International Civil Aviation Organization

WORKING PAPER

TWENTIETH MEETING OF THE METEOROLOGY SUB-GROUP (MET SG/20) OF THE ASIA/PACIFIC AIR NAVIGATION PLANNING AND IMPLEMENTATION REGIONAL GROUP (APANPIRG)

Bangkok, Thailand, 6 – 9 June 2016

Agenda Item 7:   Regional guidance material

REVIEW REGIONAL SIGMET GUIDE

(Presented by the Secretariat)

SUMMARY

The Asia/Pacific Regional SIGMET Guide provides complementary guidance on SIGMET standardization, harmonization, procedures and formats. It was last amended to adopt a common template for use by all ICAO Regions. Ongoing development of the SIGMET Guide comes under the terms of reference of the MET SG and its contributory working groups. Future amendments will require alignment of the SIGMET Guide with Amendment 77 to Annex 3 and additional improvements to assist States with alignment of SIGMET information across boundaries of responsibility. The meeting is invited to review and endorse the work plan related to the development of SIGMET Guide amendments.

1.   INTRODUCTION

1.1   The Asia/Pacific Regional SIGMET Guide (referred to from now on as the SIGMET Guide) is intended to provide regional guidance for the standardization and harmonization of procedures and formats related SIGMET information. As such, it is considered as complementary guidance to the ICAO SIGMET-related Standards and Recommended Practices (SARPs) and other provisions in the ICAO Annex 3 − *Meteorological Services for International Air Navigation* and the ICAO Asia/Pacific regional air navigation plan (ANP).

1.2   This paper discusses recent and future amendments to the SIGMET Guide, based on a common Regional SIGMET Guide template, improvements provided by the MET SG and its contributory working groups, and the need to align the SIGMET Guide with upcoming changes in Amendment 77 to Annex 3.

2.   DISCUSSION

2.1   The latest version of the SIGMET Guide (Fifth Edition − October 2015) is available on the ICAO Asia/Pacific Office website at: www.icao.int/APAC; by following the link to eDocuments and searching under the "MET" heading.

2.2   The SIGMET Guide is maintained by the ICAO Asia/Pacific Regional Office and reviewed and updated regularly to maintain alignment with the relevant SIGMET-related ICAO SARPs, provisions and regional air navigation procedures. The regular review and update of the SIGMET Guide is an important function carried out under the terms of reference and work programme of the APANPIRG and the MET SG, and in particular with assistance provided by the working groups of the MET SG (i.e., MET/S WG, MET/IE WG and MET/R WG).

2.3   The latest version of the SIGMET Guide is based on the adoption of the common *Regional SIGMET Guide template* provided by the fifth meeting of the Meteorological Warnings Study Group (METWSG/5, Action Agreed 5/4 refers), with further improvements provided by the MET SG and the MET/IE WG and MET/S WG (further discussion in WP/16).

2.4   Future necessary improvements to the SIGMET Guide were agreed at the conjoint session of MET/IE WG/14 and MET/S WG/6 (further discussion in WP/16; Task 3 refers). The proposed improvements are to align the SIGMET Guide with Amendment 77 to Annex 3, which will become applicable on 10 November 2016 (IP/05 refers). This activity was also captured in the work programme of the MET/S WG (as shown in the Attachment 1 to WP/09). The draft amendments were agreed to be provided in June 2016.

2.5   In separate discussions related to improvement of SIGMET guidance material, the MET/R WG revised its work programme to include the task of drafting amendments to the SIGMET Guide to assist States in aligning SIGMET information across the boundaries of neighbouring MWOs' areas of responsibility (further discussion in WP/04). The draft amendments were agreed to be provided in June 2016.

2.6   Preliminary draft amendments to the SIGMET Guide to assist States in aligning SIGMET information between neighbouring MWOs' areas of responsibility is provided at the **Attachment** to this paper (pages 2-1, 2-2, 3-1, 3-8, 3-14 and B-1, refer).

2.7   Additional, minor editorial improvements, based on feedback from Hong Kong, China, in relation to the SIGMET examples in the SIGMET test procedures are provided at the **Attachment** to this paper (page C-4 refers).

3.   CONCLUSION

3.1   ICAO Regional SIGMET Guides provide complementary guidance material to the Annex 3 and Regional ANP requirements to assist States with the standardization and harmonization of procedures and formats related SIGMET information.

3.2   The latest version of the Asia/Pacific SIGMET Guide was adopted based on the common *Regional SIGMET Guide template* provided by METWSG/5, with additional improvements provided by the MET SG and the MET/IE WG and MET/S WG under the terms of reference to develop guidance materials aimed at improving aeronautical meteorological services.

3.3   Further amendments will be required to align the SIGMET Guide with Amendment 77 to Annex 3 (applicable on 10 November 2016) and to assist States with providing seamless SIGMET service to users across boundaries of adjacent areas of responsibility. This work has been integrated into the revised work programmes of the working groups under the MET SG with draft amendments to be provided in June 2016.

4. **ACTION BY THE MEETING**

4.1   The meeting is invited to:

a)   Note the information contained in this paper;

b)   Propose any additional amendments to the SIGMET Guide as necessary; and

c)   Review and revise as necessary the work programme of the MET SG (and its working groups), including target dates, with respect to the future development of the SIGMET Guide.

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2. RESPONSIBILITIES AND COORDINATION

2.1. General

2.1.1. SIGMET messages provide information on hazardous meteorological phenomena which may affect safety of aircraft operations; hence they are considered a high priority among other types of meteorological information provided to the aviation users. The primary purpose of SIGMET is for in-flight service, which requires timely transmission of the SIGMET messages to pilots by the ATS units and/or through VOLMET and D-VOLMET. Further information on the responsibilities of each party involved in the SIGMET process can be found in the *Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services* (Doc 9377).

2.1.2. Airlines are the main users of the SIGMET information. They contribute to the effectiveness of the SIGMET service through issuance of special air-reports reported by pilots to the ATS units. Special air-reports are among the most valuable sources of information for the MWOs in the preparation of SIGMET. The ATS units receiving special air-reports should forward them to their associated MWOs without delay.

2.1.3. In view of the foregoing, it should be well understood that the effectiveness of the SIGMET service depends strongly on the level of collaboration between the MWOs, ATS units, pilots, TCACs, VAACs and State volcano observatories. That is why, close coordination between these parties, as well as mutual understanding of their needs and responsibilities are essential for the successful implementation of the SIGMET service.

2.1.3.2.1.4. It should also be well understood that effective coordination between MWOs with adjacent areas of responsibility is essential to ensure seamless SIGMET service for users operating across the boundaries of the MWOs' areas of responsibility.

2.1.4.2.1.5. For the special cases of SIGMET for volcanic ash and tropical cyclones, the MWOs are provided with advisories from VAACs and TCACs respectively, as designated in the regional ANPs.

2.1.5.2.1.6. SIGMET is also used for flight planning. This requires global dissemination of SIGMET through the regional OPMET data banks (RODBs), the aeronautical fixed service (AFS) satellite distribution system (SADIS 2G), the Internet-based Secure SADIS FTP service and the WAFS Internet File Service (WIFS). SIGMET should also be distributed to the World Area Forecast Centres (WAFCs) London and Washington for use in the preparation of the significant weather (SIGWX) forecasts.

2.2. Meteorological watch office (MWO) responsibilities

2.2.1. SIGMET is to be issued by the MWO in order to provide timely information on the occurrence or expected occurrence of specified en-route weather phenomena affecting the safety of the flight operations in the MWO's area of responsibility. SIGMET provides information concerning the location, extent, intensity and expected evolution of the specified phenomena.

2.2.2. Information about the provision of the SIGMET service, including details on the designated MWO(s), is to be included in the State's Aeronautical Information Publication (AIP) as required by Annex 15 – *Aeronautical Information Service*, Appendix 1, GEN 3.5.8.

2.2.3. If a State is temporarily unable to meet its obligations for establishing MWO(s) and for provision of SIGMET, arrangements have to be made for another State to assume this responsibility. Such delegation of responsibilities is to be agreed by the meteorological authority of each State concerned and should be notified by a

NOTAM, within the State's AIP and in a letter to the ICAO Regional Office concerned.

2.2.4.   The meteorological authority concerned should ensure that the MWO obligations and responsibilities are clearly defined and assigned to the unit designated to serve the MWO. Corresponding operational procedures should be established and the meteorological staff should be trained accordingly.

2.2.4.2.2.5.   MWO operational procedures should provide for adequate coordination with other MWOs that have adjacent areas of responsibility to ensure that SIGMET information provided by the MWOs is seamless across the boundary between the adjacent areas of responsibility.

2.2.5.2.2.6.   In preparing SIGMET information MWOs should follow the format prescribed in Annex 3, Appendix 6, Table A6-1. Whilst Table A6-1 is the authoritative source, this regional SIGMET guide, including a simplified version of Table A6-1 in Appendix A, provides more specific instructions on how SIGMET should be compiled. The aim is to ensure that SIGMET is produced reliably and consistently worldwide.

2.2.6.2.2.7.   SIGMET must be issued only for those weather phenomena listed in Annex 3, Appendix 6, 1.1.4 and only when specified criteria for their intensity and spatial extent are met.

2.2.7.2.2.8.   The MWOs should be adequately equipped in order to be able to identify, analyze and forecast those phenomena for which SIGMET is required. The MWO should make use of all available sources of information including:

- special air-reports passed to the MWO from ATS (voice communication);
- special air-reports received from automated downlink;
- numerical Weather Prediction (NWP) data, especially high resolution models where available;
- meteorological observations, including those from automatic weather stations and human observers;
- upper wind information;
- information from meteorological satellites;
- weather radar (including Doppler radar);
- State volcano observatories;
- International Atomic Energy Agency (IAEA) through the relevant World Meteorological Organization (WMO) Regional Specializes Meteorological Centre (RSMC) for radioactive cloud;
- local knowledge;
- volcanic ash or tropical cyclone advisory messages.

2.2.8.2.2.9.   On receipt of a special air-report from the associated ACC or FIC, the MWO shall:

a)   issue SIGMET information based on the special air-report; or

b)   send the special air-report for onward transmission to MWOs, WAFCs, and other meteorological offices in accordance with regional air navigation agreement in the case that the issuance of SIGMET information is not warranted (e.g., the phenomenon concerned is of transient nature).

2.2.9.2.2.10.   Appropriate telecommunication means should be available at the MWO in order to ensure timely dissemination of SIGMET according to a dissemination scheme, which should include transmission to:

- local ATS users;

3. PROCEDURES FOR PREPARATION OF SIGMET INFORMATION

3.1. General

3.1.1.   SIGMET is intended for transmission to aircraft in flight either by ATC or by VOLMET or D-VOLMET, and therefore, SIGMET messages should be kept concise. To this end, SIGMET information is prepared using approved ICAO abbreviations, a limited number of non-abbreviated words and, numerical values of a self-explanatory nature.

3.1.2.   The increasing use of automated systems for handling the aeronautical meteorological information by the users makes it essential that all types of OPMET information, including SIGMET messages, are prepared and issued in the prescribed standardized format. Therefore, the format of the SIGMET message, as specified in Annex 3, Appendix 6, should be strictly followed by the MWOs.

3.1.3.   The MWO should maintain watch over the evolution of the phenomenon for which a SIGMET has been issued. If the phenomenon persists or is expected to persist beyond the period of validity of the SIGMET, another SIGMET message for a further period of validity should be issued with updated information. SIGMETs for volcanic ash and tropical cyclone should be updated at least every 6 hours, while SIGMET for all other phenomena should be updated at least every 4 hours.

3.1.4.   SIGMET should be promptly cancelled when the phenomenon is no longer occurring or no longer expected to occur in the MWO's area of responsibility.

~~3.1.4~~3.1.5.   Paragraphs 2.1.4 and 2.2.5 highlight the importance of coordination between MWOs to ensure seamless SIGMET service across the boundaries between adjacent MWOs' areas of responsibility.

~~3.1.5~~3.1.6.   Some SIGMET are generated using information from special air-reports (received by voice communications or data link (downlink)). The reporting of turbulence and icing used in special air-reports includes both moderate and severe categories (as per Doc 4444, Appendix 1).

Note. ― Although the categories for the reporting, by pilots, of moderate and severe turbulence in special air-reports is provided in PANS-ATM (Doc 4444), some pilots report turbulence as "moderate to severe". A MWO is then faced with determining which category to use in a special air-report (uplink) or in a SIGMET message for severe turbulence. Some States elect to treat such "moderate to severe" observations as 'severe' in the context of using the report to prompt the issuance of a special air-report (uplink) or a SIGMET message.

3.2. SIGMET phenomena
SIGMET shall only be issued for the phenomena listed in

3.2.1.   Table 1~~Table 1~~ below and only using the abbreviations as indicated.

Phenomena Abbreviation	Description
OBSC TS	Thunderstorms that are obscured by haze or smoke or cannot be readily seen due to darkness.
EMBD TS	Thunderstorms that are embedded within cloud layers and cannot be readily recognized by the pilot in command.
FRQ TS	Frequent thunderstorms where, within the area of thunderstorms, there is little no separation between adjacent thunderstorms with a maximum spatial coverage greater than 75%.
SQL TS	A squall line indicating that a line of thunderstorms with little or no

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WI <Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or <Ennn[nn]> –
<Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or <Ennn[nn]> –
<Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or <Ennn[nn]> –
<Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or <Ennn[nn]> –
<Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or <Ennn[nn]> –
<Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or <Ennn[nn]> –
<Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or <Ennn[nn]>
```

For example:

**WI N6030 E02550 – N6055 E02500 – N6050 E02630 –
N6030 E02550**

WI N60 E025 – N62 E27 – N58 E030 – N59 E26 – N60 E025

*Note. — The points of a polygon should be provided in a clockwise order, and the
end point should be a repeat of the start point.*

Use of polygons with complex FIR boundaries.

*Note. — Paragraphs **2.1.4**, **2.2.5** and **3.1.5** of the SIGMET Guide highlight the
importance of coordination between MWOs to ensure seamless SIGMET service
across the boundaries between adjacent MWOs' areas of responsibility.*

*Annex 3 (18th Edition, July 2013) specifies that the points of a polygon '... should be
kept to a minimum and should not normally exceed seven'. However, some FIR
boundaries are complex, and it would be unrealistic to expect that a polygon would be
defined that followed such boundaries exactly. As such, some States have determined
that the polygon points be chosen in relation to the complex boundary such that the
FIR boundary approximates, but is wholly encompassed by, the polygon, and that any
additional area beyond the FIR boundary be the minimum that can be reasonably and
practically described. Caution should however be exercised in those instances where
international aerodromes are located in close proximity to such a complex FIR
boundary. **Appendix B** provides examples and advice with regard to describing such
areas.*

2a) In a sector of the FIR defined relative to a specified line joining two points on the
FIR boundary[2].

Symbolically this is indicated as:

```
<N OF> or <NE OF> or <E OF> or <SE OF> or <S OF> or
<SW OF> or <W OF> or <NW OF> LINE <Nnn[nn]> or
<Snn[nn]> <Wnnn[nn]> or <Ennn[nn]> – <Nnn[nn]> or
<Snn[nn]> <Wnnn[nn]> or <Ennn[nn]>
```

For example:

NE OF LINE N2500 W08700 – N2000 W08300

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[2] or so close to the FIR boundary so as to leave no doubt that the intent is for the line to connect to the FIR boundary at that
point (this is to allow for some small margin of error when judging the coordinates where the specified line would intersect
the FIR boundary.

Symbolically, this is indicated as:

```
WI <Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or <Ennn[nn]> –
<Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or <Ennn[nn]> –
<Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or <Ennn[nn]> –
<Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or <Ennn[nn]> –
<Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or <Ennn[nn]> –
<Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or <Ennn[nn]> –
<Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or <Ennn[nn]>
```

For example:

**WI N6030 E02550 – N6055 E02500 – N6050 E02630 –
N6030 E02550**

WI N60 E025 – N62 E27 - N58 E030 - N59 E26 - N60 E025

Note. ─ The points of a polygon should be provided in a clockwise order, and the end point should be a repeat of the start point.

Use of polygons with complex FIR boundaries.

*Note. ─ Paragraphs **2.1.4**, **2.2.5** and **3.1.5** of the SIGMET Guide highlight the importance of coordination between MWOs to ensure seamless SIGMET service across the boundaries between adjacent MWOs' areas of responsibility.*

*Annex 3 (18th Edition, July 2013) specifies that the points of a polygon '... should be kept to a minimum and should not normally exceed seven'. However, some FIR boundaries are complex, and it would be unrealistic to expect that a polygon would be defined that followed such boundaries exactly. As such, some States have determined that the polygon points be chosen in relation to the complex boundary such that the FIR boundary approximates, but is wholly encompassed by, the polygon, and that any additional area beyond the FIR boundary be the minimum that can be reasonably and practically described. Caution should however be exercised in those instances where international aerodromes are located in close proximity to such a complex FIR boundary. **Appendix B** provides examples and advice with regard to describing such areas.*

2)   Covering the entire FIR or CTA (this is only permitted for volcanic ash)

ENTIRE FIR

or

ENTIRE CTA

For describing an area of volcanic ash by reference to a zone defined by line of specified width, see the 'Level and extent' section that follows.

3.5.4.6.   <u>Level and extent of the volcanic ash cloud</u>

When the Location of volcanic ash is described using the available descriptors in the 'Location section', the Level of the volcanic ash may be described using descriptors used for other phenomena, i.e.

FLnnn

or

APPENDIX B

SIGMET EXAMPLES

Note. — The figures used in this appendix are intended simply to clarify the intent of the SIGMET message in abbreviated plain language, and therefore how each SIGMET should be constructed by MWOs and also interpreted by users. The figures used are <u>not</u> intended to give guidance on how a SIGMET in graphical format should be produced.

Note. — Paragraphs 2.1.4, 2.2.5 and 3.1.5 of the SIGMET Guide highlight the importance of coordination between MWOs to ensure seamless SIGMET service across the boundaries between adjacent MWOs' areas of responsibility.

Examples of '`WS`' SIGMET. See the sections for SIGMET for volcanic ash only (`WV`) and SIGMET for tropical cyclone only (`WC`) for examples specific to those phenomena.

Contents

General
1) An area of the FIR defined by a polygon.
   Use of polygons with complex FIR boundaries.
2a) In a sector of the FIR defined relative to specified line joining two points on the FIR boundary
2b) In a sector of the FIR defined relative to a line of latitude and a line of longitude (effectively a quadrant)
2c) In a sector of the FIR defined relative to a line of latitude or longitude (effectively a segment)
3) At a specific point within the FIR
4) Volcanic Ash SIGMET only
   Multiple areas of in SIGMET for volcanic ash
   Covering entire FIR/CTA
   Multiple areas in SIGMET for tropical cyclone
5) Tropical Cyclone SIGMET only

General

Explanation of fictional FIR.

In each of the examples below, a fictional FIR area is indicated, with portions of adjacent FIRs also indicated. The FIR areas are overlaid on a coordinate grid, in order that the example plain language SIGMETs can be explicitly related to the intended meaning.

3.3.1.2.   For example, a SIGMET test is scheduled for 0200 UTC on the 29th. The TEST SIGMET is issued as follows:

>   WSAU01 YBRF 290200
>   YBBB SIGMET Z99 VALID 290200/290210 YBRF-
>   YBBB BRISBANE FIR THIS IS A TEST SIGMET PLEASE DISREGARD=

3.3.2.   The test date and time

3.3.2.1.   ICAO Regional Office will set a date and time for each SIGMET test after consultation with the participating VAACs, TCACs and RODBs. The information about the agreed date and time will be sent to all States concerned by a State letter and copied to the States' SIGMET Tests Focal Points.

3.3.2.2.   Tests for different types of SIGMET should preferably be conducted on separate dates.

3.3.2.3.   SIGMET tests for **WC**, **WV** and **WS** should be conducted at least yearly.

3.3.3.   Dissemination of test SIGMETs and advisories

3.3.3.1.   All TEST TC/VA advisories should be sent by the TCACs and VAACs to the participating units, as specified in the Regional Air Navigation Plan (FASID Tables MET 3A and 3B respectively) and also to the five APAC RODBs and the two WAFCs. The relevant AFTN addresses for the RODBs and WAFCs are listed in paragraph 3.3.3.2 below.

3.3.3.2.   Note that priority indicator of SIGMET messages is **FF** as they are flight safety messages (Annex 10 Vol. II, 4.4.1.1.3). All TEST SIGMET should be sent by the MWOs to the five APAC RODBs and the two WAFCs at the following AFTN addresses:

>   RODBs
>   Bangkok   VTBBYPYX
>   Brisbane   YBBBYPYX
>   Nadi   NFFNYPYX
>   Singapore   WSSSYZYX
>   Tokyo   RJTDYPYX
>
>   WAFCs
>   London   EGZZMASI
>   Washington KWBCYMYX

>   *Note: To avoid duplicate TEST TCA/VAA being counted in the SIGMET test analysis, only messages received by AFTN (i.e., bulletins with WMO headings FK and FV) and not by GTS and WAFS are counted in the analysis.*

3.3.3.3.   RODBs that are nominated as Inter Regional OPMET Gateway (IROGs) will relay the test bulletins to their corresponding IROG.

3.3.3.4.   SIGMET tests should be terminated within 2 hours of the test start time. (e.g., from 0200 to 0400 UTC).

3.3.4.   Coordination with the ATS units

3.3.4.1.   MWOs should inform the associated ATS units of the forthcoming SIGMET tests by a suitable advanced notice.

3.4.   **Processing of the test messages and results**