that the priorities of the volcanic ash exercises in the APAC Region should be to demonstrate volcanic ash information exchange and responses in Indonesia and to follow-up on issues in Philippines identified in VOLPHIN15/01, and that further coordination would be necessary for planning volcanic ash exercises involving other States, such as PNG, Solomon Islands, New Zealand, etc.

2.6 Furthermore, the APAC VOLCEX/SG/2 decided that the next (second) ICAO APAC volcanic ash exercise should be conducted in the Jakarta and Ujung Pandang FIRs, Indonesia, in February 2016. The third ICAO APAC volcanic ash exercise would then be held in August 2016 involving a simulated volcanic eruption in Philippines, but affecting the FIRs of multiple States.

2.7 The APAC VOLCEX/SG/2 agreed the tentative future work plan as **Attachment C** of this paper.

### **VOLPHIN16/01**

2.8 The second ICAO APAC volcanic ash exercise (VOLPHIN16/01) was held in Indonesia on 17 February 2016 in accordance with the volcanic ash exercise directive contained in **Attachment D** of this paper and was successfully done.

2.9 The results of the VOLPHIN16/01 will be reviewed at the next meeting of the Asia/Pacific Volcanic Ash Exercises Steering Group.

### **Debrief Meeting and Future Planning Meetings**

2.10 The Third Meeting of the Asia/Pacific Volcanic Ash Exercises Steering Group (APAC VOLCEX/SG/3), including the debriefing meeting for the second exercise and the planning meeting for future exercise/s, would be held in the ICAO Regional Office, Bangkok on 14 - 16 March 2016.

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

3.1 The meeting is invited to:

- a) note the information contained in this papers;
- b) discuss the recommendation formulated by APAC VOLCEX/SG/2 contained in paragraph 2.3 of this paper; and
- c) discuss any relevant matters as appropriate.

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ATTACHMENT A  
**APAC VOLCANIC ASH EXERCISES STEERING GROUP**  
**TERMS OF REFERENCE**

**VISION**

Maintain safety, regularity and efficiency of aviation in the event of a volcanic eruption.

**OBJECTIVES**

Coordinate all aspects of the organization and conduct of volcanic ash exercises in the APAC region in order to:

1. Test volcanic activity alerting, AIS and MET message routing, volcanic ash information, air traffic control procedures, air traffic flow and capacity management and aircraft operator response and the CDM between the various actors in accordance with regional and global procedures. The exercises should be designed to:
  - a) practice the conduct of volcanic activity response in accordance with the regional reference documents;
  - b) verify existing information, AIS and MET message routing via AFTN addresses, relevant e-mail addresses, telephone and fax numbers, and internet addresses (URLs);
  - c) maintain appropriate information and message routing between all involved agencies and organizations;
  - d) provide volcanic activity response training for key personnel involved;
  - e) allow regulators to assess the preparedness and operational response in terms of planning, process and procedures of operators; and
  - f) provide, when appropriate, recommendations for amendment of the reference documents, in accordance with the lessons learned and conclusions contained in the final exercise report.

2. Ensure that detrimental effects of exercises on the aviation system performance are avoided, but that nevertheless useful experience and information is generated; and
3. Practice and develop inter-agency response to volcanic activity.

## **SCOPE**

There is significant regional variation in the nature, frequency, observation of and response to volcanic eruptions. As the APAC region encompasses much of the volcanically active zone known as the “Ring of Fire”, there are several States where regular air traffic flow is at risk from encounters with volcanic ash.

The IAVW was established globally to mitigate the risks; however the diverse nature of the APAC region, in terms of both its geography and its communities, is reflected by the diverse challenges faced in responding to volcanic ash events. Therefore, each exercise may have different objectives, which the scenario will be designed to address. For example, any or all of the activities listed below may be tested depending on the scope of the individual exercise:

- a) AFTN, e-mail addresses, websites, message routing and voice communications;
- b) alerting and observation of ash (e.g. use of VONA and VAR);
- c) VAAC response (e.g. volcanic ash information);
- d) ATS response (including air traffic control and AIS for NOTAM issuance);
- e) ATM response;
- f) aircraft operator response (including safety risk assessment);
- g) MWO response (i.e. SIGMET); and
- h) suitability of information, its frequency, format and content.

## **DELIVERABLES**

The steering group is expected to:

1. Appoint an exercise leader for volcanic ash exercise/s
2. Conduct planning meetings for volcanic ash exercise/s (initial exercise to be conducted in 2015)
3. Publish volcanic ash exercise directive/s, including:
  - ✓ Scenario/s – location/s should cover an area/s that could be affected by volcanic ash and the time/period/s should ensure volcanic ash would impact international routes
  - ✓ Procedures/instructions
  - ✓ Participants

4. Conduct volcanic ash exercise/s (initial exercise to be conducted in 2015)
5. Conduct debrief meeting/s to review the volcanic ash exercise/s, including:
  - ✓ Discuss reports
  - ✓ Review the lessons learnt
  - ✓ Revise and improve the volcanic ash exercise directive/s (based on lessons learnt)
  - ✓ Recommend improvements to the regional volcanic ash ATM contingency plan
  - ✓ Recommend improvements to global ICAO provisions and forward to APANPIRG and/or IAVWOPSG
  - ✓ Update the future work plan – for subsequent volcanic ash exercise/s
  - ✓ Consolidated report to the appropriate Sub-Group/s and APANPIRG

**STAKEHOLDERS, ROLES and RESPONSIBILITIES**

<b>STAKEHOLDERS / STAKEHOLDER GROUPS<sup>1</sup></b>	<b>ROLES</b>	<b>RESPONSIBILITIES</b>
<b><u>Air navigation service providers (ANSP)<sup>2</sup></u></b>	Participant	Inform aircraft, issue ASHTAM/NOTAM, activate contingencies, forward special air-reports
Airport operators	Participant	Tactical response
<b><u>Airspace users</u></b>	Participant	Tactical response
<b><u>ICAO</u></b>	Facilitator	Support the steering group, meetings and exercises
Meteorological watch offices (MWO)	Participant	Provide MET watch, issue SIGMET, supply information on volcanic ash (VA)
Regional OPMET Data Banks (RODB)	Support	OPMET exchange
<b><u>Regulators</u></b>	Participant	Regulations
<b><u>Volcanic ash advisory centres (VAAC)</u></b>	Participant	Issue volcanic ash advisory information (VAA) including graphical format (VAG)
Volcano observatories	Participant	Send information on volcanic activity including Volcano Observatory Notice for Aviation (VONA)

**Minimum representation** (bold type underlined) required for a quorum for the volcanic ash exercises steering group<sup>3</sup>.

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<sup>1</sup> Includes relevant industry organizations (CANSO, IATA, AIC, IFALPA)

<sup>2</sup> Includes air traffic management (ATM), area control centres (ACC), aeronautical information services (AIS) and NOTAM offices (NOF)

<sup>3</sup> Note: A representative from each stakeholder group should be involved as necessary during each phase (planning, conducting, debrief) of volcanic ash exercises.

ATTACHMENT B

**Consolidated list of Recommendations by VOLCEX/SG/2**

**Recommendation 1: Preparation for volcanic ash exercises**

Preparation for ICAO APAC volcanic ash exercises should be conducted in a manner to ensure that:

- a) All required units/organizations confirm availability and preparedness to participate in the exercise and organize the necessary resources (e.g., Internet and connection, computer facilities) to conduct the exercise (Ref: WP08; meeting report, 4.9)
- b) The exercise directive is provided to participants allowing sufficient time before the exercise to complete the necessary planning, tasks, etc. (Ref: WP04; WP06; SP08)
- c) The status of preparation of each participating unit/organization is monitored and reviewed to address any problems prior to the exercise (Ref: SP01)
- d) All participating units review, test and verify, as necessary, their policies/procedures for the preparation, issuance and dissemination of volcanic ash related messages, in accordance with the applicable global, regional and local requirements, prior to the exercise (Ref: WP01, par. 2.16, 2.19, 2.24, 2.28, 2.33, 2.35 and 2.37; SP01; WP02, par. 2.3; WP08; meeting discussions)
- e) Adequate notification is provided to enable all airspace users operating in the affected area are informed of and understand the purpose of the planned exercise (Ref: WP01; par. 2.43)
- f) The roles of exercise leader and co-leader are sufficiently clarified and documented (Ref: WP06)

**Recommendation 2: Review and update volcanic ash exercise directive**

The volcanic ash exercise directive for future ICAO APAC volcanic ash exercises should be reviewed and updated, as necessary, to ensure that:

- a) Location and communication strategies for the coordination and monitoring of the volcanic ash exercise are selected to facilitate discussion with all participants as necessary and to provide the most reliable and effective means of conducting the CDM discussions (Ref: WP01, par. 2.12 and 2.14; SP01; WP04, par. 2.9; WP08)
- b) The ‘trigger’ mechanism (e.g., a specified time, action, signal, etc.) for issuance of volcanic ash exercise messages is clearly stipulated in the schedule of volcanic ash exercise actions (Ref: WP01, par. 2.15 and 2.25)



- c) All volcanic ash exercise messages are issued based precisely on the templates published in the exercise directive, as agreed by the providers and users of the information concerned (Ref: WP01, par. 2.19, 2.27, 2.33 and 2.35; SP01; meeting discussions)
- d) All volcanic ash exercise messages reflect the required information provided in the triggering messages, including reports of volcanic eruptions, volcanic activity and volcanic ash (Ref: WP01; par. 2.21, 2.23 and 2.32)
- e) Transmission and reception of all exercise messages (including VAAs) is confirmed by all relevant exercise participants (Ref: WP02)
- f) The list of actions is agreed by the relevant suppliers and users of information concerned sufficiently in advance of the exercise to enable participants to confirm their participation and actions prior to the exercise (Ref: WP01; par. 2.36, 2.37 and 2.39; SP01; WP04, par. 2.7, 2.8, 2.11 and 2.12; WP02, par. 2.3; WP06; meeting discussions)
- g) The aims, objectives, strategies and instructions for the exercise teleconference activity are clarified to facilitate improved collaborative decision making (Ref: WP01, par. 2.39; SP01 and WP04, par. 2.10)
- h) The selected distribution method for exercise messages avoids possible detrimental effects of exercises on the aviation system performance (Ref: SP01)
- i) Appropriate message numbers are used for the exercise VAA/VAG (Ref: SP01)
- j) Airspace and airport management principles to be demonstrated in the volcanic ash exercises are clearly established (Ref: SP01; SP03, par.2.9)

**Recommendation 3: Review and update guidance material for the provision of volcanic ash information**

Relevant guidance material for the provision of volcanic ash information should be reviewed and updated, as necessary, to ensure that:

- c) Guidance on the distribution of volcanic ash advisory information to MWO and ACC locations accurately reflects current, up-to-date requirements, e.g., in APAC FASID Table MET 3B and ICAO Doc 9766, Part 2 (Ref: WP02; par. 2.3)
- d) AFTN addresses and WMO headings used for special air-reports for volcanic ash (in States concerned) are up to date (Ref: WP02; par. 2.6)

**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, *Contingency Plan Coordination and Operations Functions*, 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*

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ATTACHMENT C

**ICAO APAC VOLCEX/SG – Future Work Plan**

<b>Date</b>	<b>Activity/Meeting</b>	<b>Location</b>
February 2016 (TBD)	Conduct volcanic ash exercise (Indonesia)	Indonesia (TBD)
March 2016 (TBD)	VOLCEX/SG/3 (incl. debrief and planning)	Bangkok
August 2016 (TBD)	Conduct volcanic ash exercise (Philippines)	Philippines (TBD)
2016 or 2017 (TBD)	Conduct volcanic ash exercise (PNG or SW Pacific)	TBD
2017 (TBD)	VOLCEX/SG/4 (incl. debrief and planning)	Bangkok
2017 (TBD)	Conduct volcanic ash exercise (TBD)	TBD
2017 or 2018 (TBD)	Conduct volcanic ash exercise (TBD)	TBD
2018 (TBD)	VOLCEX/SG/5	Bangkok
As necessary (TBD)	Tele- or Web- conference (planning or debrief)	Telephone/Internet

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# ICAO ASIA/PACIFIC

## VOLCANIC ASH EXERCISE

### DIRECTIVE

### VOLPHIN16/01



#### DOCUMENT CHANGE RECORD

DATE	PAGE(S) AFFECTED
01.02.16	All
16.02.16	Appendix A A-1: Updated details for Jetstar, CASA, Qantas, Virgin Australia Appendix B B-1: Updated details for DCA Malaysia, Malaysia Airlines, IFALPA, Cathay Appendix D D-1-3: Updated details for ASHTAM, VONA and special air-report issuance Appendix F F-1: Removed telephone list from distribution list Appendix I I-2: Updated AFTN addresses Appendix J J-2: Updated examples and AFTN addresses Appendix K K-1: Corrected reference; updated e-mail and AFTN addresses Appendix L L-1-3: Updated details for Jetstar, CASA, DGCA, Qantas, Virgin Australia Appendix M M-2: Updated details for IFALPA

## 1. INTRODUCTION

1.1. “Volcanic ash exercises should be conducted by ICAO on a regional basis in order to practice and develop inter-agency response to volcanic activity, in order to maintain safety, regularity and efficiency of aviation in the event of a volcanic eruption”.<sup>1</sup>

1.2. The first ICAO APAC volcanic ash exercise to be conducted in 2016, named VOLPHIN16-01, will involve the simulated eruption of a volcano in Indonesia affecting Indonesian airspace. The simulated, high level volcanic ash cloud will contaminate both Indonesian FIRs, Jakarta and Ujung Pandang, and affect major air traffic routes.

1.3. There will be no operational impact in this exercise; dedicated staff is expected to be available for participation in the exercise.

1.4. **Exercise date and time (UTC):** From **2300 UTC 16 February 2016** to **0515 UTC 17 February 2016**. Note: tentative back-up date in case of exercise NO GO decision is **24 February 2016** (see 11.1 for more details).

1.5. **Exercise Leader:** Mr. KAKIHARA, Koichiro, Senior Coordinator for International Aeronautical Meteorology, JMA. The Exercise Leader is responsible for:

- Chairing the planning and debriefing meetings for volcanic ash exercises in APAC Region (usually combined with the VOLCEX/SG meeting)
- Publishing the exercise directive for each volcanic ash exercise
- Supervising the volcanic ash exercises
- Reporting results of volcanic ash exercises including lessons learnt, as well as recommended improvements to the regional volcanic ash ATM contingency plan and global ICAO provisions, to appropriate groups in APANPIRG

1.6. **Exercise (in-State) Co-Leader:** Moh. Hasan BASHORY, Deputy Director of Air Navigation, DGCA Indonesia. The Exercise Co-Leader is responsible for:

- Conducting the volcanic ash exercise in coordination with directing staff
- Making the GO/NO decision for the volcanic ash exercise (see 11.1 for more details)
- Conducting CDM activities during the volcanic ash exercise

1.7. **Location of Exercise Leader, Co-Leader and Secretariat:** The Exercise Leader will be at Tokyo remotely supporting the pre-exercise coordination meeting and the volcanic ash exercise itself via tele-conference and e-mail. The Exercise (in-State) Co-Leader and ICAO Secretariat will be at Bali, Indonesia to support the pre-exercise coordination meeting and the conducting of the volcanic ash exercise.

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<sup>1</sup> ICAO Doc 9766 – *Handbook on the International Airways Volcano Watch*, Appendix F- *Guidance for Conducting Volcanic Ash Exercises in ICAO Regions*

1.8. **Pre-exercise coordination meeting:** To be held on the day prior to the volcanic ash exercise, i.e., on 16 February 2016, at Bali, Indonesia. To be chaired by the Exercise (in-State) Co-Leader and supported by the ICAO Secretariat.

1.9. **Debrief meeting:** VOLCEX/SG/3, 14-16 March 2016, Bangkok, Thailand. Note: VOLCEX/SG/3 shall include the debrief activity for VOLPHIN16/01 and planning activity for the next ICAO APAC volcanic ash exercise.

1.10. **Exercise website:** A special portal website for the exercise is not yet available. Other useful websites include:

- VAAC Darwin <http://www.bom.gov.au/info/vaac/> (for access to exercise VAA and VAG).

## 2. **PARTICIPATING AGENCIES**

2.1. Agencies that have agreed to participate in the exercise are listed according to area of responsibility in **Appendix A**.

2.2. Additional agencies that have agreed to observe in the exercise and provide input to the exercise debrief meeting are listed according to area of responsibility in **Appendix B**.

## 3. **AIMS AND OBJECTIVES**

3.1 The volcanic ash exercise should demonstrate the practice of applicable global and regional procedures including the provision/exchange of volcanic ash information in support of flexible airspace management, improved situational awareness and collaborative decision making, and dynamically-optimized flight trajectory planning. In particular, the exercise should demonstrate:

- Provision/exchange of alerts (e.g., VONA) and AIS and MET information (e.g., VAA/VAG, SIGMET, NOTAM, special air-report)
- Collaboration between operational units (e.g., VO, MO, MWO, VAAC, ATM, AIS and AO) and other relevant authorities and regulators
- Enhanced situational awareness and CDM (e.g., via a tele-conference/web-conference, website, or other media)
- Responses by operational units (e.g., air traffic flow management measures, safety risk assessments, tactical re-routes, aerodrome management)

3.2. The exercise shall be planned and conducted to ensure that detrimental effects on the aviation system performance are avoided, but that nevertheless useful experience and information is generated.

## 4. **EXERCISE DURATION**

4.1. The exercise shall be conducted over a period of approximately six (6) hours commencing 2300 UTC 16 February 2016.

## 5. EXERCISE VOLCANO<sup>2</sup>

5.1. **Name:** Merapi Volcano, **Number:** 263250, **Position:** S07 32.52 E110 26.51, **Area:** Indonesia

## 6. EXERCISE SCENARIO

6.1. Simulated eruption with volcanic ash cloud up to FL350 moving north-east at 20 knots to impact ATS routes and airspace within Jakarta FIR (WIIF) and Ujung Pandang FIR (WAAF) – and just missing Bali.

6.2. Schematics of the information flow between operational units and across FIR boundaries in a volcanic ash exercise is provided in **Appendix C**.

## 7. EXERCISE SCHEDULE

7.1. Participating agencies have agreed to the chronological list of the actions to be undertaken before and during the exercise, as provided in **Appendix D**.

7.2. A schematic of the actions to be undertaken during the exercise is provided in **Appendix E**.

## 8. EXERCISE SCENARIO MESSAGES

8.1. Examples of exercise scenario messages and distribution lists are provided as follows:

- VONA – **Appendix F**
- VAA – **Appendix G**
- VAG – **Appendix H**
- SIGMET – **Appendix I**
- NOTAM – **Appendix J**
- Special air-report – **Appendix K**

## 9. COMMUNICATIONS

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<sup>2</sup> Name and number as per Smithsonian database at <http://www.volcano.si.edu/>

9.1. Exercise scenario messages comprising VONA and NOTAM (Item E), and any voice communicated exercise messages, start with: **VA EXERCISE VOLPHIN16/01** and end with: **VA EXERCISE VA EXERCISE VA EXERCISE**.

9.2. Exercise scenario messages comprising VAA and SIGMET should include the use of **VA EXERCISE** and **VOLPHIN16/01** (in accordance with ICAO Doc 9766, Part 4, 4.8) to highlight and emphasise that the advisory or SIGMET refers to the volcanic ash exercise.

9.3. Exercise scenario messages comprising special air-reports end with: **VA EXERCISE VOLPHIN16/01 VA EXERCISE VA EXERCISE VA EXERCISE**.

9.4. Exercise tele-conferences/web-conferences start with: **VA EXERCISE VOLPHIN16/01**.

## **10. DIRECTING STAFF**

10.1. A list of all Directing Staff is provided at **Appendix L**.

10.2. A list of contacts for agencies observing the exercise is provided at **Appendix M**.

## **11. SPECIAL INSTRUCTIONS**

11.1. **Exercise GO/NO decision** shall be made by the Exercise Co-Leader one day before the planned exercise commencement date/time. In case of unforeseen circumstances, such as a real volcanic eruption or other significant event affecting the air transport system, the Exercise Co-Leader may decide to either postpone the exercise to a later date or to cancel the exercise. A decision not to proceed, i.e., to postpone or cancel the exercise, shall be communicated to all participants and observers as early as possible before the exercise is due to commence.

11.2. **Exercise tele-conference/web-conference instructions:**

**A. Lead:** The lead of tele-conference/web-conference calls should be the main ATM centre of the State where the volcano is erupting (e.g. for a volcanic eruption in Indonesia: ACC Jakarta)

**B. Expected participants and general information expected from each:**

VO – brief update on eruption status, latest height information, source of height information, duration of event, expected activity

VAAC – brief update on VAA/VAG (are observations such as aircraft reports being used to update products?)

MWO – brief update on SIGMET (if different from VAA/VAG, briefly explain why)

NOF – brief update on NOTAM and published reroutes

ACC – brief update on reroutes and coordination with ACCs and ATFMU

ACC/ATFMU – brief update on overall strategy (coordination with other ATFMUs and ACCs)

AO – brief update on tactical reroutes, flight plan changes and satisfaction with reroutes

ACC/ATFMU – respond, if necessary, to AO

ACC – respond, if necessary, to ATFMU and AO



**C. Information sharing:** Free to use Internet messaging and/or communications applications may be utilized as a supplementary means to share information between participants.

**D. Language:** Each State should arrange to have participants speak in English during the tele-conference/web-conferences.

**E. Microphones:** Each Participant should mute microphones to reduce background noise. The leader of the tele-conference/web-conference will instruct the participant when to speak.

## **12. ABBREVIATIONS, ACRONYMS and DEFINITIONS**

12.1. A list of abbreviations, acronyms and definitions used in this directive is provided at **Appendix N**.

VOLPHIN16/01 — VOLCANIC ASH EXERCISE DIRECTIVE (Version 16.02.16)  
Appendix A – List of participating agencies

<b>Area of responsibility</b>	<b>Agency</b>	<b>Unit/Division</b>
Volcanic activity alerting	CVGHM	Western Office
Volcanic ash advisory information	BoM	VAAC Darwin
METAR/SPECI	BMKG	Meteorological Office
Ground Observations at airports	Airport Operator	Denpasar
SIGMET information	BMKG	MWO Jakarta
	BMKG	MWO Ujung Pandang
Air traffic control; air traffic flow and capacity management	AirNav	ACC Jakarta
	AirNav	ACC Ujung Pandang
Aeronautical information service	AirNav	NOF Jakarta
	MSS*	RODB Singapore*
Aircraft operator response	Garuda	
	AirAsia Indonesia	
	Qantas	IOC
	Jetstar Airways (Australia & New Zealand)	Dispatch
	Virgin Australia	OCC
	Singapore*	
	Air New Zealand*	
Regulation	DGCA Indonesia*	Director of Air Navigation*
	CASA	Safety Systems Office (CASA)
Exercise coordination	ICAO	Asia and Pacific Office

\* to be confirmed

VOLPHIN16/01 — VOLCANIC ASH EXERCISE DIRECTIVE (Version 16.02.16)  
Appendix B – List of observing agencies

Area of responsibility	Agency	Unit/Division
Volcanic ash advisory information	MetService NZ*	VAAC Wellington*
	JMA	VAAC Tokyo
SIGMET information	PNG NWS*	MWO Port Moresby*
	BoM*	MWO Darwin*
	Hong Kong Observatory	MWO Hong Kong
ANSP	PNG Airservices*	ACC Port Moresby*
	CAAS*	ACC Singapore*
	Airservices Australia*	ACC Melbourne & Brisbane*
	DCA Malaysia	ATCC Kuala Lumpur ACC Kota Kinabalu
Aircraft operator response	IFALPA	Asia East
	IATA	Indonesia
	KLM	
	Jetstar Asia	
	Singapore Airlines	
	Royal Brunei Airlines	
	Malaysia Airlines	Flight Operations

\* to be confirmed

SCHEMATIC TO BE PROVIDED

VOLPHIN16/01 - VOLCANIC ASH EXERCISE DIRECTIVE (Version 16.02.16)  
Appendix D – List of Actions

<i>Date/Time (UTC)</i>	<i>Player/s</i>	<i>Event/Action</i>
** <b>Additional Actions All Units:</b> In addition to the actions listed below, all units are to take further action as necessary, in accordance with ICAO Doc 9766 <i>Handbook on International Airways Volcano Watch</i> Part 4, and any relevant local instructions/procedures.		
17/01/2016	Exercise leader, ICAO Secretariat	Publish final version of exercise directive
10/02/2016	Exercise Co-leader (M. Hasan Bashory), NOF Jakarta	Exercise Co-leader request NOF to issue preparatory NOTAMs to inform the aviation community of the exercise
15/02/2016, 2300	Exercise Co-leader (M. Hasan Bashory)	GO/NO decision – inform participants
16/02/2016, 2300	Exercise Co-leader (M. Hasan Bashory)	Send email message to all players to announce commencement of the exercise
16/02/2016, 2335	—	Simulated Merapi volcano eruption
16/02/2016, 2345	VO (CVGHM)	Issue 1 <sup>st</sup> exercise VONA (initial eruption details)  <i>Note: The email from Exercise co-leader at approx. 2300 is the trigger for the VO to issue the 1<sup>st</sup> exercise VONA at 2345</i>
Sequential	VAAC Darwin	Issue 1 <sup>st</sup> exercise VAA and VAG based on VONA
	MWO Jakarta	Issue 1 <sup>st</sup> exercise SIGMET for Jakarta FIR based on VONA
	MWO Ujung Pandang	Issue 1 <sup>st</sup> exercise SIGMET for Ujung Pandang FIR based on VONA
	NOF Jakarta	Issue 1 <sup>st</sup> exercise ASHTAM based on VONA, VAA/VAG, SIGMET
Sequential	ACC Jakarta/ ACC Ujung Pandang	Apply (simulated) ATFM measures – first response
17/02/2016, 0015	VAAC Darwin	Issue 2 <sup>nd</sup> exercise VAA and VAG based on observations, reports and simulated dispersion model output.
Sequential	MWO Jakarta/ MWO Ujung Pandang	Issue 2 <sup>nd</sup> exercise SIGMETs based on VAA/VAG
Sequential	NOF Jakarta	Issue 2 <sup>nd</sup> exercise ASHTAM based on SIGMET and VAA/VAG
Sequential	ACC Jakarta/ ACC Ujung Pandang	Apply (simulated) ATFM measures based on SIGMET

VOLPHIN16/01 - VOLCANIC ASH EXERCISE DIRECTIVE (Version 16.02.16)  
Appendix D – List of Actions

<i>Date/Time (UTC)</i>	<i>Player/s</i>	<i>Event/Action</i>
Sequential	AOs	Take appropriate (simulated) flight planning actions: e.g. reroute or cancel flights
17/02/2016, various times from 0050 onwards	AO (Garuda)	Report aircraft observation [volcanic ash/no volcanic ash] as exercise special air-report
Sequential to receipt of exercise special air-reports	ACC Jakarta/ ACC Ujung Pandang	Relay and record exercise special air-report
17/02/2016, 0130	Exercise Co-leader	Send email message inviting directing staff to join exercise teleconference at 0215.
17/02/2016, 0215	All	Exercise teleconference to discuss the latest situation
17/02/2016, 0315	VAAC Darwin	Issue 3 <sup>rd</sup> exercise VAA and VAG based on observations/reports
Sequential	MWO Jakarta/ MWO Ujung Pandang	Issue 3 <sup>rd</sup> exercise SIGMET based on VAA/VAG
Sequential	NOF Jakarta	Issue 3 <sup>rd</sup> exercise NOTAM based on SIGMET and VAA/VAG
Sequential	ACC Jakarta/ ACC Ujung Pandang	Apply (simulated) ATFM measures based on SIGMET
Sequential	AOs	Take appropriate (simulated) flight planning actions: e.g. reroute or cancel flights
17/02/2016, 0415	VAAC Darwin	Issue 4 <sup>th</sup> exercise VAA and 3 <sup>rd</sup> exercise VAG based on observations/reports
Sequential	MWO Jakarta/ MWO Ujung Pandang	Issue 4 <sup>th</sup> exercise SIGMET based on VAA/VAG
Sequential	NOF Jakarta	Issue 4 <sup>th</sup> exercise NOTAM based on SIGMET and VAA/VAG
Sequential	ACC Jakarta/ ACC Ujung Pandang	Apply (simulated) ATFM measures based on SIGMET
Sequential	AOs	Take appropriate (simulated) flight planning actions: e.g. reroute or cancel flights
17/02/2015, 0515	Exercise Co-leader	Send email message to all players to announce cessation of the exercise
Sequential	VO (CVGHM)	Issue VONA update (final exercise VONA)

VOLPHIN16/01 - VOLCANIC ASH EXERCISE DIRECTIVE (Version 16.02.16)  
Appendix D – List of Actions

<i>Date/Time (UTC)</i>	<i>Player/s</i>	<i>Event/Action</i>
Sequential	VAAC Darwin, MWO Jakarta/ MWO Ujung Pandang and NOF Jakarta	Issue final exercise VAA, cancellation exercise SIGMET and cancellation exercise ASHTAM

# VOLPHIN16-01 actions





VOLPHIN16/01 — VOLCANIC ASH EXERCISE DIRECTIVE (Version 16.02.16)  
Appendix F — Example VONA

Table 1: 1<sup>st</sup> exercise VONA

VA EXERCISE VOLPHIN16/01	
(1)	VOLCANO OBSERVATORY NOTICE FOR AVIATION – VONA
(2)	Issued: 20160216/2345Z
(3)	Volcano: Merapi (263250)
(4)	Current aviation colour code: <b>GREEN, YELLOW, ORANGE or RED</b> in upper-case bold font
(5)	Previous aviation colour code: green, yellow, orange or red in lower-case font, not bold
(6)	Source: CVGHM
(7)	Notice number: Create unique number for each VONA that includes year
(8)	Volcano location: S0733 E11027
(9)	Area: Indonesia
(10)	Summit elevation: 9735 FT (2968 M)
(11)	Volcanic activity summary: Eruption with volcanic ash-cloud at 2335 UTC (0835 local). Eruption and ash emission is continuing.
(12)	Volcanic cloud height: Best estimate of ash-cloud top is 25000 FT (7700 M) above summit. Source of height data: ground observer.
(13)	Other volcanic cloud information: Large ash-cloud moving to northeast.
(14)	Remarks: Optional. Brief comments on related topics (monitoring data, observatory actions, volcano's previous activity, etc.)
(15)	Contacts: Names, telephone and fax numbers, e-mail addresses.
(16)	Next notice: A new VONA will be issued if conditions change significantly or the colour code is changed. Latest volcanic information is posted at ????(website)
VA EXERCISE VA EXERCISE VA EXERCISE	

Table 2: Final exercise VONA

VA EXERCISE VOLPHIN16/01	
(1)	VOLCANO OBSERVATORY NOTICE FOR AVIATION – VONA
(2)	Issued: 20150217/0515Z
(3)	Volcano: Merapi (263250)
(4)	Current aviation colour code: <b>GREEN, YELLOW, ORANGE or RED</b> in upper-case bold font
(5)	Previous aviation colour code: green, yellow, orange or red in lower-case font, not bold
(6)	Source: CVGHM
(7)	Notice number: Create unique number for each VONA that includes year
(8)	Volcano location: S0733 E11027
(9)	Area: Indonesia
(10)	Summit elevation: 9735 FT (2968 M)

VOLPHIN16/01 — VOLCANIC ASH EXERCISE DIRECTIVE (Version 16.02.16)  
Appendix F — Example VONA

(11) Volcanic activity summary:	Eruption has ceased.
(12) Volcanic cloud height:	Ash-cloud not visible.
(13) Other volcanic cloud information:	Ash-cloud has dissipated.
(14) Remarks:	Optional. Brief comments on related topics (monitoring data, observatory actions, volcano's previous activity, etc.)
(15) Contacts:	Names, telephone and fax numbers, e-mail addresses.
(16) Next notice:	A new VONA will be issued if conditions change significantly or the colour code is changed. Latest volcanic information is posted at ????(website)
VA EXERCISE VA EXERCISE VA EXERCISE	

Table 3: Distribution list of exercise VONAs

**Notes:**

1. Information from State volcano observatories is **required** to be sent to their associated ACCs, MWOs and VAACs [*Annex 3, Appendix 2, 4.1*]
2. Information on volcanic eruptions from State volcano observatories **should** be immediately telephoned, verbally to the associated ACCs, MWOs and VAACs to inform them of the significant activity, and then followed up with a faxed or e-mailed VONA [*Doc 9766, Part 4, 4.2 a*]
3. VONA from State volcano observatories **may** also be distributed directly to interested operators in accordance with local arrangements [*Doc 9766, Part 4, 4.2 a*]

**Distribution list:**

Fax or e-mail VONA to:

- ACC Jakarta and ACC Ujung Pandang (ahmadrizal62@gmail.com; maryadi\_ats@yahoo.com; alam\_ra@hotmail.com)
- MWO Jakarta and MWO Ujung Pandang
- VAAC Darwin
- AOs (as per local arrangements)

VOLPHIN16/01 — VOLCANIC ASH EXERCISE DIRECTIVE (Version 01.02.16)  
Appendix G – Example VAA

Table 1: 1<sup>st</sup> exercise VAA

```
FVAU04 ADRM XXXXXX
VA ADVISORY
DTG: 20160216/2350Z
VAAC: DARWIN
VOLCANO: MERAPI 263250
PSN: S0733 E11027
AREA: INDONESIA
SUMMIT ELEV: 2968M
ADVISORY NR: 2016/1
INFO SOURCE: VA EXERCISE VONA
AVIATION COLOUR CODE: RED
ERUPTION DETAILS: VA EXERCISE ERUPTION AT 20160216/2345Z TO FL350 MOV NE
20KT
OBS VA DTG: 16/2350Z
OBS VA CLD: SFC/FL350 S0741 E11036 - S0740 E10951 - S0723 E11057 - S0710
E11051 - S0710 E11039 - S0713 E11027 - S0720 E11020 - S0728 E11018 - S0738
E11026 MOV NE 20KT
FCST VA CLD +6 HR: 17/0550Z NOT AVBL
FCST VA CLD +12 HR: 17/1150Z NOT AVBL
FCST VA CLD +18 HR: 17/1750Z NOT AVBL
RMK: VA EXERCISE VOLPHIN16/01 VONA RECEIVED INDICATING ERUPTION TO FL350. A
MORE DETAILED ADVISORY WILL BE ISSUED SHORTLY. VA EXERCISE VA EXERCISE VA
EXERCISE VA EXERCISE VA EXERCISE VA EXERCISE VA EXERCISE VA EXERCISE VA
EXERCISE VA EXERCISE VA EXERCISE
NXT ADVISORY: NO LATER THAN 20160217/0015Z
```

Table 2: 2<sup>nd</sup> exercise VAA

```
FVAU04 ADRM XXXXXX
VA ADVISORY
DTG: 20160217/0015Z
VAAC: DARWIN
VOLCANO: MERAPI 263250
PSN: S0733 E11027
AREA: INDONESIA
SUMMIT ELEV: 2968M
ADVISORY NR: 2016/2
INFO SOURCE: VA EXERCISE HIMAWARI-8
AVIATION COLOUR CODE: RED
ERUPTION DETAILS: VA EXERCISE SCENARIO, VA OBS FL350 EXTENDING 40 NM TO NE
OBS VA DTG: 17/0015Z
OBS VA CLD: SFC/FL350 S0749 E11037 - S0739 E11057 - S0716 E11105 - S0701
E11055 - S0659 E11038 - S0707 E11020 - S0719 E11012 - S0735 E11012 - S0744
E11024 MOV NE 20KT
FCST VA CLD +6 HR: 17/0615Z SFC/FL350 S0753 E11013 - S0753 E11100 - S0737
E11147 - S0719 E11216 - S0633 E11253 - S0603 E11246 - S0549 E11208 - S0554
E11107 - S0612 E11044 - S0641 E11018 - S0723 E10959
FCST VA CLD +12 HR: 17/1215Z SFC/FL350 S0803 E11044 - S0544 E11511 - S0431
E11457 - S0406 E11254 - S0628 E11000 - S0722 E10951 - S0757 E11010
FCST VA CLD +18 HR: 17/1815Z SFC/FL350 S0721 E11227 - S0625 E11712 - S0346
E11639 - S0234 E11424 - S0629 E11000 - S0725 E10949 - S0758 E11010 - S0805
E11052
RMK: VA EXERCISE VOLPHIN16/01 VA OBS ON IR SAT IMAGERY AND CONFIRMED BY
GROUND REPORTS. HEIGHT BASED ON IR TEMP AND ACCESS-R MODEL SOUNDING.
FORECAST CONFIDENCE IS LOW. VA EXERCISE VA EXERCISE VA EXERCISE VA EXERCISE
VA EXERCISE VA EXERCISE VA EXERCISE
NXT ADVISORY: NO LATER THAN 20160217/0315Z
```

VOLPHIN16/01 — VOLCANIC ASH EXERCISE DIRECTIVE (Version 01.02.16)  
Appendix G – Example VAA

Table 3: 3<sup>rd</sup> exercise VAA

```
FVAU04 ADRM XXXXXX
VA ADVISORY
DTG: 20160217/0315Z
VAAC: DARWIN
VOLCANO: MERAPI 263250
PSN: S0733 E11027
AREA: INDONESIA
SUMMIT ELEV: 2968M
ADVISORY NR: 2016/3
INFO SOURCE: VA EXERCISE PIREP HW8
AVIATION COLOUR CODE: RED
ERUPTION DETAILS: VA EXERCISE SCENARIO VA ERUPTION TO FL350
OBS VA DTG: 17/0315Z
OBS VA CLD: SFC/FL140 S0729 E11024 - S0749 E10953 - S0803 E11005 - S0733
E11028 MOV SW 10KT SFC/FL350 S0734 E11119 - S0729 E11204 - S0703 E11243 -
S0617 E11307 - S0556 E11258 - S0545 E11224 - S0552 E11058 - S0616 E11040 -
S0712 E11045 MOV NE 20KT
FCST VA CLD +6 HR: 17/0915Z SFC/FL140 S0733 E11031 - S0727 E11025 - S0802
E10955 - S0810 E11014 SFC/FL350 S0712 E11232 - S0640 E11353 - S0559 E11449
- S0441 E11434 - S0434 E11313 - S0518 E11132 - S0624 E11104 - S0701 E11151
FCST VA CLD +12 HR: 17/1515Z SFC/FL140 S0728 E11027 - S0815 E11003 - S0820
E11016 - S0817 E11029 - S0729 E11031 SFC/FL350 S0649 E11411 - S0554 E11613
- S0410 E11549 - S0356 E11403 - S0502 E11214 - S0609 E11156 - S0649 E11214
FCST VA CLD +18 HR: 17/2115Z SFC/FL140 S0728 E11027 - S0825 E11007 - S0829
E11029 - S0825 E11043 - S0729 E11032 SFC/FL350 S0701 E11403 - S0625 E11712
- S0409 E11732 - S0347 E11601 - S0420 E11347 - S0526 E11235 - S0606 E11223
- S0659 E11258
RMK: VA EXERCISE VOLPHIN16/01 SATELLITE IMAGERY INDICATES THE MAIN
ERUPTION CLOUD HAS NOW DETACHED FROM THE VOLCANO. A LOWER LEVEL, CONTINUOUS
PLUME TO FL140 IS ALSO DISCERNIBLE AT THE VOLCANO. VA EXERCISE VA EXERCISE
VA EXERCISE VA EXERCISE VA EXERCISE
NXT ADVISORY: NO LATER THAN 20160217/0615Z
```

VOLPHIN16/01 — VOLCANIC ASH EXERCISE DIRECTIVE (Version 01.02.16)  
Appendix G – Example VAA

Table 4: 4<sup>th</sup> exercise VAA

```
FVAU04 ADRM XXXXXX
VA ADVISORY
DTG: 20160217/0415Z
VAAC: DARWIN
VOLCANO: MERAPI 263250
PSN: S0733 E11027
AREA: INDONESIA
SUMMIT ELEV: 2968M
ADVISORY NR: 2016/4
INFO SOURCE: VA EXERCISE PIREP HW8
AVIATION COLOUR CODE: RED
ERUPTION DETAILS: VA EXERCISE SCENARIO VA ERUPTION TO FL350
OBS VA DTG: 17/0415Z
OBS VA CLD: SFC/FL140 S0729 E11024 - S0754 E10956 - S0807 E11009 - S0733
E11028 MOV SW 10KT SFC/FL350 S0619 E11133 - S0703 E11209 - S0703 E11243 -
S0630 E11322 - S0552 E11310 - S0544 E11211 MOV NE 20KT
FCST VA CLD +6 HR: 17/1015Z SFC/FL140 S0733 E11031 - S0727 E11025 - S0806
E11002 - S0810 E11023 SFC/FL350 S0657 E11302 - S0640 E11353 - S0605 E11427
- S0514 E11426 - S0512 E11340 - S0524 E11232 - S0611 E11211 - S0648 E11222
FCST VA CLD +12 HR: 17/1615Z SFC/FL140 S0728 E11027 - S0815 E11003 - S0820
E11016 - S0817 E11029 - S0729 E11031 SFC/FL350 S0637 E11436 - S0611 E11527
- S0454 E11533 - S0448 E11407 - S0516 E11309 - S0606 E11256 - S0639 E11330
FCST VA CLD +18 HR: 17/2215Z SFC/FL140 S0728 E11027 - S0825 E11007 - S0829
E11029 - S0824 E11049 - S0729 E11032
RMK: VA EXERCISE VOLPHIN16/01 VA TO FL350 CLEARLY DISCERNIBLE ON SAT
IMAGERY, EXPECTED TO DISSIPATE BY 18/0000Z. ERUPTION TO FL140 CONTINUES AT
THE VOLCANO. VA EXERCISE VA EXERCISE VA EXERCISE VA EXERCISE VA EXERCISE VA
EXERCISE VA EXERCISE VA EXERCISE
NXT ADVISORY: NO LATER THAN 20160217/0715Z
```

Table 5: Final exercise VAA

```
FVAU04 ADRM XXXXXX
VA ADVISORY
DTG: 20160217/0515Z
VAAC: DARWIN
VOLCANO: MERAPI 263250
PSN: S0733 E11027
AREA: INDONESIA
SUMMIT ELEV: 2968M
ADVISORY NR: 2016/5
INFO SOURCE: VA EXERCISE
AVIATION COLOUR CODE: RED
ERUPTION DETAILS: VA EXERCISE SCENARIO ERUPTION HAS NOW CEASED
OBS VA DTG: 17/0515Z
OBS VA CLD: VA NOT IDENTIFIABLE FM SATELLITE DATA WIND SFC/FL350 VRB20KT
FCST VA CLD +6 HR: 17/1115Z NO VA EXP
FCST VA CLD +12 HR: 17/1715Z NO VA EXP
FCST VA CLD +18 HR: 17/2315Z NO VA EXP
RMK: VA EXERCISE VOLPHIN16/01 END NO FURTHER ADVISORIES VA EXERCISE VA
EXERCISE VA EXERCISE VA EXERCISE VA EXERCISE VA EXERCISE VA EXERCISE VA
EXERCISE VA EXERCISE VA EXERCISE VA EXERCISE VA EXERCISE VA EXERCISE VA
EXERCISE VA EXERCISE VA EXERCISE VA EXERCISE
NXT ADVISORY: NO FURTHER ADVISORIES
```

Table 6: Distribution list (including AFTN addresses) of exercise VAAs

**Notes:**

1. In accordance with Annex 3, 3.5.1 c), VAACs **shall** issue advisory information to:
  - a. MWOs, ACCs and FICs serving FIRs in their area of responsibility which may be affected;
  - b. Other VAACs whose areas of responsibility may be affected;
  - c. WAFCs, international OPMET databanks, international NOTAM offices, and SADIS/WIFS gateways; and
  - d. Airlines requiring the advisory information through the AFTN address provided specifically for this purpose.
2. All exercise VAA will be available from the Darwin VAAC webpage: <http://www.bom.gov.au/info/vaac/advisories.shtml>

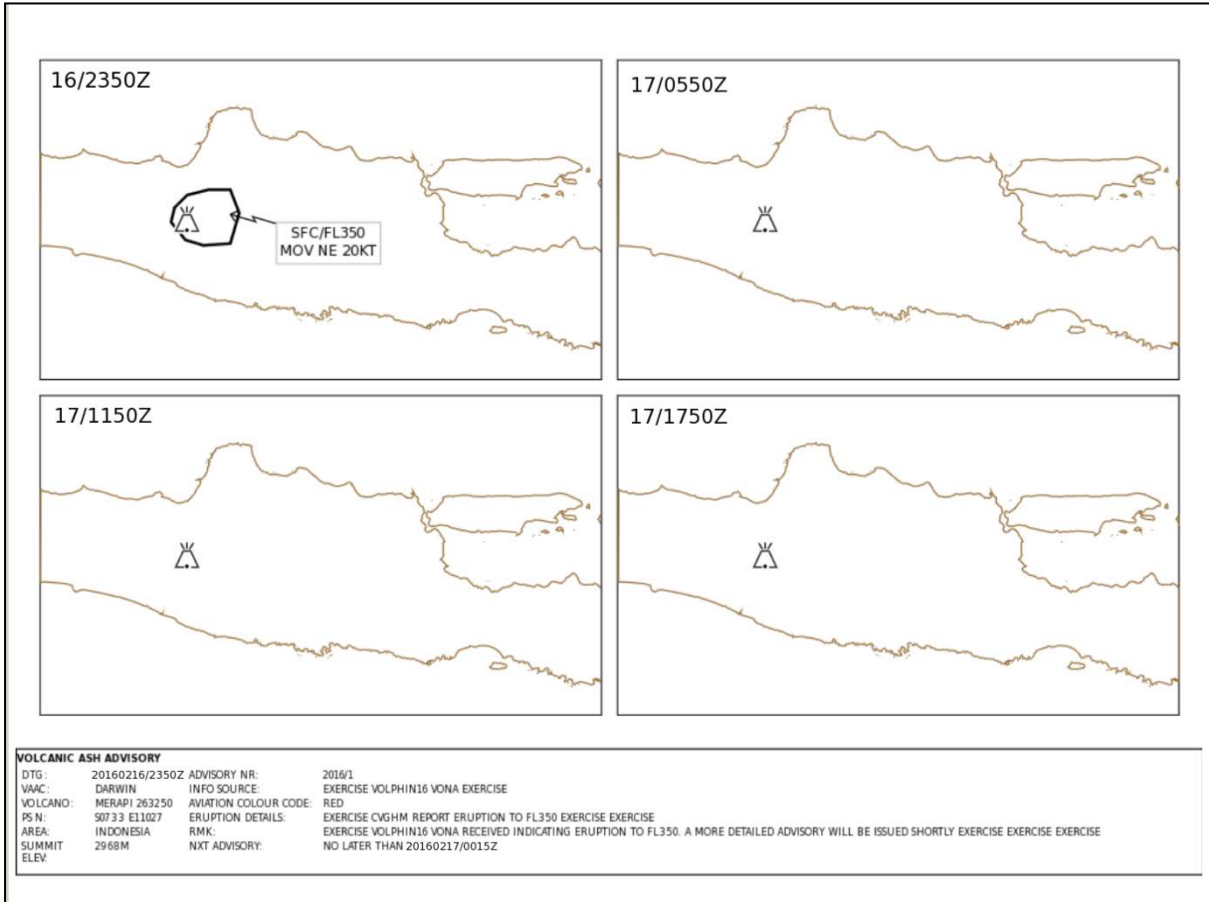
**Distribution list:**

**AFTN**

AGGHYMYX, ANYNYOYX, AYPMYMYX, AYPMYSYX, AYPMZGZX, AYPYANGM, AYPYANGO, EGKKVIRW, EGLLSITV, EGZZMASI, EGZZMPAC, EGZZVANW, EHAMKLM D, EHAMKLMK, EHAMKLMW, ELLXCLXB, KDENXLDW, KJFKGTIW, KWBCYMYX, LOZZMMSS, LSZHSWRW, NFFNYPYX, NZAAANZO, NZKLYMYX, RJAAANAO, RJA AJALO, RJAANCAO, RJAAYMYX, RKS IYPYX, RPHIZRZX, RPLLYMYX, VCB IYMYX, VCBIZQZX, VHHHCPAO, VHHHYMYX, VOMFZQZX, VOMMYMYX, VTBBYPYX, VTBDYMYX, VTBSYMYX, VVGLYMYX, VVNBZRZX, VVTSYMYX, VVTSZRZX, VYYYYMYX, VYYYYZQZX, WAAAYMYX, WAAAZQZX, WABBYMYX, WADDYMYF, WADDYMYX, WADDYOYX, WBFCZQZX, WBKMYMYX, WBSBYMYX, WIHHYMYX, WIIYMYX, WIIIZQZX, WMFCZQZX, WMKBYMYX, WMKBYWYX, WMKKMASD, WMKMYMYX, WPD LZTZX, YPTNZTZX, YSSYQFAM, WRRRYNYX, WSATYMYX, WSJCZQZX, WSSSIAO, WSSSYMYW, WSSSYMYX, WSZZMYR, YAMBZAZX, YAMBZGZA, YAMBZTZX, YBBBNCYM, YBBBVOZM, YBBBZRZA, YBBBZRZB, YBBBZRZG, YBBBZRZX, YMMLJSTX, YMMMZRZA, YMMMZRZB, YMMMZRZG, YPDNZAZX, YPDNZGZA, YPDNZTZX, YPTNZAZX, YPTNZGZA

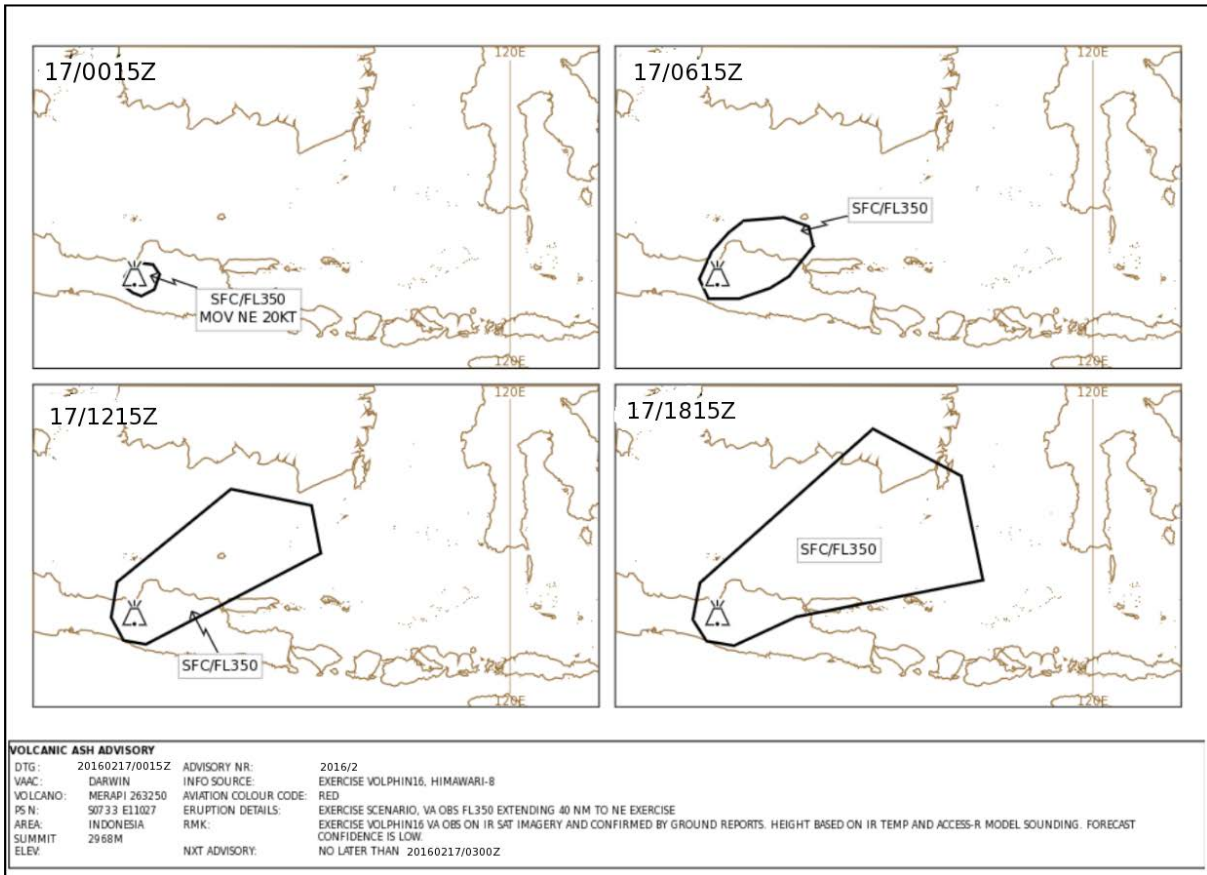
VOLPHIN16/01 — VOLCANIC ASH EXERCISE DIRECTIVE (Version 01.02.16)  
 Appendix H — Example VAG

Table 1: 1<sup>st</sup> exercise VAG



VOLPHIN16/01 — VOLCANIC ASH EXERCISE DIRECTIVE (Version 01.02.16)  
 Appendix H — Example VAG

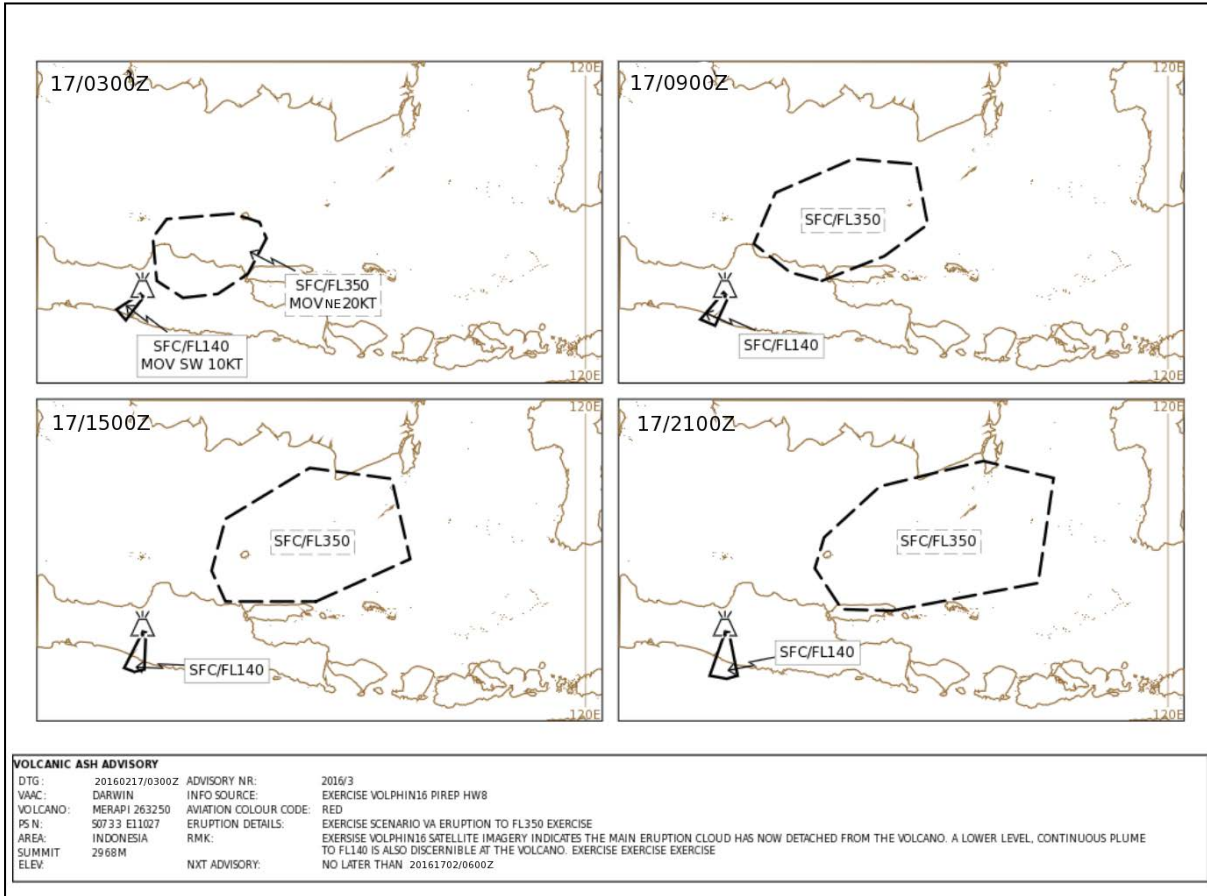
Table 2: 2<sup>nd</sup> exercise VAG





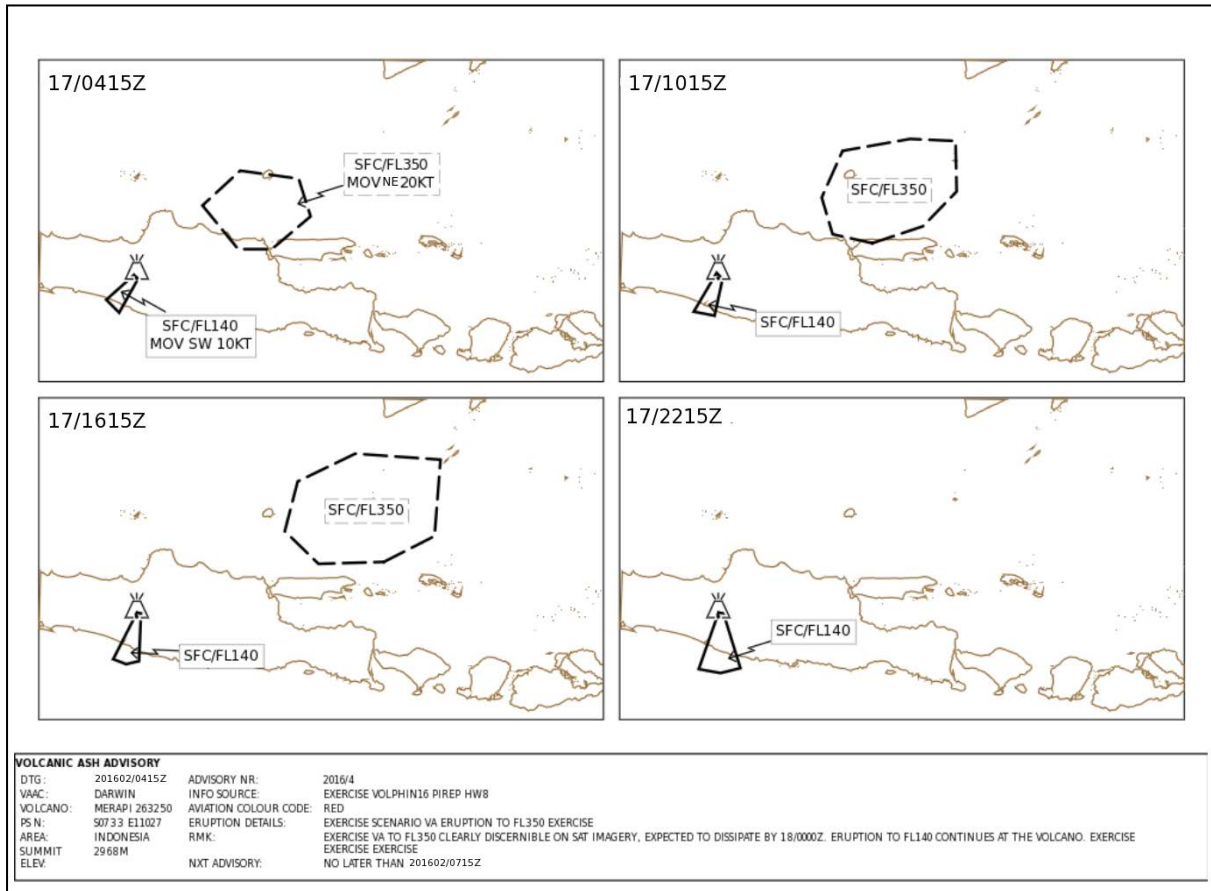
VOLPHIN16/01 — VOLCANIC ASH EXERCISE DIRECTIVE (Version 01.02.16)  
 Appendix H — Example VAG

Table 3: 3<sup>rd</sup> exercise VAG



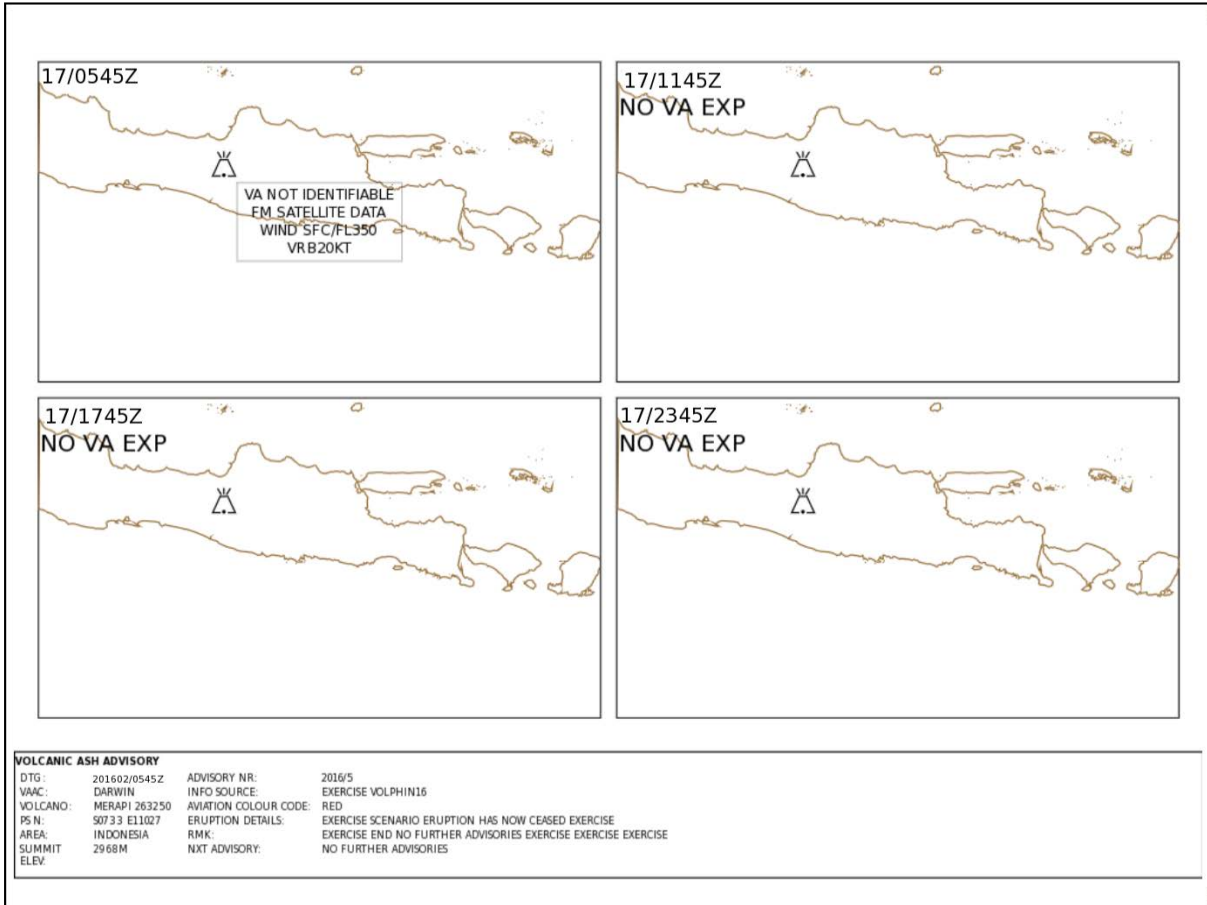
VOLPHIN16/01 — VOLCANIC ASH EXERCISE DIRECTIVE (Version 01.02.16)  
 Appendix H — Example VAG

Table 4: 4<sup>th</sup> exercise VAG



VOLPHIN16/01 — VOLCANIC ASH EXERCISE DIRECTIVE (Version 01.02.16)  
 Appendix H — Example VAG

Table 5: Final exercise VAG



**Table 6: Distribution list of exercise VAGs**

**Notes:**

1. When prepared in graphical format, VAAC Darwin issues advisory information (VAG) using the PNG format and distributes it via the public Internet.
2. All exercise VAG will be available from the Darwin VAAC webpage: <http://www.bom.gov.au/info/vaac/advisories.shtml>

**Distribution list:**

E-mail

[list]

VOLPHIN16/01 — VOLCANIC ASH EXERCISE DIRECTIVE (Version 16.02.16)  
Appendix I — Example SIGMET

Table 1: 1<sup>st</sup> exercise SIGMET

```
WVID21 WAAA 162355
WAAZ SIGMET [nn]n VALID 162355/170555 WAAA-
WAAZ UJUNG PANDANG FIR VA EXERCISE VOLPHIN16/01 VA ERUPTION MT MERAPI PSN
S0733 E11027 VA CLD OBS AT 2345Z APRX SFC/FL350 S0741 E11036 - S0740 E10951
- S0723 E11057 - S0710 E11051 - S0710 E11039 - S0713 E11027 - S0720 E11020
- S0728 E11018 - S0738 E11026 MOV NE 20KT=
```

Table 2: 2<sup>nd</sup> exercise SIGMET

```
WVID21 WAAA 170020
WAAZ SIGMET [nn]n VALID 170020/170520 WAAA-
WAAZ UJUNG PANDANG FIR VA EXERCISE VOLPHIN16/01 VA ERUPTION MT MERAPI PSN
S0733 E11027 VA CLD OBS AT 0015Z APRX SFC/FL350 S0749 E11037 - S0739 E11057
- S0716 E11105 - S0701 E11055 - S0659 E11038 - S0707 E11020 - S0719 E11012
- S0735 E11012 - S0744 E11024 MOV NE 20 KT=
```

Table 3: 3<sup>rd</sup> exercise SIGMET

```
WVID21 WAAA 170320
WAAZ SIGMET [nn]n VALID 170320/170920 WAAA-
WAAZ UJUNG PANDANG FIR VA EXERCISE VOLPHIN16/01 VA ERUPTION MT MERAPI PSN
S0733 E11027 VA CLD OBS AT 0315Z APRX SFC/FL350 S0729 E11024 - S0749 E10953
- S0803 E11005 - S0733 E11028 MOV SW 10KT SFC/FL350 S0734 E11119 - S0729
E11204 - S0703 E11243 - S0617 E11307 - S0556 E11258 - S0545 E11224 - S0552
E11058 - S0616 E11040 - S0712 E11045 MOV NE 20KT WKN=
```

Table 4: 4<sup>th</sup> exercise SIGMET

```
WVID21 WAAA 170420
WAAZ SIGMET [nn]n VALID 170420/171020 WAAA-
WAAZ UJUNG PANDANG FIR VA EXERCISE VOLPHIN16/01 VA ERUPTION MT MERAPI PSN
S0733 E11027 VA CLD OBS AT 0415Z APRX SFC/FL140 S0729 E11024 - S0754 E10956
- S0807 E11009 - S0733 E11028 MOV SW 10KT SFC/FL350 S0619 E11133 - S0703
E11209 - S0703 E11243 - S0630 E11322 - S0552 E11310 - S0544 E11211 MOV NE
20KT WKN=
```

Table 5: Final exercise SIGMET

```
WVID21 WAAA 170520
WAAZ SIGMET [nn]n VALID 170520/171020 WAAA-
WAAZ UJUNG PANDANG FIR VA EXERCISE VOLPHIN16/01 CNL SIGMET [nn]n
170420/171020=
```

Table 3: Distribution list of exercise SIGMET messages

**Note:**

In accordance with Annex 3, Appendix 6, 1.2, and the Regional SIGMET Guide, SIGMET messages **shall** be disseminated to:

1. Local ATS users
2. Aerodrome meteorological offices
3. Adjacent MWOs and ACCs;
4. WAFCs (via the RODBs/ROBEX scheme);
5. Responsible VAACs;
6. RODBs (via the RODBs/ROBEX scheme); and
7. SADIS and WIFS gateways (via the RODBs/ROBEX scheme).

**Distribution list:**

**Local ATS users:** [list]

**Aerodrome meteorological offices:** [list]

**MWOs and ACCs:** Jakarta, Ujung Pandang, Kuala Lumpur, Singapore, Kota Kinabalu, Manila, Port Moresby, Darwin

**RODBs:** Bangkok, Brisbane, Nadi, Singapore, Tokyo

**VAACs:** Darwin

**AFTN**

VTBBYPYX, YBBBYPYX, NFZZRFXX, WSZZPYM, RJTDYPYX, EGZZMASI,  
KWBCYMYX, WIZZMIMI, WSZZYPYX, WMZZYPYR, WMKKZQZX, WBKKZQZQ,  
RPHIZRZX

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Appendix J — Example NOTAM/ASHTAM

**Table 1: Preparatory NOTAM (issued 1 week prior to exercise)**

(Axxxx/16 NOTAMN Q) nnnn/QWWXX/IV/NBO/W/000/999/0733S11027E999  
 A) nnnn  
 B) nnnnnnnnnn  
 C) nnnnnnnnnn  
 D)  
 E) VA EXERCISE VOLPHIN16/01. VOLCANIC ASH EXERCISE TAKES PLACE FROM 16 FEBRUARY 23:00UTC TO 17 FEBRUARY 05:15UTC. EXERCISE NAME: VOLPHIN16/01. EXERCISE VOLCANO: MERAPI 263250 S07 33 E110 27 INDONESIA. FREE TEXT OF PROMULGATED EXERCISE MESSAGES CONTAINS: VA EXERCISE OR VA EXERCISE VOLPHIN16/01.  
 F) SFC  
 G) UNL)

**Table 2: Exercise ASHTAM**

VAWR[serial number] [location indicator] [date/time of issuance]  
 ASHTAM [serial number]  
 A) [FIR affected]  
 B) 02162350  
 C) MERAPI 263250  
 D) S0733 E11027  
 E) RED ALERT  
 F) VA EXERCISE VOLPHIN16/01 [existence and horizontal/vertical extent of volcanic ash cloud]  
 G) [direction of movement of ash cloud]  
 H) [air routes or portions of air routes and flight levels affected]  
 I) [closure of airspace and/or air routes or portions of air routes, and alternative air routes available]  
 J) [source of information]  
 K) [plain-language remarks] VA EXERCISE VA EXERCISE VA EXERCISE

**Table 3: Final exercise NOTAM**

(Axxxx/16 NOTAMC Q) Axxxx/16 nnnn/QWWXX/IV/NBO/W/000/999/0733S11027E999  
 A) nnnn  
 B) nnnnnnnnnn  
 C) nnnnnnnnnn  
 D)  
 E) VA EXERCISE VOLPHIN16/01 HAS CONCLUDED. [Details of cessation of eruption and dissipation of VA cloud based on final exercise VONA]. VA EXERCISE VA EXERCISE VA EXERCISE.  
 F)  
 G))

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Appendix J — Example NOTAM/ASHTAM

Table 4: Distribution list (including AFTN addresses) of exercise NOTAMs

**Notes:**

1. International exchange of exercise NOTAM shall take place only as mutually agreed between the international NOTAM offices concerned [*Annex 15, Chapter 5, 5.3.4*];
2. International exchange of exercise NOTAM shall include VAACs and the SADIS and WIFS gateways [*Annex 15, Chapter 5, 5.3.4*];
3. Exercise NOTAM should also be sent to the associated MWO [*Doc 9766, Part 4, 4.2 a) and 4.3.1*].

**Distribution list:**

AFTN

AGGHYMYX	ANYNYOYX	AYPMYMYX	AYPMYSYX	AYPMZGZX	AYPYANGM	AYPYANGO
EGKKVIRW	EGLLSITV	EGZZMASI	EGZZMPAC	EGZZVANW	EHAMKLM D	EHAMKLMK
EHAMKLMW	ELLXCLXB	KDENXLDW	KJFKGTIW	KWBCYMYX	LOZZMMSS	LSZH SWRW
NFFNYPYX	NZAAANZO	NZKLYMYX	RJAAANAO	RJAAJALO	RJAANCAO	RJAAYMYX
RKSIYPYX	RPHIZRZX	RPLLYMYX	VCBIYMYX	VCBIZQZX	VHHHCPAO	VHHHYMYX
VOMFZQZX	VOMMYMYX	VTBBYPYX	VTBDYMYX	VTBSYMYX	VVGLYMYX	VVNBZRZX
VVTSYMYX	VVTSZRZX	VYYYYMYX	VYYYYQZX	WBFCZQZX	WBKKYMYX	WBSBYMYX
WMFCZQZX	WMKBYMYX	WMKBYWYX	WMKKMASD	WMKKYMYX	WPD LZTZX	YPTNZTZX
YSSYQFAM	WSATYMYX	WSJCZQZX	WSSSSIAO	WSSSYMYW	WSSSYMYX	WSZZMYR
YAMBZAZX	YAMBZGZA	YAMBZTZX	YBBBNCYM	YBBBVOZM	YBBBZRZA	YBBBZRZB
YBBBZRZG	YBBBZRZX	YMMLJSTX	YMMMZRZA	YMMMZRZB	YMMMZRZG	YMMMZRZX
YPDNZAZX	YPDNZGZA	YPDNZTZX	YPTNZAZX	YPTNZGZA	WII IYMYX	WAAAYMYX
WII IYOYW	WII IYFYB	WII IGIAX	WIJJYOYW	WIEEYOYW	WIGGYOYW	WIBBYOYW
WICCYOYW	WARRYOYW	WAHQYOYE	WAHSYOYE	WAHHYOYE	WADDYOYE	WADLYOYE
WIRRYOYW	WILLYOYW	WAAAYOYE	WAOOYOYE	WALLYOYE	WAMMYOYE	WAMGYOYE
WAWWYOYE	WAPPYOYE	WASSYOYE	WABBYOYE	WAQQYOYE	EFZZNOWI	EHZZNTXX
ESZZNAWI	LIZZNBWI	OBZZNAXX	OEJDYNYX	OJZZNJXX	OKNOYNYX	OOZZNDNX
OPZZNAXX	RCZZNMXX	RJZZNAXX	RPZZNANX	RPLLYNYX	UUZZNINX	VEZZNAXX
VGZZNAXX	VMMCYNXX	VRMMYNYX	WMZZNAXX	ZGZZNFXX	WBSBYOYX	EUECYIYN
EBZZNAWI	EDZZNLWI	EGZZNWII	EKZZNAWI	FSSSYNYX	LSZZNAWI	OMZZNGXX
RKZZNKXX	VAZZNAWI	VCZZNOAX	VHZZNMXX	VVZZNAXX	VTBDYNYX	VOZZNAVA
RKSSAARO	VTZZNTXX	VVZZNANX	WSZZNAXX	OII IYNYX	WIKKYOYW	WITTYOYW



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Appendix K — Example special air-report

**Table 1: Special air-report compiled for voice communications (flight crew to ATS unit)**

AIREP SPECIAL [aircraft identification] [position] [time] [level] VOLCANIC  
ASH CLOUD VA EXERCISE VOLPHIN16/01 VA EXERCISE VA EXERCISE VA EXERCISE

**Table 2: Special air-report as recorded by the ATS unit and forwarded to the MET office concerned**

ARS [aircraft identification] [position] [time] [level] VA CLD VA EXERCISE  
VOLPHIN16/01 VA EXERCISE VA EXERCISE VA EXERCISE=

**Table 3: Special air-report (uplink) – as recorded by the MWO and transmitted to VAACs, WAFCs, SADIS/WIFS**

ARS [aircraft identification] VA CLD [FL nnn/nnn] or VA [MT nnnnnnnnnn] OBS  
AT nnnnZ [location] [level] VA EXERCISE VOLPHIN16/01 VA EXERCISE VA  
EXERCISE VA EXERCISE=

**Table 4: Distribution list (including AFTN addresses) of exercise special air-reports**

**Notes:**

1. To simulate the transmission of special air-report on volcanic ash from flight crew to ATS unit by voice communications, the designated participating AO should transmit the exercise special air-report compiled in voice communication format via e-mail to the ACC concerned;
2. ACCs shall forward exercise special air-reports without delay to their associated MWOs [PANS-ATM, Chapter 4, 4.12.6.3];
3. MWOs should transmit exercise special air-reports to their associated VAACs, the WAFCs and SADIS/WIFS gateways [Doc 9766, Part 4, 4.5.1 a)].

**Distribution list:**

E-mail

ACC Jakarta — ahmadrizal62@gmail.com

ACC Ujung Pandang — maryadi\_ats@yahoo.com; alam\_ra@hotmail.com

AFTN

MWO Jakarta — WIIIZQZX

MWO Ujung Pandang — WAAAYMYX

VAAC Darwin — YPDMYMYX

W AFC London/SADIS — EGZZMASI

W AFC Washington — KWBCYMYX

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Appendix L — List of Directing Staff

**Table 1: Directing Staff**

<i>Role</i>	<i>Organization</i>	<i>State</i>	<i>Contact name</i>	<i>Contact position</i>	<i>Telephone/Fax numbers</i>	<i>Email and skype address/es</i>
Exercise Leader	JMA	Japan	Mr. Koichiro KAKIHARA	Senior Coordinator for International Aeronautical Meteorology	Tel: +81 (3) 3212 8968 Fax: +81 (3) 3212 8968	k-kakahara@met.kishou.go.jp kakahara516@gmail.com
In-State Exercise Co-leader	DGCA	Indonesia	Moh. Hasan Bashory  Mrs Dinni Noerdiani	Deputy Director, Air Navigation Deputy Director, Operation	Tel: +62 21 3505006 ext 16003	bashory@aviasi.org  dinni_n@yahoo.com
Lead VO	CVGHM	Indonesia	Gede Suantika	Kepala Bidang Pengamatan dan Penyelidikan Gunung Api	Tel : +6282129999218(WA) +6222 7272606	gede@vsi.esdm.go.id gedesuantika@ymail.com
Lead VAAC	VAAC Darwin, BoM	Australia	Emile Jansons	Manager Upper Airspace	Tel: +61 3 9669 4388	e.jansons@bom.gov.au darwin.vaac.admin@bom.gov.au
Lead MWO	MWO Jakarta, BMKG	Indonesia	Rekso Hartono	Coordinator for data and information	Tel : +628138389986(WA)	Rekso.hartono@yahoo.com
Lead MWO	MWO Ujung Pandang, BMKG	Indonesia	Hari Triwibowo	Coordinator for data and information	Tel : +6285244560626(WA)	Hari.triwibowo@bmgk.go.id

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Appendix L — List of Directing Staff

<i>Role</i>	<i>Organization</i>	<i>State</i>	<i>Contact name</i>	<i>Contact position</i>	<i>Telephone/Fax numbers</i>	<i>Email and skype address/es</i>
MET service	BMKG HQ	Indonesia	Zulkarnain	Forecaster Met Penerbangan	Tel : +6281385391410(WA)	zulkarnain@bmgk.go.id
Lead ACC, ANSP	ACC Jakarta, AirNav	Indonesia	Ahmad Rizal		Tel : +6281298283098(WA)	ahmadrizal62@gmail.com
Lead ACC, ANSP	ACC Ujung Pandang, AirNav	Indonesia	Sumaryadi Alam M.		Tel : +6281933955777(WA) +6281355439784(WA)	maryadi_ats@yahoo.com alam_ra@hotmail.com
Lead NOF, ANSP	NOF Jakarta, AirNav	Indonesia	R Ahmad Hasyim		Tel : +6281319709759(WA)	r.ahmadhasyim@gmail.com
AO, airspace user	Silk Air	Indonesia	Capt Luth Boroh			Luth_Boroh@singaporeair.com.sg
AO, airspace user	Garuda	Indonesia	Capt. Hasyim Capt. Lucky Luksmono			hasyim737@yahoo.co.id ll.goemono@garuda-indonesia.com
AO, airspace user	Lion Group (Batik Air)	Indonesia	Capt. Wisnu			wijayanto.wisnu@gmail.com
AO, airspace user	Indonesia Air Asia	Indonesia	Capt. Andik Setiawan			andiksetiawan@airasia.com
AO, airspace user	Sriwijaya Air	Indonesia	Capt. Toto Sebandoro			toto.soebandoro@sriwijayaair.co.id
AO,	Jetstar	Australia	Glenn			Glenn.Johnston@jetstar.com

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Appendix L — List of Directing Staff

<i>Role</i>	<i>Organization</i>	<i>State</i>	<i>Contact name</i>	<i>Contact position</i>	<i>Telephone/Fax numbers</i>	<i>Email and skype address/es</i>
airspace user	Airways (Australia & New Zealand)		Johnston Chandrike Jayasundera	Dispatch Manager	Ph: (+61) 3 8628 3165 Mob: (+61) 437400683	Chandrike.jayasundera@jetstar.com
AO, airspace user	Qantas	Australia	Graham Rennie	Principal Adviser Global Operations Development	Tel: +61 2 9691 1157 Mob: +61(0)418602638	grennie@qantas.com.au
AO, airspace user	Virgin Australia	Australia	Adrian Slootjes	Manager, ATM and Meteorology	Tel: +61 7 3136 4877 Mob: +61(0)434077615	adrian.slootjes@virginaustralia.com
Regulation	CASA	Australia	Ashley McAlpine	Volcanic Ash Working Group Secretary	+61 (0)7 3144 7411	Ashley.mcalpine@casa.gov.au
Exercise support	ICAO	APAC	Peter Dunda Shane Sumner	RO/MET RO/ATM	T: +66 (0)2 537 8189	pdunda@icao.int ssumner@icao.int

VOLPHIN16/01 — VOLCANIC ASH EXERCISE DIRECTIVE (Version 12.02.16)  
Appendix M — List of Observing Staff

**Table 1: Observing Staff**

<i>Role</i>	<i>Organization</i>	<i>State</i>	<i>Contact name</i>	<i>Contact position</i>	<i>Telephone/Fax numbers</i>	<i>Email address/es</i>
VO						
VAAC	Japan Meteorological Agency	Japan	Yohko IGARASHI (Ms.)		Tel: +81-3-3212-8341 ext. 4726	y_igarashi@met.kishou.go.jp
MWO	Hong Kong Observatory	Hong Kong, China	Luen-on LI			loli@hko.gov.hk
MWO						
ATMC						
ATMC						
ATMC						
ACC	DCA Malaysia	Malaysia	Nasruddin B. Zainol Abidin	D Dir		nasruddin@dca.gov.my
ACC						
NOF						
AO, airspace user	KLM		Atiek Kuncorowati		+62 811 820 4280	atiek.kuncorowati@klm.com
AO, airspace user	Jetstar Asia		Al Nawaz Calvin Koh	Duty Officer (OCC)	+65 96549497 +65 90690670 +65 90887628	Al.Sajwani@jetstar.com Calvin.Koh@jetstar.com operations.resources@jetstarasia.com

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Appendix M — List of Observing Staff

<i>Role</i>	<i>Organization</i>	<i>State</i>	<i>Contact name</i>	<i>Contact position</i>	<i>Telephone/Fax numbers</i>	<i>Email address/es</i>
AO, airspace user	Singapore Airlines		Capt. Jeremy Aeria Capt. Leonard Wee		+65 96869688 +65 96824744	jeremy_aeria@singaporeair.com.sg kleonard_wee@singaporeair.com.sg
AO, airspace user	Royal Brunei Airlines		Capt. Sabirin Hari Prasetyo Utomo	RB MCC	+6738770217 +628155063378 +6738747320	Sabirin.Hamid@rba.com.bn SUBPRASETYO@rba.com.bn OCMCC@rba.com.bn
AO, airspace user	Malaysia Airlines		Capt. Tan Poh Keat Capt. Hamdan Capt. Andrew Lim		+60125203086 +60126077823 +60123061777	pohkeat.tan@malaysiaairlines.com hamdan.cheismail@malaysiaairlines.com Andrew.lim@malaysiaairlines.com
AO, airspace user	Cathay Pacific			Manager on duty Airport service manager	+62-81238-01822 +62-81238-07667	bakti_setiariani@cathaypacific.com DPSKZ@cathaypacific.com
AO, airspace user	IATA Indonesia		Roro Silasih		+62811804715	siliasihr@iata.org
AO, airspace user	IFALPA Asia/East	(observing from MSS)	Capt. Jaffar Hassan	RVP for Asia/East		jaffar747@gmail.com
Regulatory						
Regulatory						

Table 1: Abbreviations, acronyms and definitions

<b><i>Abbreviation or acronym</i></b>	<b><i>Definition</i></b>
<b>ACC</b>	Area control centre
<b>AirNav</b>	AirNav Indonesia (Government business entity that organizes flight navigation services)
<b>AIS</b>	Aeronautical information service
<b>AO</b>	Aircraft operator
<b>APAC</b>	Asia and Pacific
<b>APANPIRG</b>	APAC air navigation planning and implementation regional group
<b>ATFMU</b>	Air traffic flow management unit
<b>ATM</b>	Air traffic management
<b>ATS</b>	Air traffic services
<b>BMKG</b>	Badan Meteorologi, Klimatologi, dan Geofisika (Indonesian agency for meteorology, climatology and geophysics)
<b>BoM</b>	Bureau of meteorology (Australian Government)
<b>CAAS</b>	Civil aviation authority of Singapore
<b>CASA</b>	Civil aviation safety authority (of Australia)
<b>CDM</b>	Collaborative decision making
<b>DCA</b>	Department of civil aviation
<b>DGCA</b>	Director general of civil aviation
<b>FIR</b>	Flight information region
<b>FL</b>	Flight level
<b>ICAO</b>	International civil aviation organization
<b>JMA</b>	Japan meteorological agency
<b>MET</b>	Meteorological
<b>MO</b>	Meteorological office
<b>MSS</b>	Meteorological service Singapore
<b>MWO</b>	Meteorological watch office
<b>NOF</b>	International NOTAM office
<b>NOTAM</b>	A notice distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations
<b>SIGMET</b>	Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena which may affect the safety of aircraft operations
<b>UTC</b>	Coordinated universal time
<b>VA</b>	Volcanic ash
<b>VAA</b>	Volcanic ash advisory information (issued in abbreviated plain language)
<b>VAAC</b>	Volcanic ash advisory centre
<b>VAG</b>	Volcanic ash advisory information (issued in graphical format)
<b>VO</b>	Volcano observatory
<b>VOLCEX/SG</b>	(APAC) volcanic ash exercises steering group
<b>VONA</b>	Volcano observatory notice for aviation