



International Civil Aviation Organization

**Eight Meeting of the Communications/Navigation/Surveillance and
Meteorology Sub-Group (CNS/MET/SG/8) of APANPIRG**

Bangkok, Thailand, 12 – 16 July 2004

**Agenda Item 10: Review of the implementation of ICAO Warning Systems
1) International Airways Volcano Watch (IAVW)**

REGIONAL PROGRESS IN IAVW IMPLEMENTATION

(Presented by Secretariat)

SUMMARY

The paper presents brief information on the developments related to the IAVW implementation in the ASIA/PAC Region since the last CNS/MET SG meeting. The paper provides information on the first meeting of the IAVW Operations Group and presents the executive summary of the report of this meeting.

1. INTRODUCTION

1.1. The two major events related to the implementation of IAVW in the ASIA/PAC Region during the period after CNS/MET SG/7 meeting were the ASIA/PAC SIP on volcanic ash SIGMET and the first meeting of the IAVW Operations Group (IAVWOPSG/1). The SIP is discussed in a separate working paper and this paper presents briefly the discussions and the major Conclusions of IAVWOPSG/1 which affect the regional planning and implementation of IAVW.

1.2 It may be recalled that the IAVWOPSG had been established in response to Recommendation 1/22 of the Meteorology (MET) Divisional Meeting (2002) in order to ensure that the operation and development of the IAVW continued to meet current and evolving operational requirements in a cost effective manner. The terms of reference approved by the ICAO Air Navigation Commission included *inter alia* that the group should ensure the currency of the IAVW-related procedures in the regional ANPs (BANP and FASID). The PIRGs should review the outcome of the IAVWOPSG meetings and identify any follow-up actions necessary at regional level. Similarly, issues related to IAVW planning raised by the PIRGs should be referred to the IAVWOPSG for consideration.

1.3 The first meeting of the IAVW Operations Group (IAVWOPSG) was held in the ICAO Asia/Pacific Regional Office, Bangkok from 15 to 19 March 2004. The meeting was attended by eighteen representatives from the eight volcanic ash advisory centre (VAAC) Provider States, one User State, International Air Transport Association and the World Meteorological Organization.

1.4 The executive summary of the report of IAVWOPSG/1 meeting is given in Attachment A to this paper for review by the group.

2. DISCUSSION

2.1. The IAVWOPSG/1 meeting formulated 29 Conclusions and 5 Decisions. The list of the Conclusions and Decisions is given in Attachment B to the paper.

2.2. Conclusions and decisions, which require follow-up action at regional level will be highlighted during the presentation of the paper at the meeting. It should be noted in particular, that IAVWOPSG/1 Conclusion 1/22, regarding the harmonization of the format of those elements that are common to both volcanic ash and tropical cyclone advisories, was formulated in response to APANPIRG Conclusion 14/39; also, Conclusion 1/3 of IAVWOPSG is based on the findings of ASIA/PAC MET SIP on volcanic ash SIGMET.

2.3. In regard to Conclusion 1/1, Amendment to IAVW-related regional procedures in the Basic ANP and FASID, the amendment proposals are given in Attachment C and D to the paper. It should be noted that the amendment proposal needs additional processing before circulating to States. The main outstanding work to be done by the Secretariat is to collect information on the ACCs from all States concerned to be included in the Table MET 3B, as agreed by IAWOPSG/1. The meeting is invited to review the amendments proposed by IAVWOPSG/1 and to consider the following draft conclusion:

**DRAFT CONCLUSION 8/xx — Amendment of regional procedures related
to IAVW in the ASIA/PAC Basic ANP and
FASID**

That, the ASIA/PAC Basic ANP and FASID (Doc 9673) be amended as indicated in Appendix xx to the report.

3. ACTION BY THE MEATING

4.1 The meeting is invited to:

- a) Note the information provided in this paper;
- b) Review the executive summary of IAVWOPSG/1 report and provide comments regarding the follow-up actions required at regional level; and
- c) Agree on the proposed Draft Conclusion in para. 2.3 above.

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FIRST MEETING

IAVW OPERATIONS GROUP

(Bangkok, Thailand, 15 to 19 March 2004)

EXECUTIVE SUMMARY¹

1. INTRODUCTION

1.1 The first meeting of the International Airways Volcano Watch Operations Group (IAVWOPSG/1), held in the ICAO Asia/Pacific (Asia /Pac) Regional Office, Bangkok, Thailand, 15 to 19 March 2004, was attended by eighteen experts from the eight volcanic ash advisory centre (VAAC) Provider States, one User State, International Air Transport Association (IATA) and the World Meteorological Organization (WMO).

1.2 Mr. P. Lechner (New Zealand) was elected Chairman and Mr. P. Chen (Canada) was elected Vice-Chairman. Mr. P. Lechner presided over the meeting throughout its duration. Mr. R. Romero, from ICAO Headquarters, Montreal, was Secretary of the meeting assisted by Mr. Dimitar Ivanov, Regional Officer, Meteorology from the Asia/Pacific Regional Office.

2. Tasks of the IAVWOPSG

2.1 The group noted that, in accordance with its terms of reference, it was expected to:

- a) undertake work on specific tasks included in its work programme;
- b) ensure the currency of
 - 1) International Airways Volcano Watch (IAVW) — related provisions in Annex 3 — *Meteorological Service for International Air Navigation*; and
 - 2) IAVW-related procedures in the air navigation plan/facilities and services implementation documents (ANP/FASID).

2.2 With regard to specific tasks, the group addressed sixteen outstanding tasks of the disbanded Volcanic Ash Warnings Study Group (VAWSG), seven IAVW-related issues raised by the MET Divisional Meeting (2002) and referred to the IAVWOPSG for follow-up and four issues raised at the Air Navigation Commission.

2.3 The group reviewed the IAVW related regional procedures contained in ANP/FASID and agreed to a new format for FASID Table MET 3B (Conclusion 1/1 refers).

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

3. Operation of the IAVW

3.1 To facilitate the future assessments of the IAVW implementation and operation, the group agreed that, the volcanic ash advisory centre Provider States should prepare a joint concise management report for consideration by each IAVWOPSG Meeting. The report would cover the period elapsed since the previous meeting addressing the IAVW operations, highlighting recent developments and future plans for operational updates (Conclusion 1/2 refers). The group also considered it necessary that a sample letter of agreement should be developed to assist States in order to enhance their coordination with the States authorities/agencies involved in the implementation of the IAVW (Conclusion 1/3 refers).

3.2 The group agreed to assist the Secretariat in reviewing, by correspondence, Doc. 9691, *Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds* and to send comments by 20 July 2004. After this date the Secretariat will finalize the amendment (Conclusion 1/4 refers).

3.3 Regarding the update of the worldwide ash encounter database, the group considered that the implementation of the provisions in Annex 3 regarding the special air reports to be made by aircraft in case of an encounter or observation of a volcanic ash cloud, pre-eruption activity or a volcanic eruption was very important for the operation of the IAVW and agreed that airlines should be encouraged to issue them (Conclusion 1/5 refers). The group's attention was drawn by the Secretariat to the lack of procedures regarding the archiving of aircraft encounters with volcanic ash. It was agreed that, special air-reports on volcanic ash were to be sent to the Smithsonian Institution for updating their global database and that the Secretariat should develop appropriate procedures for inclusion in the *Handbook on the International Airways Volcano Watch (IAVW) — Operational Procedures and Contact List* (Doc 9766) (Conclusion 1/6 refers).

3.4 Concerning VAAC back-up procedures, the group agreed that VAACs Anchorage and London should be tasked with drafting these procedures. Once the procedures are agreed to by all VAACs, the Secretariat will include them in the *Handbook on the International Airways Volcano Watch (IAVW) — Operational Procedures and Contact List* (Doc 9766) (Conclusion 1/7 refers).

3.5 The group reconfirmed the importance to request the International Union of Geodesy and Geophysics (IUGG) to provide guidance on the aviation volcano level of alert colour code to relevant member organizations, in order to promote the use of the colour code by vulcanological agencies when providing vulcanological information to VAACs, area control centres (ACCs) and meteorological watch offices (MWOs) (Conclusion 1/8 refers). The group agreed that the current wording of the colour code in Annex 15 — *Aeronautical Information Services* should be amended (Conclusion 1/9 refers). The group was aware of the problems related to the use of the colour code which was not suitable for the users' tactical and strategic planning. The group felt nevertheless that the colour code as defined in Annex 3 and Annex 15 provided useful information and that the existing deficiencies should be addressed by an ad-hoc working group (Conclusion 1/10 refers).

3.6 Concerning the introduction of the source of volcanic information in SIGMETs for volcanic ash, the group agreed that there was no need to propose amendments to the SIGMET format (Decision 1/11 refers).

3.7 The group welcomed the willingness of VAACs Toulouse and Washington to extend their areas of responsibility which would permit a quasi-global coverage of the IAVW (Conclusion 1/12 refers).

3.8 The group noted that the PIRGs would have to develop a new table (FASID Table MET 3C) listing the State volcano observatories from which information was required by ACCs, MWOs and VAACs. In order to assist the PIRGs, the group developed a set of principles (Conclusion 1/13 refers), which would allow an equitable evaluation of State volcano observatories.

4. Development of the IAVW

4.1 The group discussed issues related to the graphical format for volcanic ash advisories and SIGMETs for volcanic activity. Regarding graphical SIGMETs, the group reviewed the current template for SIGMETs messages (in alphanumeric form) included in Amendment 73 of Annex 3. It was agreed that the graphical product should contain the same information that is currently in the alphanumeric message with the improvement of the display of the area affected by volcanic ash which no longer would be limited to a polygon with at most five sides. In view of the obvious advantages of the graphical products, the group agreed to the establishment of an ad hoc working group to review and develop graphical products (volcanic ash advisories and SIGMETs) and to prepare a report on time for the IAVWOPSG/2 (Conclusion 1/14 refers). The group also agreed that the word "FIRST" in the time label "DATE AND TIME OF FIRST ERUPTION" in the volcanic ash advisories in graphical format should be removed, and referred this task (Conclusion 1/20 refers) to this ad hoc working group.

4.2 Concerning Recommendation 1/13 of the MET Divisional Meeting (2002) which had called for the upgrade of the status of the volcanic ash advisory to a "warning", the group concluded that the upgrade was not feasible in view of the far -reaching and legal implications that would emerge from such a change (Decision 1/15 refers).

4.3 With regard to the inclusion of an abbreviated WMO "dummy" header in the format of ASHTAM/NOTAM for volcanic ash with the purpose to facilitate routing of messages, the group considered that this procedure would *de facto* double the workload at most international NOTAM offices (NOFs) and agreed that there was no need to pursue work in this regard (Decision 1/16 refers). The group also considered a related issue raised at the recent meeting of the EANPG which had formulated Conclusion 45/18 calling for the IAVWOPSG to consider the global operational requirements to disseminate ASHTAMs and NOTAMs for volcanic ash on SADIS. The group agreed that it was essential that any data on volcanic activity should reach the States and users concerned with a minimum of delay and that ASHTAMs and NOTAMs for volcanic ash should be uplinked on the international satellite communications system (ISCS) and SADIS (Conclusion 1/17 refers). EANPG Conclusion 40/21 b) had also called for ICAO to review Annex 3 provisions for SIGMET messages for volcanic ash cloud in order to introduce a requirement for MWOs to acknowledge the receipt of volcanic ash advisories. In this regard, the group agreed that this proposal would be difficult to implement, and that work on this issue should be discontinued (Decision 1/18 refers).

4.4 The group considered the possibility of the inclusion of the smell of sulphur in Annex 3 as a condition prompting the issuance of a special aircraft observation. Since sulphur dioxide could be used as an indicator of the existence of volcanic ash, the group agreed on its inclusion in special aircraft observations (Conclusion 1/19 refers).

4.5 The group was pleased to note the improvement of the quality of volcanic ash advisories, highlighted by the users. However, the group recognized that there was still some scope for improvement and agreed to the establishment of an ad hoc working group to review the format of the volcanic ash advisory (Conclusion 1/21 refers). Concerning the harmonization of the format of those elements which are common to both volcanic ash and tropical cyclones advisories called for by APANPIRG Conclusion 14/39, the group

agreed that the Secretariat should develop a proposal for consideration by the IAVWOPSG/2 (Conclusion 1/22 refers).

4.6 The group discussed the feasibility of volcanic ash deposition observations at aerodromes and the inclusion of this information in meteorological reports. The group felt that these observations were necessary and tasked the Secretariat, in coordination with the IAVWOPSG member from WMO, to undertake a feasibility study on this issue (Conclusion 1/23 refers). The group also agreed that the VAACs should be encouraged to work towards a consistent approach on the development of a Volcano Explosivity Index (VEI)/Source term matrix (Conclusion 1/24 refers). The group also discussed the need of end users of assurance that there would not be significant changes in the projected trajectories as originally forecast in case of transference of responsibility between VAACs. In this regard, the group agreed that VAACs Provider States should conduct informal model intercomparisons on a routine basis (Conclusion 1/25 refers).

4.7 Concerning the inclusion of volcano number in SIGWX charts called for by APANPIRG Conclusion 8/27, the group agreed that the work had been completed with the inclusion of a Standard in Annex 3. However, it was noted that users (International Air Transport Association (IATA) and International Federation of Air Line Pilots' Associations (IFALPA)) had no utilization of the volcano number in SIGWX charts. Therefore, this issue would be brought to the attention of the WAFSOPSG (Conclusion 1/26 refers).

4.8 With the emerging complexity of volcanic ash cloud monitoring, the workload of most VAACs would increase. In this regard, the group invited ICAO, in coordination with WMO, to send a letter to VAAC Provider States highlighting the need for their continuous support to the IAVW (Conclusion 1/27 refers).

5. Matters related to the accidental release of toxic chemicals and radioactive material into the atmosphere

5.1 Regarding accidental release of toxic chemical into the atmosphere and the development of possible international arrangements for the exchange of related information, the group recognized that this was a problematic task and that progress had been delayed due to the absence of a lead organization. However, from the users point of view, the development of procedures for obtaining such information and its transmission to aircraft in-flight in a timely manner was considered necessary. In order to initiate work in this area the group agreed that an ad hoc working group be established (Conclusion 1/31 refers). Regarding the assessment and enhancement, called for by Recommendation 1/20 a) of the MET Divisional Meeting of existing operational procedures and notification practices on the accidental release of radioactive material from nuclear facilities, the group agreed that it should also be undertaken by this ad hoc working group.

5.2 Regarding the early notification by the International Atomic Energy Agency (IAEA) of an accidental release of radioactive materials into the atmosphere, it was pointed out that the IAEA was reluctant to advise more than one international aviation focal point. It was noted that based on the informal contacts established by the Secretariat with some States, ACCs were generally not prepared to accept this additional responsibility due to the unusual nature of the task. The group agreed that if a database converting positions into FIRs and their associated ACCs was available, it would help to find an international aviation focal point. In this regard, the group instructed the Secretariat to undertake a study (Conclusion 1/28 refers).

5.3 With regard to the feasibility of the inclusion by the WAFCs of information on the trajectory of a radioactive material on a separate chart, the group expressed serious misgivings about the utility of this information within the WAFS which provided meteorological information at the pre-flight planning stage. It was agreed that this type of "perishable" time-critical information should not be provided by the WAFS (Decision 1/29 refers).

5.4 Regarding the proposal for the amendment of the relevant Annexes and PANS to take account of the altitude to which trajectories forecasts of radioactive concentrations should be provided by WMO RSMC, the group agreed that, since no definitive upper limit can be established, ICAO documents should not be amended (Decision 1/30 refers).

5.6 Concerning the need for the development of an international format for advisories for all radioactive and hazardous material accidentally released into the atmosphere called for by Recommendation 1/20 b) of the MET Divisional Meeting, the group agreed that for aeronautical users it would be a step forward if information could be provided in abbreviated plain language. Regarding radioactive materials, the group agreed that the best option would be a SIGMET and instructed the Secretariat to undertake a study in this regard (Conclusion 1/32 refers).

5.7 Concerning the assessment of the need for the provision of information for international air navigation on solar radiation storms and other bio-hazards, called for by the MET Divisional Meeting (2002), the group noted that Annex 15 (5.1.1.1 t) refers) already required the issuance of a NOTAM when a forecast of solar cosmic radiation was provided. The group felt that the provision of additional information should be assessed. and agreed to request the member from the United States to present a report for consideration at the IAVWOPSG/2 (Conclusion 1/33 refers).

6 Future work programme

6.1 The group reviewed the work programme and proposed changes based on the discussions under Agenda Items 2, 3 and 4 (Conclusion 1/34 refers).

— END —

LIST OF IAVWOPSG/1 DECISIONS

- Decision 1/11 — Introduction of the source of volcanic information in SIGMETs for volcanic ash
- Decision 1/15 — Feasibility of the upgrade of the volcanic ash advisory message to a "warning" .
- Decision 1/18 — Acknowledgement of the receipt of volcanic ash advisories by MWOs
- Decision 1/29 — Feasibility of the inclusion, by the WAFCs, of information on the trajectory of radioactive material on a separate chart
- Decision 1/30 — Amendment of Annex 3 to include altitude to which trajectory forecasts of radioactive materials should be provided

LIST OF IAVWOPSG CONCLUSIONS

- Conclusion 1/1 — Amendment to IAVW-related regional procedures in the Basic ANP/FASID
- Conclusion 1/2 — Preparation of IAVW management report
- Conclusion 1/3 — Assistance to States in enhancing the coordination between the States' authorities/agencies involved in the implementation of IAVW
- Conclusion 1/4 — Update of Doc 9691, Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds
- Conclusion 1/5 — Reporting, recording and post-flight reporting of aircraft observations of volcanic activity
- Conclusion 1/6 — Information related to aircraft encounters to ICAO and the Smithsonian Institution by the VAACs
- Conclusion 1/7 — Development of VAAC back-up procedures for inclusion in Doc 9766, Handbook on the International Airways Volcano Watch (IAVW) — Operational Procedures and Contact List
- Conclusion 1/8 — Coordination with the International Union of Geodesy and Geophysics (IUGG)
- Conclusion 1/9 — Amendment to Annex 15 regarding the level of alert colour code
- Conclusion 1/10 — Establishment of an ad hoc working group to assess the application of the aviation volcanic ash colour code
- Conclusion 1/12 — Extension of the areas of responsibility of VAACs
- Conclusion 1/13 — Designation of selected State volcano observatories to be included in the ANP/FASID i-4 IAVWOPSG/1
- Conclusion 1/14 — Graphical format for volcanic ash advisories and SIGMETs
- Conclusion 1/16 — Amendment of ASHTAM/NOTAM for volcanic ash in Annex 15 to facilitate routing of messages
- Conclusion 1/17 — Dissemination of ASHTAMs and NOTAMs for volcanic ash on the ISCS and SADIS broadcasts
- Conclusion 1/19 — Inclusion of the smell of sulphur in special aircraft observations
- Conclusion 1/20 — Reference to first eruption in graphical volcanic ash advisories
- Conclusion 1/21 — Format of volcanic ash advisory messages
- Conclusion 1/22 — Harmonization of the format of VA and TC advisories
- Conclusion 1/23 — Feasibility of volcanic ash deposition observations at aerodromes and inclusion of this information in meteorological reports
- Conclusion 1/24 — Development of a VEI/Source term matrix
- Conclusion 1/25 — Model inter-comparisons exercises
- Conclusion 1/26 — Inclusion of volcano number in SIGWX charts
- Conclusion 1/27 — Increase of the workload of the volcanic ash advisories centres
- Conclusion 1/28 — Early notification of ACCs of an accidental release of radioactive materials into the atmosphere

Attachment B

- Conclusion 1/31 — Study on operational procedures and notification practices for accidental release of toxic chemicals and radioactive materials
- Conclusion 1/32 — Message format for the provision to aircraft of information on radioactive materials accidentally released into the atmosphere
- Conclusion 1/33 — Report on developments related to solar radiation storms and other bio-hazards
- Conclusion 1/34 — Update of the work programme of the IAVWOPSG

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PART VI

METEOROLOGY (MET)

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6. SIGMET and AIRMET information (FASID Tables MET 3A and MET 3B)

6.1 The period of validity of SIGMET messages should not exceed 4 hours. In the special case of SIGMET messages for volcanic ash cloud and tropical cyclones, the validity period may be extended up to 6 hours and an outlook should be added giving information for an additional period of up to 12 hours concerning the trajectory of the volcanic ash cloud and positions of the centre of the tropical cyclone respectively.

[ASIA/PAC/3 Rec. 8/16]

[IAVWOPSG/1 Conclusion 1/1]

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6.3 In order to assist MWOs in the preparation of the outlook included in SIGMET messages for volcanic ash, Volcanic Ash Advisory Centres Anchorage, Darwin, Tokyo, Washington and Wellington have been designated to prepare the required advisory information and send it to MWOs concerned in the Asia and Pacific Regions following notification/detection of the ash cloud. FASID Table MET 3B sets out the areas of responsibility of the volcanic ash advisory centres and the MWOs and ACCs to which the advisory information should be sent.

[ASIA/PAC/3 Rec. 8/9, Rec. 8/16]

[APANPIRG/4 Concl. 4/36]

[IAVWOPSG/1 Conclusion 1/1]

6.4 In order for volcanic ash advisory centres the VAACs to initiate the monitoring of volcanic ash from satellite data and the forecast of volcanic ash trajectories, MWOs should notify the relevant volcanic ash advisory centre immediately on receipt of information that a volcanic eruption has occurred or volcanic ash has been observed in the FIR for which they are responsible. In particular, any special air-reports of pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud, received by MWOs should be transmitted without delay to the VAAC concerned.

[ASIA/PAC/3 Rec. 8/16]

[IAVWOPSG/1 Conclusion 1/1]

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PART VI

METEOROLOGY (MET)

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5. VOLCANIC ASH ADVISORY CENTRES (FASID Table MET 3B, FASID Chart MET 3)

5.1 The areas of responsibility of the designated Volcanic Ash Advisory Centres (VAACs) Anchorage, Darwin, Tokyo, Washington and Wellington, and the MWOs to which the advisory information should be sent by the Centres VAACs are contained in FASID Table MET 3B. The areas of responsibility of the designated VAACs in all regions are shown on FASID Chart MET 3.

to pilots in avoiding actual ash encounters. The Handbook has been published as a single volume reference for both ground and air crews to assist coordination between the two in the event of an encounter with volcanic ash. The Handbook is published by the ICAO Asia and Pacific Office, Bangkok.

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Note 1. — Operational procedures to be used for the dissemination of information on volcanic eruptions and associated ash clouds in areas which could effect routes used by international flights and necessary pre-eruption arrangements as well as the list of operational contact points are provided in the document entitled Handbook on the International Airways Volcano Watch (IAVW) - Operational Procedures and Contact List (Doc 9766). This Handbook is published by ICAO. The Handbook is available on the ICAO web site: http://www.icao.int/cgi/goto_anb.pl?met and “click” on “International Airways Volcano Watch”.

Note 2. — The Additional information in particular on the problem of volcanic ash and the guidance regarding what each of the parties in the IAVW is expected to do and why, are contained in the Manual on Volcanic Ash, radioactive materials and toxic clouds (Doc 9691). This document is prepared by ICAO Secretariat with assistance of the Volcanic Ash Warning Study Group (VAWSG).

Note 3. — “Volcanic Ash and Aircraft Operations ASIA/ PAC Regional Handbook” addresses the danger of airborne volcanic ash, procedures for notifying ash occurrences and provides assistance

FASID Table MET 3 B
VOLCANIC ASH ADVISORY CENTRES

EXPLANATION OF THE TABLE

Column

- | | |
|---|---|
| 1 | Location of the volcanic ash advisory centre (VAAC). |
| 2 | Area of responsibility for the preparation of advisory information on volcanic ash by the VAAC in Column 1. |
| 3 | MWOs to which the advisory information on volcanic ash should be sent. |
| 4 | ACC to which the advisory information on volcanic ash should be sent. |
| 5 | ICAO location indicator assigned to the ACC in Column 4. |

Note. — ICAO location indicators for MWOs are shown in FASID Table MET 1B.

Volcanic ash advisory centre	Area of responsibility	MWO to which advisory information is to be sent	ACC to which advisory information is to be sent	
			Name	ICAO loc. ind.
1	2	3	4	5
Anchorage (United States)	Anchorage Oceanic Anchorage Continental Anchorage Arctic and west to E150, north of N60	Anadyr	Anadyr	UHMA
		Anchorage	Anchorage	PAZA
		Chaybukha	Boston	KZBW
		Chersky	Chaybukha	UHMG
		Chokurdakh	Chersky	UJSS
		Kelowna	Chicago	KZAU
		Mys Shmidt	Chokurdakh	UESO
		Pevek	Cleveland	KZOB
		Seymchan	Denver	KZDV
		Provideniya Bay	Fairbanks	PAFA
		Tilichiki	Minneapolis	KZMP
		Tiksi	Mys Shmidt	UHMI
		Tokyo	New York	KZNY
		Zyryanka	Pevek	UHMP
			Salt Lake	KZLC
			Seattle	KZSE
			Seymchan	UHMS
			Tiksi	UEST
			Tokyo	RJTI
			Washington	KCFC
			Zyryanka	UESU
Darwin (Australia)	Southward from N10 and from E100 to E160, and the Perth FIR between E100 and E75, Colombo FIR, and those parts of the Kuala Lumpur, Bangkok, Chennai, Yangon and Calcutta FIRs lying within N10 E100 to N20 E100 to N20 E82 to N10 E82 to N6 E78 to S2 E78 to E6 E75	Adelaide	Adelaide	FAAD
		Bangkok	Bali	WRRZ
		Biak	Bangkok	VTBB
		Brisbane	Brisbane	YBBN
		Chennai	Cairns	YBCS
		Darwin	Chennai	VOMF
		Denpasar	Darwin	YPDN
		Gia Lam	Ho-Chi-Minh	VVTS
		Guam	Honiara	AGGH
		Hobart	Jakarta	WIIZ
		Honiara	Kota Kinabalu	WBKK
		Jakarta	Kuala Lumpur	WMFC
		Kota Kinabalu	Manila	RPHI
		Kuala Lumpur	Medan	WIMZ
		Manila	Melbourne	YMMM
		Melbourne	Perth	YPPH
		Perth	Port Moresby	AYPM
		Port Moresby	Singapore	WSJC
		Singapore	Sydney	YSSY
		Sydney	Townsville	YBTL
		Townsville	Ujung Pandang	WAAZ
		Ujung Pandang	Washington	KCFC
		Yangon		
Tokyo (Japan)	N60 to N10 – and from E90 to Oakland Oceanic and Anchorage Oceanic and Continental FIR boundaries	Bangkok	Bangkok	VTBB
		Blagoveschenk	Blagoveschenk	UHBB
		Beijing	Beijing	ZBPE
		Bratsk	Bratsk	UIBB
		Chita	Changsha	ZGCS
		Gia Lam	Chengdu	ZUDS
		Guangzhou	Chongqing	ZUCK
		Hong Kong	Chita	UIAA
		Irkutsk	Daegu	RKTT
		Khabarovsk	Dalian	ZYTL
		Kirensk	Fukuoka	RJDG
		Kunming	Guangzhou	ZGZU
		Lanzhou	Guilin	ZGKL
			Haikou	ZJHK

Volcanic ash advisory centre	Area of responsibility	MWO to which advisory information is to be sent	ACC to which advisory information is to be sent	ICAO loc. ind.
1	2	3	Name 4	5
		Magadan	Hanoi	
		Magdagachi	Harbin	ZYHB
		Manila	Hefei	ZSOF
		Naha	Ho-Chi-Minh	VVTS
		Nikolayevsk- na-Amure	Hong Kong	VHHH
		Okha	Huhhot	ZBHH
		Okhotsk	Irkutsk	UIII
		Petropavlovsk- Kamchatsky	Jinan	JSTN
		Phnom-Penh	Khabarovsk	UHHH
		Pyongyang	Kirensk	UIKK
		Seoul	Kunming	ZPKM
		Shanghai	Lanzhou	ZLAN
		Shenyang	Manila	RPHI
		Taibei	Magadan	UHMM
		Tokyo	Magdagachi	UHBI
		Ulan-Bator	Naha	ROAH
		Urumqi	Nanchang	ZSCN
		Vientiane	Nanjing	ZSNJ
		Vladivostok	Nanning	ZGNN
		Wuhan	Nikolayevsk- na-Amure	UHNN
		Yuznosakhalinsk	Okha	UHSH
			Okhotsk	UHOO
			Osaka	RJOO
			Petropavlovsk- Kamchatsky	UHPP
			Phnom-Penh	VDPP
			Pyongyang	ZKKK
			Qingdao	RCMQ
			Sanya	ZJSA
			Shanghai	ZSHA
			Shenyang	ZYSH
			Taibei	RCTP
			Taiyuan	ZBYN
			Tokyo	RJTI
			Ulan-Bator	ZMUB
			Urumqi	ZWWW
			Vladivostok	UHWW
			Washington	KZDC
			Wuhan	ZHWH
			Xiamen	ZSAM
			Xi'an	ZLSN
			Yuzno-Sakhalinsk	UHSS

Volcanic ash advisory centre	Area of responsibility	MWO to which advisory information is to be sent	ACC to which advisory information is to be sent	
			Name	ICAO loc. Ind.
1	2	3	4	5
Washington (United States)	New York Oceanic Oakland Oceanic and United States Continental FIRs, CAR Region, SAM Region north of S10	Belem	Albuquerque	KZAB
		Bogotá	Atlanta	KZTL
		Caracas	Barranquilla	SKEC
		Cayenne	Belem	SBBL
		Darwin	Bogotá	SKED
		Gander	Boston	KZBW
		Georgetown	Chicago	KZAU
		Guam	Cleveland	KZOB
		Guayaquil	Curaçao	TNCF
		Habana	Denver	KZDV
		Honolulu	Fort Worth	KZFW
		Kansas City	Georgetown	SYGC
		Kingston	Guayaquil	SEGU
		Lima-Callao	Habana	MUFH
		Manaus	Honolulu	PHZH
		Mexico	Houston	KZHU
		Nassau	Indianapolis	KZID
		Panama	Jacksonville	KZJX
		Port-au-Prince	Kansas City	KZKC
		Port of Spain	Kingston	MKJK
		Recife	Lima	SPIM
		San Francisco	Los Angeles	SPLI
		San Juan, Puerto Rico	Maiquetia	SVZM
		Santo Domingo	Manaus	SBMU
		Tegucigalpa	Mazatlán	MMZT
		Tokyo	Menphis	MMMZ
		Willemstad	Mérida	MMID
		Zandery	México	MMEX
			Minneapolis	KZMP
			Monterrey	MMTY
			Nassau	MYNA
			New York	KZNY
			Oakland	KZOA
			Panamá	MPZL
			Paramaribo	SMPM
			Piarco	TTPP
			Port-au-Prince	MTEG
			Porto Velho	SBPH
			Recife	SBRE
			Rochambeau	SOOO
			Salt Lake City	KZLC
			San Juan, Puerto Rico	TJZS
			Santo Domingo	MDSD
			Seattle	KZSE
			Tegucigalpa	MHTG
			Washington	KCFC
Wellington¹ (New Zealand)	Southward from the Equator and from E 160 to W140	Darwin	Auckland	NZAA
		Fiji	Brisbane	YBBB
		Honiara	Christchurch	NZZC
		Honolulu	Darwin	YPDN
		Nauru	Honolulu	PHZH
		Tahiti	Nadi	NFFF
		Wellington	Tahiti	NTAA
			Washington	KZDC

¹New Zealand is currently providing the advisory service from the equator up to S60.

FASID CHART MET 3

