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CAR/SAM Regional Planning and Implementation Group (GREPECAS)
Eighth Meeting of the GREPECAS Aeronautical Meteorology Subgroup (AERMETSG/8)
Santiago, Chile, 9 to 13 October 2006

Agenda Item 3: Implementation of the International Airways Volcano Watch (IAVW) in the CAR/SAM Regions

REGIONAL PROGRESS IN IAVW IMPLEMENTATION

(Presented by the Secretariat)

SUMMARY

This working paper presents information on the developments related to the implementation of the International Airways Volcano Watch (IAVW) in the CAR/SAM Regions. The paper also provides information regarding the Second Meeting of International Airways Volcano Watch Operations Group (IAVWOPSG/2).

References:

- Report of the Seventh Meeting of the GREPECAS Aeronautical Meteorology Subgroup (AERMETSG/7) (Mexico City, Mexico, 23 to 27 May 2005);
- Report of the First Meeting of the International Airways Volcano Watch Operations Group (IAVWOPSG/1), (Bangkok, Thailand, 15 to 19 March 2004); and
- Report of the Second Meeting of the International Airways Volcano Watch Operations Group (IAVWOPSG/2), (Lima, Peru, 26 to 30 September 2005).

1. Introduction

1.1 The two major events related to the implementation of IAVW in the CAR/SAM Regions after the AERMETSG/7 Meeting, were the preparation and dissemination of the Seventh edition of the CAR/SAM SIGMET Guide, following Recommendation 1/12 of the MET Divisional Meeting, to assist CAR/SAM States/Members in the full implementation of SIGMET provisions in Annex 3/Technical Standards [C.3.1]. The second event corresponds to the Second Meeting of the IAVW Operations Group (IAVWOPSG/2).

1.2 It may be recalled, that the IAVWOPSG was established in response to Recommendation 1/22 of the Meteorology (MET) Divisional Meeting (2002), to ensure that the operation and development of the IAVW continue, in order to meet current and evolving operational requirements in a cost effective

manner. The terms of reference approved by the ICAO Air Navigation Commission included, among other things, that the group should ensure the dissemination of the IAVW related procedures in the regional ANPs (BANP and FASID). The Air Navigation Planning and Implementation Groups (PIRGs) should review the results of the IAVWOPSG meetings and identify any necessary follow-up action at regional level. Additionally, issues related to IAVW planning raised by the PIRGs should be referred to the IAVWOPSG for consideration.

1.3 The Second Meeting of the International Airways Volcano Watch Operations Group (IAVWOPSG/2), was held from 26 to 30 September 2005, in Lima, Peru. The Meeting formulated 35 Conclusions and 4 Decisions. The executive summary was sent to CAR/SAM States; however, in order that the Meeting is aware of the discussions, agreements and decisions of this Group, a copy of this summary is presented in **Appendix A** to this working paper. Complete information about IAVWOPSG meetings is also available at the IAVWOPSG website: http://www.icao.int/anb/iavwopsg.

2. Discussion

2.1 Regional Progress in the implementation of Conclusions of the International Airways Volcanic Watch Operations Group (IAVWOPSG)

2.1.1 In respect to Conclusions 1/1 and 2/2 – Amendment to IAVW regional-related procedures in the ANP Basic/FASID, ICAO SAM Regional Office processed and circulated to ICAO States/Territories and international organizations proposal for amendment SAM No. 06/3 – MET to SAM FASID ANP and proposal for amendment SAM N° 06/2 – MET to SAM Basic ANP, informing of their approval on 4 May and 3 July 2006, respectively.

2.1.2 Regarding Conclusion 1/3 – Assistance to States in enhancing the coordination between States' authorities/agencies involved in the implementation of IAVW, the sample letter of agreement between States' meteorological authorities, ATS authorities and vulcanological observatories/agencies has already been included in the web English version of ICAO Doc 9766, *Handbook on the International Airways Volcano Watch (IAVW), Operational Procedures and Contact List*, (www.icao.int, publications, miscellaneous publications), as well as the issues related to Conclusion 1/6 – Information related to aircraft encounters with volcanic ash to ICAO and Smithsonian Institution by the VAACs and Conclusion 1/7 – Development of VAAC backup procedures.

2.1.3 Conclusion 1/13 – Designation of selected States volcano observatories to be included in ANP/FASID, has been implemented as a follow up to GREPECAS Conclusion 13/21, and the new Table MET 3C was included in CAR/SAM FASID

2.2 Regional Progress in the implementation of GREPECAS Conclusions

2.2.1 In respect to Conclusion 12/59 - Harmonising ICAO colour code indicating level of alert of volcanic activity and the codes used by vulcanological organizations and IFALPA, as mentioned in Appendix B to WP/02, the IAVWOPSG/2 formulated Conclusion 2/15 – Amendment to Annex 15, related with ICAO colour codes to indicate the level of alert of volcanic activity, to be included in Amendment 34 to the referred Annex.

2.2.2 Concerning Conclusion 13/20[1] - Periodic Tests on volcanic ash SIGMETS, volcanic ash advisories and volcanic ash ASHTAMs or NOTAMs, which requests ICAO to invite VAAC Buenos Aires and VAAC Washington, and CAR/SAM NOFs and MWOs to take active part in periodic tests of

[1] AERMETSG/7 Conclusion 7/6 Pre-approved by GREPECAS Members on 22 August 2005.

SIGMETs (WV), volcanic ash advisories, and volcanic ash ASHTAMs or NOTAMs, to be carried out in accordance to the procedures agreed by the AERMET Subgroup. In August 2066, letters were sent to VAAC Buenos Aires and VAAC Washington with a draft protocol for their approval or comments, inviting to carry out the test. In this regard, it is expected that the Meeting agrees the use of the proposed protocols, which are presented in **Appendix B** to this paper, or to make the relevant modifications for their adoption.

2.2.3 The application of GREPECAS Conclusion 13/22 – Operational requirements for volcano observatories, will be discussed during IAVWOPSG/3.

2.2.4 The follow up to GREPECAS Conclusions 13/23 and 13/24 will presented by the Rapporteur of the IAVW Task Force of the Subgroup.

3. **Action required**

3.1 The meeting is invited to:

a) take note of the information provided in this paper;

b) take note of the Executive Summary of the IAVWOPSG/2; and

c) take action in respect of paragraph 2.2.2.

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APPENDIX A

SECOND MEETING OF THE IAVW OPERATIONS GROUP

(Lima, Peru, 26 to 30 September 2005)

EXECUTIVE SUMMARY[1]

1. INTRODUCTION

1.1 The second meeting of the International Airways Volcano Watch Operations Group (IAVWOPSG/2), held in the ICAO South American (SAM) Regional Office, Lima, Peru, 26 to 30 September 2005, was attended by eighteen experts from the eight volcanic ash advisory centres (VAAC) Provider States, Comprehensive Nuclear Test-Ban Treaty Organization (CTBTO), International Air Transport Association (IATA), International Federation of Air Line Pilots' Associations (IFALPA), International Union of Geodesy and Geophysics (IUGG) and the World Meteorological Organization (WMO).

1.2 Mr. P. Lechner, the Chairman of the IAVWOPSG, presided over the meeting throughout its duration. Mr. R. Romero, from ICAO Headquarters, Montreal, was Secretary of the meeting and he was assisted by Mrs. Nohora Arias, Regional Officer, Meteorology from the South American Regional Office.

2. FOLLOW-UP IAVWOPSG/1 MEETING

2.1 Regarding the follow-up action of IAVWOPSG/1 conclusions, the group noted that action was completed on all issues except for Conclusion 1/7, which was addressed under Agenda Item 5.7 (Conclusion 2/1 refers).

3. REVIEW OF ICAO PROVISIONS RELATED TO IAVW

3.1 The group reviewed the IAVW related regional procedures contained in air navigation plan (ANP)/facilities and services implementation document (FASID) which would render them compatible with Annex 3 — *Meteorological Service for International Air Navigation*. The amended procedures would be referred to the ICAO Regional Offices for processing (Conclusion 2/2 refers).

3.2 As a follow-up to IAVWOPSG/1 conclusions, the group endorsed a draft amendment to Annex 3 regarding the inclusion of the smell of sulphur in special aircraft observations and the harmonization of the format of VA and TC advisories (Conclusion 2/3 refers). In a related issue, the group agreed that WMO should amend the legend box in WAFS SIGWX charts in order to alert users to consult all information available on volcanic ash (i.e. SIGMET, volcanic ash advisories, ASHTAM and NOTAM for volcanic ash) (Conclusion 2/4 refers).

[1] The full report is available in English at the following open website: www.icao.int/anb/IAVWOPSG

4. OPERATION OF THE IAVW

4.1 The group reviewed the management reports prepared by the VAACs Provider States, noted their contents and expressed satisfaction with the scope of information provided.

4.2 Regarding the monitoring of active volcanoes by volcano observatories, the group agreed that the Secretariat, in coordination with IUGG, should develop a template to facilitate the exchange of information related to volcanic activity from the selected State volcano observatories to area control centres (ACC), meteorological watch offices (MWO) and volcanic ash advisory centres (VAAC), to be included in the *Handbook on the International Airways Volcano Watch (IAVW) — Operational Procedures and Contact List* (Doc 9766) (Conclusion 2/5 refers).

4.3 Concerning aircraft observations and reports of the smell of sulphur, the group agreed that, coincident with the introduction of the requirement for these aircraft observations, it would be necessary to send them to the VAACs for evaluation to avoid false alarms and to amend Annex 3 and the *Handbook on the International Airways Volcano Watch (IAVW) — Operational Procedures and Contact List* (Doc 9766) accordingly (Conclusion 2/6 refers). The group also felt that further work was necessary concerning the use of the smell of sulphur as a tool for the detection of volcanic ash (Conclusion 2/7 refers).

4.4 The group felt that further work was necessary in the development of so called ensemble approach to ash forecasting using different VAAC models. In this regard, the group agreed that WMO should develop guidance for use by all VAACs to improve their operational models (Conclusion 2/8 refers).

4.5 Concerning the exchange of reports regarding ash encounters by aircraft, the group noted that the appropriate procedures had been included in the *Handbook on the International Airways Volcano Watch (IAVW) — Operational Procedures and Contact List* (Doc 9766) to ensure the receipt of these reports by VAACs and the Smithsonian Institution. The group concluded that with the inclusion of such procedures, the task had been completed (Decision 2/9 refers).

4.6 With regard to the post-flight reporting of aircraft observations using the special air-report of volcanic activity form (Model VAR) in the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444) it was suggested that there were more effective methods to gather this information, e.g. through an Internet site. Therefore, the group agreed that the usefulness of Model VAR form should be validated by an ad hoc working group (Conclusion 2/10 refers). In the meantime, based on an assessment of the Model VAR form carried out by IFALPA, the group agreed that it should be replaced with a more user-friendly form (Conclusion 2/11 refers).

4.7 With regard to alphanumeric volcanic ash advisories, the group reviewed their format and agreed to introduce changes to four elements (Conclusion 2/12 refers). In this context, the group also realized that the current format for volcanic ash advisories only permitted the description of the initial volcanic ash clouds in terms of observation, not in terms of estimation. To cater for the inclusion of initial ash clouds based on estimation in volcanic ash advisories, the group developed a corresponding draft amendment to Annex 3 (Conclusion 2/13 refers). The group also noted that Annex 3 only allowed the description of ash clouds using latitude/longitude points and that the description of elongated plumes was cumbersome for the users to decode when the points were close together (less than one degree of separation). To allow for the description of narrow volcanic ash clouds, the group agreed to amend Annex 3 accordingly (Conclusion 2/14 refers).

4.8 Concerning the application of the aviation volcanic ash colour code, the group agreed that the dependence on flight levels of the colour code included in Annex 15 — *Aeronautical Information*

Services should be deleted since the potential hazard of volcanic ash would be similar irrespective of an artificial threshold of 25 000 ft (Conclusion 2/15 refers). Related to the colour code, the group also agreed that the State volcano observatories should introduce a message related to the cessation of significant volcanic activity to be sent to the ACC, MWO and VAAC (Conclusion 2/16 refers).

4.9 With regard to graphical volcanic ash advisories, the group proposed a number of changes to the model form. Due to the fact that Appendix 1 to Annex 3 is the responsibility of WMO, the group agreed that WMO should be invited to include the proposed model form for the graphical volcanic ash advisory in Appendix 1 to Annex 3 (Conclusion 2/17 refers). The group also agreed that the portable network graphics (PNG) format be used, on a trial basis, for the dissemination of volcanic ash advisories in graphical format (Conclusion 2/18 refers).

4.10 Concerning VAAC back-up procedures, the group endorsed the procedures for inclusion in the *Handbook on the International Airways Volcano Watch (IAVW) — Operational Procedures and Contact List* (Doc 9766) (Conclusion 2/19 refers) and concurred that the related task had been completed (Decision 2/20 refers). In this regard, the group also agreed that the requirement for VAAC back-up should be stated in Annex 3 (Conclusion 2/21).

4.11 The group welcomed the extension of the areas of responsibility by VAACs Washington and Toulouse and agreed that, with the current areas of coverage, there was no need to modify them in the foreseeable future (Decision 2/22 refers).

4.12 With regard to the display of latitudes and longitudes in ASHTAM, and NOTAM for volcanic ash specified in Annex 15, the group agreed that it should be aligned with the format used in Annex 3 in order to promote standardization and to improve communication of information to pilots and dispatchers (Conclusion 2/23 refers).

5. DEVELOPMENT OF THE IAVW

5.1 With regard to the assessment of the usefulness of subsonic and infrasonic data from the Comprehensive Nuclear Test-Ban Treaty Organization (CTBTO) observing networks to the IAVW, the group agreed that VAAC Montreal should take the lead in the development of CTBTO data receiving and processing system, and that VAACs should identify existing experiments and studies on the use of CTBTO data (Conclusion 2/24 refers). The group also agreed that VAAC Montreal, in coordination with ICAO and WMO, should organize a workshop on the use of CTBTO data in support of the IAVW (Conclusion 2/25 refers).

5.2 Regarding the inclusion of volcanic ash deposition observations at aerodromes in meteorological reports, the group ruled out the use of METAR/SPECI for this purpose, and agreed that the Secretariat should study the feasibility of including this information in another suitable aeronautical message (Conclusion 2/26 refers).

5.3 Concerning the development of eruption source parameters (ESP), the group, based on a report presented by IAVCEI, agreed that the understanding concerning the ESP should be enhanced in view of its key role in the forecasts of volcanic ash dispersion in the atmosphere (Conclusion 2/27 refers). The group also agreed that a data-set of well-studied volcanic eruptions, including ESP, should be created (Conclusion 2/28 refers).

6. MATTERS RELATED TO THE ACCIDENTAL RELEASE OF TOXIC CHEMICAL AND RADIOACTIVE MATERIAL INTO THE ATMOSPHERE

6.1 Regarding the designation of a focal point for forwarding to the ACC concerned the early notification of the accidental release of the radioactive material into the atmosphere provided by the IAEA, the group noted that most VAACs were regional specialized meteorological centers (RSMC) in the WMO Emergency Response Activity (ERA) programme and received direct notification regarding nuclear accidents from the IAEA. Therefore, it was agreed that an ad hoc working group be established with the task to propose the designation of a VAAC as the focal point for the reception of information from IAEA (Conclusion 2/29 refers).

6.2 With regard to the feasibility of the establishment of international arrangements for the exchange of information on the accidental release into the atmosphere of toxic chemicals, the group recognized that it would be beyond the resources of the IAVW to establish its own monitoring infrastructure. In view of the work being currently undertaken within the WMO ERA Programme in this area, the group concurred that the WMO member of the group should monitor the progress made within that programme. The group also agreed that, in the interim, a suitable message (e.g. NOTAM or SIGMET) should be identified as a means of warning international civil aviation regarding the accidental release of toxic chemicals in the atmosphere (Conclusion 2/30 refers).

6.3 Regarding the development of a message format for the provision of information on radioactive material accidentally released into the atmosphere, the group reconfirmed its view expressed at the IAVWOPSG/1 Meeting that the best suitable option would be the use of SIGMET and concluded that the SIGMET for radioactive material should contain the mandatory elements of any SIGMET together with the *location* and *forecast position* of radioactive material, if available. The group endorsed the corresponding draft amendment to Annex 3 with the understanding that any future results from the work undertaken in the area of toxic chemicals could have an influence on the SIGMET format for radioactive material (Conclusion 2/31 refers).

7. FUTURE WORK PROGRAMME

7.1 The group reviewed the work programme and proposed additional changes based on the discussions under Agenda Items 5, 6, 7 and 9 (Conclusion 2/32 refers).

8. ANY OTHER BUSINESS

8.1 Under this agenda item the group dealt with four issues emanating from the North Atlantic Systems Planning Group (NAT SPG) Conclusion 41/12 addressed to the IAVWOPSG.

8.2 With regard to the possibility of the VAACs issuing volcanic ash SIGMET for multiple FIRs in order to decrease the number of lengthy SIGMET messages, the group had severe reservations as to the feasibility of VAACs, rather than MWOs, issuing SIGMETs, inter alia, for legal reasons. Furthermore, it. noted that the issuance of one single SIGMET for more than one FIR was impossible since a SIGMET, in accordance with Annex 3, could only cover one FIR. Therefore, the group agreed that, to alleviate the problem identified by the NAT SPG, the outlook part of the SIGMET, readily available from the volcanic ash advisories, should be deleted. For consistency, the outlook in SIGMETs for tropical cyclones should also be deleted (Conclusion 2/33 refers).

8.2.1 Regarding the usefulness of the ASHTAM format, the group did not share the point of view expressed by the NAT SPG that, in view of the increased level of automation of the NOTAM format,

the ASHTAM format would no longer be needed. The group felt that the ASHTAM format continued to contribute to the safety of operations during a volcanic ash event and was the option preferred by the users. Therefore, the provisions related to the ASHTAM format should be retained without change in Annex 15.

8.2.2 Concerning participation of VAACs in regional ATM volcanic ash contingency planning and exercises, the group concurred with the NAT SPG that it was important for VAACs to participate in these exercises (Conclusion 2/34 refers).

8.2.3 Regarding the need to consolidate guidance material included in the *Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds* (Doc 9691) and in the *Handbook on the International Airways Volcano Watch (IAVW) — Operational Procedures and Contact List* (Doc 9766) into one publication, the group concluded that, due to the differences in the scope and nature of the two documents, it would not be advisable to merge them, and that there were no inconsistencies between the web versions of the two documents which were frequently updated by the Secretariat.

8.3 Under this agenda item, the group also considered a proposal to amend Annex 3 to allow IAVW resources to be used for non-aviation volcanic hazard mitigation by volcanic observatories. In this regard, the group considered that such proposed changes could not, in view of their nature, be included in an ICAO Annex. Nevertheless, the group agreed that explanatory notes could be added to the sample letter of agreement between meteorological, ATS and volcanological observatories contained in the *Handbook on the International Airways Volcano Watch (IAVW) — Operational Procedures and Contact List* (Doc 9766), (Conclusion 2/35 refers).

- END -

APPENDIX B

PROTOCOL FOR SIGMET TEST (WV), ASHTAM/NOTAM AND VAA –

VAAC BUENOS AIRES

MWO Lima-Callao

1. Based on a fictitious air-report of the FICTITUS volcano, prepare a simulated SIGMET WV, the 7th August 2006 at 01:00 UTC, adding after "SIGMET" or after the SIGMET number: **TEST NO VALID**. (1)

2. Disseminate SIGMET WV according to CAR/SAM FASID table MET 2B and to Doc 9766-AN/968 (Appendix F to CAR/SAM SIGMET Guide, 2006), and within ATS and NOF units. (2)

Oficina NOF de Lima-Callao

3. Prepare the respective simulated NOTAM on volcanic activity, adding after box "E": **TEST NO VALID.** (3)

4. Distribute the corresponding NOTAM, including in the international distribution list the VAAC Washington (KWBCYMYX), and WAFCs London and Washington (EGZZVANW and KWBCYMYX). (4)

VAAC Buenos Aires

5. Prepare the respective simulated VAA, adding after the name of the volcano: **TEST NO VALID**. (5)

6. Disseminate the VAA in accordance with CAR/SAM FASID Table MET 3B (see Appendix E to CAR/SAM SIGMET Guide, 2006). (6)

MWO under the responsibility of VAAC Buenos Aires (Table MET 3B)

7. If in the VAA received from Buenos Aires the zone being attended by the corresponding MWO (FIR) is being affected by volcanic ash, prepare and issue the respective simulated SIGMET WV, following steps (1) and (2). (8)

NOF Office associated to the above mentioned MWO

8. Prepare and distribute the ASHTAM/NOTAM following steps (3) and (4). If the respective NOF prepares ASHTAM, add after box "C": **TEST NO VALID** (9)

MWO Lima-Callao and MWO with FIR affected by volcanic ash

9. Prepare and disseminate subsequent SIGMET WV following the same protocol. (10)

NOF Lima-Callao and with FIR affected by volcanic ash

10. Cancel the ASHTAM/NOTAM the 8th August 2006 at 14:00 UTC. (11)

ACC, MWO, NOF, VAAC and WAFC

11. Send to the AERMETSG Secretary, Nohora Arias, na@lima.icao.int and to the Rapporteaur of the VA TF, Gustavo Flores, gflores@meteofa.mil.ar, the list of messages received during the test in each area of the units involved of the States/Territories, and in the respective VAAC and WAFC. (END)

PROTOCOL FOR SIGMET TEST (WV), ASHTAM/NOTAM AND VAA

VAAC WASHINGTON

MWO MEXICO

12. Based on a fictitious air-report of the FICTITUS volcano, prepare a simulated SIGMET WV on the 7th August 2006 at 02:00 UTC, adding after "SIGMET" or after the SIGMET number: **TEST NO VALID**. (1)

13. Disseminate SIGMET WV according to CAR/SAM FASID Table MET 2B and to Doc 9766-AN/968 (Appendix F to CAR/SAM SIGMET Guide, 2006), and within ATS and NOF units. (2)

NOF Office, MEXICO

14. Prepare the respective simulated NOTAM on volcanic activity, adding after box "E": **TEST NO VALID** (3)

15. Distribute the corresponding NOTAM, including in the international distribution list the VAAC Washington (KWBCYMYX), and WAFCs London and Washington (EGZZVANW and KWBCYMYX). (4)

VAAC WASHINGTON

16. Prepare the respective simulated VAA, adding after the name of the volcano: **TEST NO VALID**. (5)

17. Disseminate the VAA in accordance with CAR/SAM FASID Table MET 3B (see Appendix E to CAR/SAM SIGMET Guide, 2006). (6)

MWO under the responsibility of VAAC Washington (Table MET 3B)

18. If in the VAA received from Washington the zone being attended by the corresponding MWO (FIR) is being affected by volcanic ash, prepare and issue the respective simulated SIGMET WV, following steps (1) and (2). (8)

NOF Office associated to the above mentioned MWO

19. Prepare and distribute the ASHTAM/NOTAM following steps (3) and (4). If the respective NOF prepares ASHTAM, add after box "C": **TEST NO VALID** (9)

MWO Mexico and NOF with FIR affected by volcanic ash

20. Prepare and disseminate subsequent SIGMET WV following the same protocol. (10)

NOF Mexico and NOF with FIR affected by volcanic ash

21. Cancel the ASHTAM/NOTAM the 8th August 2006 at 14:00 UTC. (11)

ACC, MWO, NOF, VAAC and WAFC

22. Send to the AERMETSG Secretary, Nohora Arias, na@lima.icao.int and to the Rapporteaur of the VA TF, Gustavo Flores, gflores@meteofa.mil.ar, the list of messages received during the test in each area of the units involved of the States/Territories, and in the respective VAAC and WAFC. (END)

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