



Agenda Item 3: Implementation of the International Airways Volcano Watch

b) Review of the status of implementation of the IAVW

**IMPLEMENTATION OF THE NOTIFICATION MESSAGE OF VOLCANIC ACTIVITY
BY VOLCANO OBSERVATORIES**

(Presented by United States of America)

Summary

This paper provides information on use of the Volcano Observatory Notice for Aviation (VONA) and encourages States to implement the VONA for the purposes of improving communication of information about volcanic-ash hazards between the vulcanological authority and the Area Control Center, Meteorological Watch Office, and Volcanic Ash Advisory Center.

1. Introduction

1.1 Amendment 74 to Annex 3 – *Meteorological Service for International Air Navigation* – identifies the responsibility of volcano observatories (VO) to send information about significant pre-eruption volcanic activity, volcanic eruptions, and/or volcanic ash in the atmosphere directly to the appropriate to Area Control Centers (ACC), Meteorological Watch Offices, and Volcanic Ash Advisory Centers (VAAC). The International Civil Aviation Organization (ICAO) has amended Regional Air Navigation Plans (RANP) to include the selected VO in Table MET3C for purposes of supporting international air navigation.

1.2 Information provided by VO is used by ACC in the preparation of an ASHTAM or NOTAM on the status of a volcano (including both precursory unrest and eruptive activity), by MWO in preparation of SIGMET when volcanic ash is present in the atmosphere. VO information also is shared with the supporting VAAC so the VAAC can begin to monitor the volcano using satellite imagery, issue advisories as required, and forecast ash-cloud movement. Given how quickly ash from an explosive eruption can reach the stratosphere (within 5 minutes) and the speed with which aircraft can travel toward ash-contaminated airspace (~12 kilometers per minute), timely notification of the location and movement

of an ash cloud is of the greatest importance to aviation to ensure that en- route aircraft avoid volcanic-ash clouds.

1.3 A format for a structured message issued by VO to provide information to ACC, MWO, and VAAC has been developed and included in the U.S. National Volcanic Ash Operating Plan for Aviation. The message format was presented at the Third Meeting of the International Airways Volcano Watch Operations Group (IAVWOPSG/3), in Bangkok, 2007, after receiving endorsement at the APANPIRG CNS/MET meeting in Bangkok in July 2006 and at the AERMET SG/8 meeting in Santiago in October 2006. The group at the IAVWOPSG/3 meeting reviewed and endorsed the format with minor revisions and recommended that the message template (given below) be renamed Volcano Observatory Notice for Aviation (VONA) and included in the Handbook on the International Airways Volcano Watch: Operational Procedures and Contact List (Document 9766-AN/968).

- (1) VOLCANO OBSERVATORY NOTICE FOR AVIATION
- (2) Issued: Universal (Z) date and time (YYYYMMDD/HHMMZ).
- (3) Volcano: Name and Smithsonian number
- (4) Current Aviation Color Code:
- (5) Previous Aviation Color Code:
- (6) Source: Name of Volcano Observatory
- (7) Notice Number: Unique number with year
- (8) Volcano Location: Latitude, longitude in NOTAM format
- (9) Area: Regional descriptor
- (10) Summit Elevation: XXX meters (YYYY feet)
- (11) Volcanic Activity Summary: Concise statement that describes activity at the volcano. If known, specify time of onset and duration of eruptive activity.
- (12) Volcanic Cloud Height: Best estimate of ash-cloud top in nnnn M (nnnnn FT) above summit or AMSL (specify which). Give source of height data (ground observer, pilot report, radar, etc.). "NIL" if no ash cloud is produced.
- (13) Other Volcanic Cloud information: Brief summary of relevant cloud characteristics such as color of cloud, shape of cloud, direction of movement, etc. Specify if cloud height is obscured or suspected to be higher than what can be observed clearly. "NIL" if no ash cloud produced.
- (14) Remarks: Optional. Brief comments on related topics such as monitoring data, observatory actions, volcano's previous activity, etc.
- (15) Contacts: Names, phone numbers (voice and fax), email addresses
- (16) Next Notice: "Will be issued when conditions at the volcano warrant changing the aviation color code or when a significant volcanic event occurs within the current color code." Or, indicate if final notice for an event.

1.4 The VONA incorporates a volcanic alert level system for aviation that uses colour codes to succinctly describe conditions at or near a volcano. Use of aviation colour codes by VO is endorsed by ICAO as a recommended standard in Annex 15 of Aeronautical Information Services. Not all observatories currently assign aviation colour codes, but where they do, the codes are defined as:

- GREEN – Volcano is in normal, non-eruptive state; or, after a change from a higher level, volcanic activity considered to have ceased, and volcano reverted to its normal, non-eruptive state.
- YELLOW – Volcano is exhibiting signs of elevated unrest above known background levels; or, after a change from higher 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].

1.5 Aviation colour codes and VONA are designed to be used by VO worldwide, and the World Organization of Volcano Observatories is looking at ways to foster their implementation by VO within the framework of the International Airways Volcano Watch (IAVW). However, there also is a need to improve understanding on the part of ACC and MWO on how to use the volcanic information in the VONA. This paper highlights some key steps to address that need.

2. Discussion

2.1 Effective implementation of the IAVW by any State requires that different agencies understand the services to be provided, which may entail formal agreements and/or documentation of protocols among those agencies. In order to assist States in enhancing the coordination between the different States' authorities/agencies involved in the IAVW, ICAO provides a sample letter of agreement covering the coordination of responsibilities among meteorological authorities, air-traffic services authorities, and vulcanological authorities for the provision and exchange of information related to volcanic ash. The sample letter is published in the ICAO Handbook on the International Airways Volcano Watch (Document 9766-AN/968, Appendix A). The Handbook is online at http://www.icao.int/icaonet/dcs/9766/9766_cons_en.pdf/.

2.2 In addition, the U.S. National Volcanic Ash Operating Plan for Aviation, completed in 2007, may be a useful guide for other countries to consider adapting for their particular circumstances. The plan defines the roles and responsibilities of the U.S. federal agencies involved in the observing, monitoring, and reporting of airborne volcanic ash and documents the basic practices needed for coordinated exchange and dissemination of ash-hazard information. The plan is online at <http://www.ofcm.gov/p35-nvaopa/pdf/FCM-P35-2007-NVAOPA.pdf/>.

2.3 With regard to VONA, it should be emphasized that hazard information from vulcanological authorities is a key part of the IAVW. The ash hazard to aviation originates from explosive volcanic eruptions that eject magmatic particles and gases into the atmosphere to cruise altitudes of jet aircraft and beyond. Accordingly, VO that monitor volcanoes to detect precursory unrest as well as eruptive activity have important hazard information for aviation users. A VONA should be issued by a VO when the aviation color code at a volcano is changed (up or down) or within a color-code level when an ash-producing event or other significant change in volcanic behavior occurs. The structured format and concise text of the VONA is intended to help non-volcanologists – such as controllers at centers or meteorologists at MWO – more easily incorporate vulcanological information directly into Volcanic Ash NOTAM and WV SIGMET.

3. **Recommendation**

3.1 It is recommended that meteorological authorities, air-traffic services authorities, and volcanological authorities within States look for ways to improve coordination of their activities related to the provision and exchange of information about volcanic ash, using established ICAO guidance in Annex 3 of the Meteorological Service for International Air Navigation, Annex 15 of the Aeronautical Information Services, RANP, and the Handbook on the International Airways Volcano Watch. Therefore, the following draft conclusion is proposed.

DRAFT

CONCLUSION 9/XX

**COORDINATION AND IMPLEMENTATION OF THE
VOLCANO OBSERVATORY NOTICE FOR AVIATION (VONA)**

The States are encouraged to implement the VONA:

- a) to improve communication of information on volcanic activity to ACC, VAAC, and MWO; and
- b) to provide feedback on the utility of the VONA and refinements that should be considered by the International Airways Volcano Watch Operations Group.

4. **Action proposed**

4.1 The meeting is invited to note the information in this paper and to endorse the recommended course of action.