International Civil Aviation Organization

Twelfth Meeting of the Air Traffic Management Sub-Group (ATM/SG/12) of APANPIRG

Bangkok, Thailand, 23 – 27 September 2024

Agenda Item 7: AOP, AIM, MET, SAR

NOTAM/ASHTAM FOR VOLCANIC UNREST

(Presented by Secretariat, on behalf of Meteorology Sub-group)

SUMMARY

This paper presents the safety issue identified by the Meteorology Sub-group in relation to the lack of awareness by international aviation of elevated pre-eruptive unrest of many Asia and Pacific volcanoes and invites the meeting to consider options for addressing the problem.

1. INTRODUCTION

1.1 The 28th Meeting of the Meteorology Sub-group of APANPIRG (MET SG/28) considered an information paper from New Zealand on the outcomes of a volcanic ash exercise (IP/09 Taranaki Mounga Exercise Outcomes).

1.2 During discussion, the meeting noted that for pre-eruptive volcanic unrest, it was difficult for international operators to know of any current elevated volcanic activity status unless a NOTAM for volcanic ash or ASHTAM (hereafter just referred to as NOTAM for brevity) was available, due to information from State volcano observatories (SVOs) only required to be provided to designated volcanic ash advisory centres (VAACs), meteorological watch offices (MWOs) and area coordination centres/flight information centres (ACC/FIC) – and not directly to operators.

1.3 It is anticipated that Amendment 82 to Annex 3 *Meteorological Services for International Air Navigation* will include a new Recommended Practice for SVOs to provide volcanic activity information in the form of volcano observatory notice to aviation (VONA), however until this is enabled in each applicable State, there will continue to be a need for the provision of NOTAM on volcanic unrest.

2. DISCUSSION

ICAO Requirements and Guidance

2.1 Several ICAO documents include Standards and guidance on the provision of volcanic activity information, as provided in Attachment A to this paper. Despite this information, few States in the Asia and Pacific region provide such information on elevated pre-eruptive unrest. At the time of writing, elevated pre-eruptive volcanic unrest NOTAM were in force for Asia and Pacific volcanoes in the Philippines, United States (Hawai'i and Alaska regions) and New Zealand only. However elevated unrest was also being reported by local volcano observatories for volcanoes in (at least) Tonga, Vanuatu, Papua New Guinea, Indonesia, Japan.

2.2 Noting the Annex 15 requirement to include information on "significant pre-eruption volcanic activity", States should ensure coordination between their volcano observatories and ACC/FIC, to ensure a clear understanding of what 'significant' means. If an SVO is using the ICAO aviation colour code system (currently defined in ICAO Doc 9766 *Handbook on the International Airways Volcano Watch*), then a colour code of YELLOW (or higher) would be considered significant. However, for States that have not adopted the ICAO aviation colour code, equivalent unrest alerts should be well understood by the associated ACC/FIC.

LEVEL OF ALERT	**STATUS OF ACTIVITY OF VOLCANO**
GREEN	Volcano is in normal, non-eruptive state. *or, after a change from a higher alert level:* Volcanic activity considered to have ceased, and volcano reverted to its normal, non-eruptive state
YELLOW	Volcano is experiencing signs of elevated unrest above known background levels. *or, after a change from a higher alert level:* Volcanic activity has decreased significantly but continues to be closely monitored for possible renewed increase.
ORANGE	Volcano is exhibiting heightened unrest with increased likelihood of eruption. *or* Volcanic eruption is underway with no or minor ash emission. [specify ash-plume height if possible].
RED	Eruption is forecast to be imminent with significant emission of ash into the atmosphere likely. *or* Eruption is underway with significant emission of ash into the atmosphere [specify ash-plume height if possible].

Flight Safety Implications

2.3 Airlines normally use information on elevated pre-eruptive volcanic unrest in their safety risk management processes when flight planning, usually adding a buffer around any volcano of interest, to avoid a flight being directly impacted an unexpected explosive eruption.

2.4 Unfortunately, State volcano observatories are hugely varied in their current practices when sharing information outside of the standard VAACs, MWOs and ACC/FIC. Some have email

dissemination lists which include only local airlines, while others have email lists that anyone can subscribe to. Most however simply provide information via websites or social media, making it difficult for airlines to remain informed about current activity.

NOTAM for Flight Information Regions

2.5 Further confusion on NOTAM requirement arises when a flight information region (FIR) covers multiple States, with different practices for sharing information on volcanic activity.

2.6 The provision of a NOTAM on volcanic unrest that may impact an aerodrome is useful for local operators but does not necessarily ensure overflights are aware of the activity and so NOTAM on elevated pre-eruptive volcanic unrest (and of course also volcanic ash emission) should be issued for the FIR itself.

2.7 States with responsibility for FIRs that contain active or potentially active volcanoes should ensure that information is shared with the responsible ACC/FIC by all relevant volcano observatories contained within the FIR (potentially associated with more than one State). States should take steps to ensure there is clear understanding of any volcanic activity alert level system used.

2.8 States that do not have FIR responsibilities should develop procedures and agreement with States who are the relevant FIR authorities for volcanic information dissemination based on ICAO requirements, so that necessary actions are taken to ensure safety.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matters, including actions to address the issues raised, as appropriate.

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Attachment A – ICAO Standards and Guidance on volcanic unrest information

Annex 3 – *Meteorological Services for International Air Navigation*

3.6 State volcano observatories

Contracting States with active or potentially active volcanoes shall arrange that State volcano observatories monitor these

volcanoes and when observing:

a) significant pre-eruption volcanic activity, or a cessation thereof;

b) a volcanic eruption, or a cessation thereof; and/or

c) volcanic ash in the atmosphere

shall send this information as quickly as practicable to their associated ACC/FIC, MWO and VAAC.

Note 1.— Pre-eruption volcanic activity in this context means unusual and/or increasing volcanic activity which could presage a volcanic eruption.

Note 2.— Doc 9766 contains guidance material about active or potentially active volcanoes.

Annex 15 – *Aeronautical Information Services*

6.3.2.3 A NOTAM shall be originated and issued concerning the following information:

[…]

x) an operationally significant change in volcanic activity, the location, date and time of volcanic eruptions and/or horizontal and vertical extent of volcanic ash cloud, including direction of movement, flight levels and routes or portions of routes which could be affected;

[…]

ICAO Doc 9766 – *Handbook on the International Airways Volcano Watch*

4.3 ACTION TO BE TAKEN BY THE ACC PRIOR TO AND DURING A VOLCANIC ERUPTION

In the event of significant pre-eruption volcanic activity, a volcanic eruption occurring or a volcanic ash cloud being reported (including a cloud of re-suspended volcanic ash) in areas which could affect routes used by international flights, the ACC/FIC responsible for the FIR concerned, on receiving information of the occurrence, should take the following actions:

a) Pass this information **immediately** to aircraft in flight which could be affected by the volcanic ash cloud and advise ACCs/FICs in relevant adjacent FIRs. Issue an ASHTAM or a NOTAM through the State International NOTAM Office (NOF), in accordance with the PANS-AIM (Doc 10066), giving details of the pre-eruption activity, volcanic eruption and ash cloud, including the name and geographical coordinates of the volcano, the date and time of the eruption, the flight levels and

routes or portions of routes which could be affected and, as necessary, routes temporarily closed to air traffic. Include in the address list for ASHTAMs or NOTAMs concerning volcanic activity the associated MWO (see Part 2 of this document), all VAACs and the SADIS WIFS gateway at EGZZVANW.

Note 1.— In issuing an ASHTAM or a NOTAM concerning significant pre-eruption volcanic activity, or for volcanic eruptions not producing ash plumes, it is recommended that the ASHTAM or NOTAM text include the following actual wording, as appropriate:

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

or

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

Use of such language in an ASHTAM or a NOTAM ensures that large volumes of airspace are not rendered unavailable to aircraft unnecessarily until such time as a volcanic ash plume/cloud is actually reported, or observed from satellite data and, where available, ground-based and airborne data.

Note 2.— In order to ensure speedy transmission of initial information to aircraft, the first ASHTAM or NOTAM issued may simply contain information that an eruption and/or ash cloud has been reported and the date/time and location. It is not necessary to await further detailed information; this may be included in subsequent ASHTAMs or NOTAMs as it becomes available.

Note 3.— Volcano level of alert colour codes for aviation should be used by some vulcanological agencies to report volcanic activity information (see 4.2.4). In States where the volcano level of alert colour codes for aviation have been introduced by the vulcanological agency, it is highly desirable to include the reported colour code in ASHTAMs or NOTAMs issued for volcanic activity.