INTERNATIONAL CIVIL AVIATION ORGANIZATION
AFI PLANNING AND IMPLEMENTATION REGIONAL GROUP (APIRG)
FIFTEENTH MEETING

(Nairobi, Kenya, 26 – 30 September 2005)

Agenda Item 4 : Air Navigation Issues

4.4 : Meteorology – Review of the report of the Seventh Meeting of the Meteorology Sub-Group (MET/SG/7)

(Presented by the Secretariat)

This paper presents the report of the Seventh Meeting of the MET/SG. The Sub-Group reviewed action taken on various conclusions and decisions of the APIRG. The meeting also discussed matters relating to the WAFS in the AFI Region, the AFI Meteorological Bulletins Exchange (AMBEX) Scheme, provision of tropical cyclone and volcanic ash advisories for the AFI Region, the list of deficiencies in the MET field and challenges facing AFI meteorological services.

1. Introduction

1.1 The Seventh Meeting of the Meteorology Sub-Group (MET/SG/7) was held at the ICAO Western and Central African Office, Dakar, Senegal from 11 to 13 April 2005. The meeting was attended by 24 participants from 15 States and two international organizations.

1.2 It should be noted that the Sub-Group recorded its actions in the form of Conclusions and Decisions. Apart from approval of the report, formal action is required by the APIRG on conclusions which are submitted for consideration in this paper.

2. Review of APIRG Conclusions and Decisions

2.1 Under this agenda item, the Sub-Group noted action taken and progress made so far on the implementation of conclusions and decisions formulated by MET/SG in previous meetings and which had been endorsed by the APIRG. The Sub-Group also noted the efforts made by States to implement Decisions and Conclusions of MET/SG adopted by the APIRG.

3. WAFS in the AFI Region

3.1 Under this agenda item, the Sub-Group reviewed the status of implementation in the AFI Region of the WAFS in particular the Satellite Distribution System for information relating to air navigation (SADIS) provided by the United Kingdom as an integral part of the ICAO aeronautical fixed service (AFS).

3.2 The meeting noted the follow-up action taken by ICAO and the WAFC London Provider State concerning Conclusions of the APIRG relating to the WAFS in particular the training on the use of GRIB and BUFR codes and the acquisition by AFI States of latest version of workstation software. The meeting also noted that despite the training seminars organized jointly by ICAO/WMO and UK for the Region, there are still States which have not received the training. It was proposed that these States should take action to receive the required training at earliest. Options include arranging training from their software vendor, sourcing training material from WAFC London and contacting ASECNA with regard to their offer to assist in their training programmes. If all these options fail then consideration should be given by ICAO, WMO and UK (subject to MET Authority approval) to arranging a further training event. The following conclusion was formulated:

Conclusion 15/- : Training for the use of GRIB and BUFR Codes

That the UK, in coordination with ICAO and WMO, be invited to consider providing training for the use of GRIB and BUFR Codes to those AFI States which have not benefited from previous training seminars.

3.3 The meeting was aware through AFI ICAO Regional Offices concerned of the introduction of the SADIS Second Generation (SADIS 2G) service and the termination of the 1G service on 31 December 2008. All existing SADIS users must have migrated to the SADIS 2G service before this date. The following conclusion is formulated:

Conclusion 15/-: Procurement of the necessary SADIS 2G hardware

That SADIS users in the AFI Region be invited to:
a) procure the necessary SADIS 2G hardware well ahead of the termination of the 1G service on 31 December 2008, and
b) attend the SADIS seminar scheduled to take place in 2006 aimed at assisting users in the procurement of SADIS 2G hardware, and as necessary compliant visualisation software.

3.4 The meeting discussed the role of the SADIS Internet-based FTP service and agreed to the proposed change whereby the management of the SADIS FTP service would become part of the task of the SADISOPSG, and the SADIS users would be in a position to impact the development of the SADIS FTP service. However the meeting was of the view that this service should be free for all SADIS users not only the less developed countries (LDCs). This however was not supported at SADISOPSG/9 and SCRAG/6 meetings. The meeting welcome the move of WAFC London to produce WAFS SIGWX (SWH and SWM) in the (PNG) portable network graphics format for specific regions and place these on the Internet based WAFS FTP service. It was noted that this will provide users with convenient access to standard area charts that requires minimal investment in end user software. The meeting urged States to take part in the planned survey in May 2006 aimed at verifying the implementation of the reception and effective utilisation of BUFR coded (SIGWX) forecasts by States. The following conclusion was formulated:

Conclusion 15/- : Participation of AFI States in the survey in May 2006 on utilisation of BUFR coded (SIGWX) forecasts

That AFI States be urged to participate in the survey in May 2006 aimed at verifying the implementation of the reception and effective utilisation of BUFR coded (SIGWX) forecast by States.

The following conclusion was also formulated:

Conclusion 15/-: SADIS FTP Service

That, in parallel with the satellite broadcast, the SADIS Provider State be invited, as of 1 July 2005, to make WAFS forecasts and OPMET data available, as a primary component of the SADIS service, in accordance with the *SADIS User Guide* through the Internet-based SADIS FTP service.

Note 1. - The development and management of this service will be overseen by the SADISOPSG and its work programme will be amended accordingly.

Note 2. - The SADIS cost Recovery Administrative Group (SCRAG) has been informed about the planned date of implementation.

3.5 The meeting was informed by ASECNA that as a result of the lack of reliable and cost effective Internet access across many of the ASECNA States, it would be highly beneficial if the PNG formatted SIGWX charts could also be added to the SADIS satellite service. In this regard the group formulated the following conclusion:

Conclusion 15/-: The PNG formatted (SIGWX) charts to be added to the SADIS Satellite Services

That the SADISOPSG be invited to consider adding the PNG formatted WAFS SIGWX charts to the SADIS satellite services.

3.6 The meeting reviewed the SADIS strategic assessment tables as given at **Appendix B** with entries regarding the current and projected data volumes for the period 2005-2009. The meeting agreed on the proposed tables and formulated the following conclusion:

Conclusion 15/- : SADIS strategic assessment tables

That, the SADIS strategic assessment tables, as given in Appendix C to this report, be adopted and forwarded to the SADISOPSG for planning the future requirements for bandwidth on the SADIS broadcast. .

3.7 Table MET 7: Authorized users of the SADIS Satellite Broadcast in the AFI Region was revised and updated as given in **Appendix A** to this working paper.

4. AFI Meteorological Bulletins Exchange (AMBEX) Scheme

4.1 The meeting noted that following the introduction of METARs in AMBEX exchanges Conclusion 13/66 of APIRG/13 refers, the AMBEX Scheme now caters for exchanges of TAFs, AIREPs and METARs. The meeting was of the view that there is a need to enhance OPMET exchanges with adjacent regions. Therefore amendments were made to AMBEX exchanges, the predetermined address Toulouse : LFZZMAFI was added for exchange of METARs and TAFs with EUR Region. In fact the EUR requirements of AFI TAFs and METARs are exactly the same as those included in the SADIS User's Guide (SUG) Annex 1 which is included in the new EUR FASID Table MET 2A (AFI Part). The following conclusion was formulated:

Conclusion 15/-: OPMET Exchanges with EUR Region

That AFI TAF Collecting Centres (TCCs) be invited to add in the AMBEX the predetermined address Toulouse: LFZZMAFI for exchange of METARs and TAFs with EUR Region.

4.2 The meeting discussed the content of AFI FASID Table MET 2A and suggested that this table be aligned to Annex 1 of SADIS User's Guide (reference SADISOPSG as posted on ICAO public website). The following conclusion was formulated:

Conclusion 15/-: AFI FASID TABLE MET 2A

That the SADIS Users' Guide (SUG) Annex 1 be adopted as the AFI FASID Table MET 2A.

4.3 The meeting recalled that APIRG approved the establishment of two AFI OPMET data banks in Dakar and Pretoria, to serve Western and Central Africa for Dakar and Eastern and Southern Africa for Pretoria, Conclusion 12/66 of APIRG refers. Senegal and South Africa informed the meeting that action is underway for the implementation of the two data banks by the end of the year 2005. It was agreed that in the meantime the AFI Region will continue to be served by the EUR data banks: Toulouse, Brussels and Vienna. The following conclusion was formulated:

Conclusion 15/-: Implementation of the AFI OPMET data banks

That Senegal and South Africa be invited to urgently implement the Dakar and Pretoria international OPMET data banks.

5 Provision of tropical cyclones and volcanic ash advisories for the AFI Region

5.1 Under this agenda item, the meeting discussed the issuance of tropical cyclone and volcanic ash advisories by Tropical Cyclone Advisory Centre (TCAC), La Réunion and Volcanic Ash Advisory Centre (VAAC), Toulouse.

5.2 The meeting noted that there was cooperation and coordination between the ICAO Regional Offices in the AFI Region, TCAC, La Réunion and WMO Tropical Cyclone Committee for the South West Indian Ocean. ICAO was represented at the 16th session of the Committee, Maputo, Mozambique (2003).

5.3 New formats for tropical cyclone advisories were introduced in Amendment 73 to Annex 3 and were fully implemented by the TCAC La Réunion. 192 advisories were issued in 2003/2004 tropical cyclone season and 142 in 2004/2005 season up to 31 March, 2005. The meeting, however noted that there were still some meteorological watch offices (MWOs) which did not fully comply with the requirements of Annex 3 when issuing SIGMETs for tropical cyclones. In an effort to assist the States, the ICAO Regional Offices, Dakar and Nairobi had issued new SIGMET Guides.

Volcanic Ash Advisories

5.4 The meeting noted the activities of the IAVW Operations Group (IAVWOPSG) and that at its first meeting which was held in Bangkok, Thailand in 2004, it had reviewed and updated operational requirements for volcanic ash advisories. The relevant changes were included in Amendment No. ESAF MET/04/02 to the AFI Air Navigation Plan (ICAO Doc.7474) which has since been circulated to States and awaiting the formal approval by the President of the Council.

5.5 The meeting was informed that the Secretariat had already contacted States with volcano observatories from which information was required by ACCs, MWOs and VAACs in order to develop a new table (FASID Table MET 3C) for the AFI ANP as recommended by IAVWOPSG/1 (Conclusion 1/13 refers).

5.6 In 2004, thanks to use of a new multi-spectrum product developed by the space meteorology centre in Lannon, France, the detection of S02 in Central Africa was carried out in a regular operational basis (every 15 minutes). Combined with HRV imagery, this technique enabled to enhance volcano surveillance in the Democratic Republic of the Congo. Such surveillance is generally difficult due to many convective clouds hiding the area.

5.7 In 2004, 204 advisories were issued for NYAMURAGIRA and NYIRAGONGO volcanoes. The clouds described have affected Kinshasa FZZA and Kigali HRYR FIRs. Following the messages, no SIGMET was issued by the MWOs for the FIRs concerned, resulting in non-compliance with Annex 3 provisions and the International Airways Volcanic Watch (IAVW) procedures.

5.8 The meeting noting the above agreed that there was a need to carry out a test in order to check on the accuracy and currency of procedures maintained by MWOs relative to IAVW procedures including the reliability of telecommunications circuits. The meeting then concluded as follows:

Conclusion 15/-: Test on the reception of volcanic ash advisories in the AFI Region

That Volcanic Ash Advisory Centre, Toulouse, in coordination with ICAO, be invited to organize a test for the reception of volcanic ash advisories in the AFI Region before end ofJuly 2006.

5.9 The procedures to be followed for the test are at **Appendices C-1 to C-3.**

5.10 The meeting agreed that the test volcanic ash SIGMET header list for the AFI Region be prepared on the basis of the current SIGMET header list with “WS” replaced by “WV”. It was concluded that WMO in consultation with ICAO and the States prepare such list in readiness for the test.

Conclusion 15/-: Preparation of the volcanic ash header list for the AFI Region

That WMO, in consultation with the ICAO and the States, be invited to prepare the volcanic ash SIGMET header list for the AFI region on the basis of the current SIGMET header list and replacing “WS” with “WV” in the headers.

6. Deficiencies in the MET field

6.1 Under this agenda item, the meeting reviewed and updated the list of deficiencies based on the uniform methodology approved by Council for identification, assessing, tracking and reporting of deficiencies of air navigation systems. The review also took into account the remedial action from States concerned and inclusion of additional deficiencies identified since APIRG/14 meeting. The updated list of deficiencies in the meteorology field is at **Appendix D**.

6.2 The meeting was aware of the establishment by ICAO of a mechanism for air navigation safety in the AFI Region, Conclusion 14/53 of the APIRG refers. The mechanism falls within the scope of the formalized meetings of the Directors General of Civil Aviation (DGCAs) of the Region and placed under the aegis of ICAO. The DGCAs meeting are tasked with the air navigation mechanism including: to evaluate, validate, monitor and follow-up those deficiencies in the AFI Region which are classified as urgent (U) and develop appropriate remedial action to be taken.

7. Challenges facing AFI Meteorological services

7.1 The meeting reviewed the challenges facing AFI meteorological services in order to assess improvement made in taking up the challenges. It may be recalled that the MET/SG identified a number of challenges facing the AFI MET Services in particular, autonomous management, cost, recovery, qualified personnel in sufficient number and introduction of quality management system. The MET/SG had formulated relevant conclusions which had subsequently been approved by the APIRG.

7.2 The meeting noted the follow-up actions on these conclusions by the AFI Regional Offices in encouraging States to establish cost recovery systems and autonomous entities to manage meteorological services. Seminars were organized to that end by WACAF and ESAF Offices. Seminars on quality management have been programmed to take place in 2005, 13-14 April for WACAF area and fourth quarter for ESAF area. As to acquisition of latest version of SADIS workstation, the problem is being addressed adequately within the framework of the SADISOPSG, which invites States to submit application to WMO seeking assistance from donor States.

8. Review of Regional Meteorological procedures in AFI ANP/FASID

8.1 Under this agenda item, the meeting recognized that the meteorological procedures included in the AFI ANP/FASID need to be reviewed and aligned to Annex 3 provisions. Moreover these procedures used to be thoroughly revised and updated by Regional Air Navigation (RAN) meetings which were held at a pace of every 8 to 10 years. The last AFI RAN meeting (AFI/7) was held in Abuja, Nigeria in May 1997, therefore the necessary amendments were carried out by the AFI MET/SG of the APIRG, relevant conclusions of APIRG/12 (1999), APIRG/13 (2001) and APIRG/14 (2003) refer.

8.2 The meeting was of the view that the regional meteorological procedures contained in the AFI ANP/FASID should be updated and fully aligned to Annex 3 provisions. This will avoid the risk of the regional plan to become increasingly outdated and less relevant for aviation users. It was emphasized that the review should be an on-going process so that the MET/SG should include a routine item in its agenda on this subject.

8.3 The meeting endorsed a comprehensive review of regional procedures relating to Annex 3 provisions including Amendment 73 as given in **Appendix E.** The following conclusion was formulated:

Conclusion 15/-: Meteorological Regional Procedures

That the Meteorological Regional Procedures given at Appendix to the report replace the existing Regional procedures of the AFI ANP/FASID (Doc.7474).

Meteorology component of the AFI CNS/ATM plan

9.1 The meeting was presented with the report of the Task Force on meteorology component of the AFI CNS/ATM Plan.

9.2 The meeting was aware that the Air Navigation Commission in reviewing the APIRG/14 report recommended that the planning of the MET component of the AFI CNS/ATM Plan be tasked to the AFI ATM Sub-group. The meeting therefore decided to dissolve the Task Force on meteorology component of the AFI CNS/ATM Plan. The following decision was formulated:

Decision 15/-: Dissolution of the Task Force on Meteorology Component of the AFI CNS/ATM Plan

That the Task Force on meteorology component of the AFI CNS/ATM Plan be dissolved as its task is now transferred to the AFI ATM Sub-Group.

10. Terms of reference, Work programme and composition of the MET/SG

10.1 The meeting discussed training and qualification of aeronautical meteorology personnel and concluded that this subject be included in the work programme of the MET sub-group. The following decision was formulated:

Decision 15/-: Training and qualifications of aeronautical meteorology personnel

That the subject of training and qualifications of aeronautical meteorology personnel be included in the work programme of the AFI MET/SG.

10.2 The meeting reviewed the terms of Reference, the Work Programme and composition of the MET/SG as given at **Appendix F.**

Appendix A

TABLE MET 7/TABLEAU MET 7
IMPLEMENTATION OF THE SADIS IN THE AFI REGION/
MISE EN OEUVRE DU SADIS DANS LA RÉGON AFI

SATELLITE DISTRIBUTION SYSTEM/SYSTÈME DE DISTRIBUTION PAR SATELLITE			
State/Etat	***WAFS User/ Usager WAFS***	***Location of VSAT/ Emplacement du VSAT***	***Equipment operational/ Equipement Opérationnel***
1	*2*	*3*	*4*
Algeria	*NMS*	*Dar-El-Beida*	*1W*
Benin	*NMS*	*Cotonou/Aéroport Cajehoun*	*1W*
Botswana	*NMS*	*Gaborone/S.S. Khama Airport*	*1W*
Burkina Faso	*NMS*	*Ouagadougou/Aéroport*	*1W*
Burundi	*NMS*		
Cameroon	*NMS*	*Douala/Airport*	*1W*
Central African Republic	*NMS*		
Chad	*NMS*	*Ndjamena/Aéroport*	*1W*
Congo	*NMS*	*Brazzaville/Maya Maya Aéroport*	*1W*
Congo (RD)	*NMS*	*Kinshasa/Aeroport N'Jili*	*1W*
Côte d'Ivoire	*NMS*	*Abidjan/F.H. Boigny Aéroport*	*1W*
Egypt	*NMS*	*Cairo International Airport*	*1W*
Equatorial Guinea	*NMS*	*Malabo/Aéroport*	*1W*
Eritrea	*NMS*		
Ethiopia	*NMS*	*Addis Ababa/Bole Intl.*	*1W*
Ethiopia	*CAA*	*Addis Ababa*	*1W*
Gabon	*NMS*	*Libreville/Aéroport MBa*	*1W*
Gambia	*NMS*	*Banjul/Yundum Intl.*	*1W*
Ghana	*NMS*	*Kotoka International Airport*	*1W*
Guinea	*NMS*	*Conakry/Aéroport Gbessia*	*1W*
Kenya	*NMS*	*Nairobi/Jomo Kenyatta Intl.*	*1W*
Kenya	*NMS*	*Mombasa Airport*	*1W*
Liberia	*NMS*		
Madagascar	*NMS*	*Antananarivo/Aéroport IVATO*	*1W*

SATELLITE DISTRIBUTION SYSTEM/SYSTÈME DE DISTRIBUTION PAR SATELLITE			
State/Etat	***WAFS User/ Usager WAFS***	***Location of VSAT/ Emplacement du VSAT***	***Equipment operational/ Equipement Opérationnel***
1	*2*	*3*	*4*
Malawi	*NMS*		
Mali	*NMS*		
Mauritania	*NMS*		
Mauritius	*NMS*	*Mauritius/Sirs. Rangoolam Intl.*	*1W*
Mozambique	*NMS*	*Maputo Airport*	*1W*
Niger	*NMS*	*Niamey/Aéroport Diori Hamani*	*1W*
Niger	*EAMAC*	*Niamey EAMAC*	*IW*
Nigeria	*NMS*	*Lagos Airport*	*1W*
Rwanda	*NMS*	*Kigali Airport*	*1W*
Sao Tome & Principe	*NMS*		
Senegal	*NMS* *NMS*	*Dakar -/Aéroport L.S. Senghor* *Dakar -/Aéroport L.S. Senghor*	*1W* *2W*
Seychelles	*NMS*	*Mahé/Seychelles Intl.*	*1W*
Sierra Leone	*NMS*		
Somalia	*NMS*		
South Africa	*NMS*	*Pretoria/NMS*	*2W*
South Africa	*NMS*	*Pretoria/NMS*	*1W*
Swaziland	*NMS*	*Mbabane/NMS*	*1W*
Tanzania	*NMS*	*Dar-Es-Salaam*	*1W*
Togo	*NMS*	*Lome/Tokoin*	*1W*
Tunisia	*NMS*		
Uganda	*NMS*	*Entebbe/Intl.*	*1W*
Zambia	*NMS*	*Lusaka/Intl.*	*1W*
Zimbabwe	*NMS*	*Harare Airport*	*1W*

NMS - National MET Services/ Service Météorologique National

Appendix B

Strategic Assessment Tables for AFI Region

TABLE A

OPMET (Kbytes)

OPMET	**2005**	**2006**	**2007**	**2008**	**2009**
AFI	653K	654K	661K	667K	674K

BUFR(Kbytes)

BUFR	**2005**	**2006**	**2007**	**2008**	**2009**
AFI	0K	0K	40K	40K	40K

AIS(Kbytes)

AIS	**2005**	**2006**	**2007**	**2008**	**2009**
AFI	0K	20K	20K	20K	20K

SADIS STRATEGIC ASSESSMENT TABLES
CURRENT AND PROJECTED DATA VOLUMES 2006-2009

Note.— 1 octet = 1 byte = 1 character.

Table 1. AFI— OPMET data volumes

OPMET data	*Current 2005*	*Projected 2006*	*Projected 2007*	*Projected 2008*	*Projected 2009*
ALPHANUMERIC DATA					
Number of **FC bulletins** issued per day	151	155	160	165	170
Average number of stations per FC bulletin	5	5	5	5	5
Number of **FT bulletins** issued per day	313	315	320	325	330
Average number of stations per FT bulletin	3	3	3	3	3
Number of **SA bulletins** issued per day	1557	1560	1570	1580	1590
Average number of stations per SA bulletin	4	4	4	4	4
Number of **SP bulletins** issued per day	4	5	5	5	5
Number of **SIGMET bulletins** issued per day	8	10	10	10	10
Number of **FK/FV bulletins** issued per day	0	0	0	0	0
BINARY DATA					
Number of other bulletins issued per day	0	0	0	0	0
(please specify header(s))					
Average number of stations per bulletin	0	0	0	0	0
TOTALS					
Total number of OPMET bulletins per day	2033	2045	2065	2085	2105
Average size of OPMET bulletin (bytes)	321	320	320	320	320
Total estimated OPMET data volume per day (bytes)	653K	654K	661K	667K	674K

Table 2. AFI — BUFR data volumes

Graphical information in the BUFR code form	*Current 2005*	*Projected 2006*	*Projected 2007*	*Projected 2008*	*Projected 2009*
WMO Header			**Not available**		
Time(s) of issue of data (UTC)			Misc.	Misc.	Misc.
Average size of message (bytes)			20K	20K	20K
Data level			Misc.	Misc.	Misc.
Validity times of data (in hours after the time of issuance)			6, 12, 18	6, 12, 18	6, 12, 18
TOTALS					
Total number of BUFR messages per day	0	0	2	2	2
Average size of messages (bytes)	0	0	20K	20K	20K
Total estimated volume of BUFR messages per day (bytes)	0K	0K	40K	40K	40K

Note.— Provision is made for the distribution of BUFR-encoded VAGs staring from the year 2007

Table 3. AFI — AIS data volumes

AIS	*Current 2005*	*Projected 2006*	*Projected 2007*	*Projected 2008*	*Projected 2009*
ALPHANUMERIC AIS DATA (e.g. NOTAMs, ASHTAMs)		**ASHTAMs and NOTAMs related to volcanic ash**			
Bulletin type		ASHTAM	ASHTAM	ASHTAM	ASHTAM
Number of bulletins issued per day		2	2	2	2
Average size of each bulletin (bytes)		5K	5K	5K	5K
Bulletin type		NOTAM	NOTAM	NOTAM	NOTAM
Number of bulletins issued per day		2	2	2	2
Average size of each bulletin (bytes)		5K	5K	5K	5K
CHART AIS DATA (e.g. AIP CHARTS)					
Header number/Chart type (e.g. AIP)					
Time(s) of issue of chart (UTC)					
Average size of chart (bytes)					
Validity time of chart VT (UTC)					
Header number/Chart type (e.g. AIP)					
Time(S) of issue of chart (UTC)					
Average size of chart (bytes)					
Validity time of chart VT (UTC)					
TOTALS					
Total number of AIS bulletins per day	0	4	4	4	4
Average size of AIS bulletin (byte)	0	5K	5K	5K	5K
Total number of AIS charts issued per day	0	0	0	0	0
Average size of AIS chart (byte)	0	0	0	0	0
Total estimated volume of AIS data per day (bytes)	0K	20K	20K	20K	20K

Note.— Provision is made for the distribution of ASHTAMs and NOTAMs related to volcanic ash starting from the year 2006.

1. The test would be run during the (to be agreed between VAAC, Toulouse and ICAO Regional Offices in AFI). The exact date and the hour of the test have to remain secret in order to ensure that the MWO and CC issuing acknowledgement receipt from the test VAA are really reacting to the reception of this advisory.

2. The test will be initiated by the issuance of a Volcanic Ash Advisory (VAA) from the Toulouse Volcanic Ash Advisory Centre. The VAA bulletin will be clearly marked as TEST bulletin. The format of the VAA test message is provided in the **Appendix D-2.**

3. For the purpose of this test, it is proposed that the each meteorological watch offices (MWO), area control centres (ACC) and flight information centres (FIC) serving flight information regions that will receive the VAA issue an administrative message to acknowledge the reception of the VAA. The format of feedback message expected from ACC, FIC and MWO is described in Appendix C.

4. If you require further information, please contact by email: Mr Philippe HUSSON (VAAC Toulouse) philippe.husson@meteo.fr or Mr Patrick SIMON (EUR IROG for the AFI region) patrick.simon@meteo.fr

AFI Volcanic ash test procedure, June 2005

Format of the test VAA

1. The format for the TEST VAA that will be provided by the Toulouse VAAC can be seen below. ***DD*** is the day of the month, ***HH*** the hour of issuance.

FVAF01 LFPW ***DDHH***00

VOLCANIC ASH ADVISORY

ISSUED: 200506***DD***/HH00Z

VAAC: TOULOUSE

VOLCANO: FICTITIOUS

LOCATION: NIL

AREA: NIL

SUMMIT ELEVATION: NIL

ADVISORY NUMBER: 2005/01

INFORMATION SOURCE: NIL

AVIATION COLOUR CODE: NIL

ERUPTION DETAILS: NIL

OBS ASH DATE/TIME: NIL

OBS ASH CLOUD: NIL

FCST ASH CLOUD+6H: NIL

FCST ASH CLOUD+12H: NIL

FCST ASH CLOUD+18H: NIL

NEXT ADVISORY: NO FURTHER ADVISORIES

REMARKS:

THIS IS A VAA TEST MESSAGE APPLICABLE TO THE WHOLE ICAO AFI REGION. EACH METEOROLOGICAL WATCH OFFICE, AREA CONTROL CENTRE AND FLIGHT INFORMATION CENTRE SERVING FLIGHT INFORMATION REGIONS WITHIN THE AFI REGION RECEIVING THIS MESSAGE SHOULD ISSUE AN ADMINISTRATIVE MESSAGE USING THE WMO HEADER NOAF33 LFPW AND SEND IT TO THE AFTN ADDRESS LFZZMAFI TO ACKNOWLEDGE THE RECEPTION OF THIS VAA MESSAGE=

AFI Volcanic ash test procedure, June 2005

Format of the administrative message to acknowledge the reception

1. The meteorological watch offices, area control centres and flight information centres serving flight information regions that will receive the VAA will issue an administrative message to acknowledge the reception of the VAA. The format of this message is provided below. ***DD*** is the day of the month.
2. The message described below has to be sent by AFTN to the IROG Toulouse Address by using its AFTN address LFZZMAFI.
3. ***aftn_address***, in the first line after the WMO heading, should be replaced by the AFTN address of the recipient,
4. ***decription***, in the first line after the WMO heading, should be replaced by the name of the organism who has received the VAA,
5. ***HHMMmm*** is the reception hour of the VAA bulletin, if the VAA has been received.

NOAF33 LFPW ***DD***1300
FROM : ***aftn_address*** , ***description***
TO: LFZZMAFI
ACK RECEPTION TEST VAA FROM VAAC TOULOUSE AT ***HHMMmm***=

Deficiencies in the Meteorology Field
(REF. Air Navigation Plan - Africa-Indian Ocean region (Doc 7474)
Part IV - Meteorology (MET)

Identification		Deficiencies			Corrective action			
Requirements	**Facilities or services**	**Description of Deficiency**	**Date first reported**	**Comments on deficiency**	**Description of corrective action**	**Executing body**	**Target date for imple-mentation**	**Priority for action**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Requirement to provide aerodrome forecasts (AFI FASID Table MET 1A)	Angola/Luanda 4 de Fevereiro Associated MET Office	TAF of Luanda not regularly available	2003	Advice given by correspondence	Improve reliability of telecomm	INAMET and ENANA	2005	A
Requirement to provide information on volcanic eruptions to civil aviation units. (Annex 3, Chapter 3, para. 3.6)	Democratic Republic of Congo/State volcano observatory	Information on volcano activities not always reaches civil aviation due to lack of fixed communications with State volcano observatories. This has an impact on the timely issuance of VA advisories and SIGMETs by the VAACs and MWOs concerned.	14/5/1997	Observed by the State concerned. Reported at the AFI/7 RAN Meeting, May 1997	Volcano observations and warnings to be made available to civil aviation and MET Authorities for dissemination	Civil Aviation and MET Authorities, D.R. of Congo Implementation by Department of Transportation.	2005	U

Identification		Deficiencies			Corrective action			
Requirements	**Facilities or services**	**Description of Deficiency**	**Date first reported**	**Comments on deficiency**	**Description of corrective action**	**Executing body**	**Target date for imple-mentation**	**Priority for action**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Requirement to provide aerodrome forecasts (AFI FASID Table MET 1A)	Equatorial Guinea/Malabo Aeronautical MET centre	TAF of Malabo issued by the Douala MET Office not by MET Office of Malabo	2000	Advice given through correspondence and mission	Installation of reliable telecomm. link and provision of sufficient number of forecasters	Civil Aviation Authority, Equatorial Guinea	12/2005	B
Requirement to measure and report surface wind (Annex 3, Chapter 4, para 4.6.1	The Gambia/ Banjul - Yundum Intl./Aeronautical MET station	Wind measurement unreliable	May 1994 & February 1999	Advice given through correspondence	Installation of reliable wind equipment	Civil Aviation Authority and MET, The Gambia	12/2005	U
Requirement to issue trend type landing forecast (Annex 3, chapter 6, para. 6.3.2)	Guinea Bissau/ Bissau Osvaldo V. Intl. Aeronautical station	Trend type landing fore-casts not issued	1995	Advice given through correspondence	Forecast unit to issue Trend type landing forecasts	Civil Aviation and MET of Guinea Bissau	-	U
Requirement to provide meteorological repoprts to the ATS units (Annex 3, Chapter 10, para. 10.1.1	Liberia/ Roberts Intl. Associated MET Office	Provision of MET data to ATS units deficient	May 2000	Advice given to authorities through correspondence	Better display system of MET data to ATS	Liberia Civil Aviation Authority and MET	2005	A

Identification		Deficiencies			Corrective action			
Requirements	**Facilities or services**	**Description of Deficiency**	**Date first reported**	**Comments on deficiency**	**Description of corrective action**	**Executing body**	**Target date for imple-mentation**	**Priority for action**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Requirement for a continous watch over meteorological conditions (Annex 3, para. 3.4.2(a))	Namibia/Windhoek Hosea Kutako Meteorological Watch Office	The MWO operational hours do not cover same period as ATS	2004	Advice given during mission	MWO operational hours to coincide with ATS operational hours	CAA/MET Division	2005	A
Requirement to issue trend type landing forecast (Annex 3, Chapter 6, para 6.3.2)	Namibia/Windoek/ Hosea Kutako	Trend type landing forecasts not issued	2004	Advice given during mission and by correspondence	Forecast office to issue Trend type landing forecasts	CAA/MET Division	2005	U
Requirement to provide MET reports to ATS units (Annex 3, Chapter 10, para.10.1.1)	Nigeria Kano MA Associated MET Office	Provision of MET data to ATS deficient	2/10/1996	Advice given through correspondence and mission	Better display system of MET data to ATS units	Nigerian MET Agency (NIMET) and NAMA, Nigeria	2005	A
Requirement to provide aerodrome forecasts (AFI FASID Table MET 1A)	Sao Tomé & Principe/ Sao Tomé Aerodrome MET Office	TAF of Sao Tome not regularly disseminated outside MET centre	28/10/2002	Advice given through correspondence	Installation of reliable telecom. link.	Civil Aviation Authority and MET, Sao Tome & Principe	2005	B
Requirement to measure and report surface wind (Annex 3, Chapter 4,para. 4.6.1.1)	Sierra Leone/ Lungi Airport, Associated MET Office	Wind measurement unreliable	May 1994	Advice given through correspondence	Installation of reliable MET basic equipment	Civil Aviation Authority and MET, Sierra Leone	2005	U

Identification		Deficiencies			Corrective action			
Requirements	**Facilities or services**	**Description of Deficiency**	**Date first reported**	**Comments on deficiency**	**Description of corrective action**	**Executing body**	**Target date for imple-mentation**	**Priority for action**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Requirement to provide MET reports to ATS Units (Annex 3, Chapter 10, para 10.1.1)	Swaziland/Manzini Matsapha Airport Associated MET Office	Provision of MET reports to ATS units deficient. No wind displays in control tower	2004	Advice was given on mission	Install a display system for MET data and information at ATS	DCA and MET Department	2005	U
Requirement to provide meteorological data and forecasts in form of flight documentation (Annex 3, Chapter 3, para 3.3.2)	Zambia/Lusaka Meteorological Office	Provision of flight documentation deficient	2002	Advice given during mission and by correspondence	Install appropriate telecomms equipment to receive OPMET information and appoint adequate trained personnel	MET Department	2005	U
Requirement to provide MET reports to ATS Units (Annex 3, Chapter 10, para 10.1.1)	Zambia/Lusaka Meteorological Office	Provision of MET reports to ATS Units deficient	2002	Advice given during mission by correspondence	Install display system of MET data to ATS units	MET Department	2005	U
Implementation of MET facilities and services (Annex 3, para 4.1.6)	Zambia/Lusaka International Airport MET Office	Inadequate level of equipment maintenance	2002	Equipment remain unserviceable for a long time due to lack of spare parts	Provide financial resources including use of air navigation charges which currently is not fully available to the MET	Zambia MET Department and NACL		U

EXPLANATORY NOTES FOR APPENDICES ON DEFICIENCIES

1. Requirement identified at a given meeting through a recommendation; name of the meeting and the related recommendation number

2. Name of the State or States involved and/or the name of the facilities such as name of airport, FIR, ACC, TWR, etc.

1. Brief description of the deficiency :

2. Date deficiency was first reported :

3. Comments.

4. Brief description of the corrective actions to be undertaken.

5. Identification of the executing body.

6. Target date for completion of the corrective action.

7. Priority and classification.

8. Target date for implementation.

9. Priority for Action.
10.

"U" priority = **Urgent** requirements having a **direct** impact on **safety** and requiring i**mmediate** corrective actions.

Urgent requirements consisting of any physical, configuration, material, performance, personnel or procedures specifications, the application of which is urgently required for air navigation safety.

"A" priority = **Top priority** requirements **necessary** for air navigation **safety**.

Top priority requirement consisting of any physical, configuration, material, performance, personnel or procedures specification, the application of which is considered necessary for air navigation safety.

"B" priority = **Intermediate** requirements **necessary** for air navigation **regularity**.

Intermediate priority requirement consisting of any physical, configuration, material, performance, personnel or procedures specification, the application of which is considered necessary for air navigation regularity and efficiency.

Appendix E

Model AFI regional procedures without red-line/strike-out markings

Introduction

1. This part of the AFI Basic Air Navigation Plan contains elements of the existing planning system and introduces the basic planning principles, operational requirements and planning criteria related to aeronautical meteorology (MET) as developed for the AFI Region and considered to be the minimum necessary for effective planning of MET facilities and services. A detailed description/list of the facilities and/or services to be provided by States in order to fulfill the requirements of the Basic ANP is contained in the AFI Facilities and Services Implementation Document (FASID). During the transition and pending full implementation of the future CNS/ATM systems, it is expected that the existing requirements will gradually be replaced by the new CNS/ATM related requirements. Further, it is expected that some elements of the CNS/ATM systems will be subject to amendment, as necessary, on the basis of experience gained in their implementation.

2. The Standards, Recommended Practices and Procedures to be applied are contained in Annex 3 — *Meteorological Service for International Air Navigation*.

3. Background information of importance in the understanding and effective application of the Plan is contained in the *Report of the Seventh Africa-Indian Ocean Regional Air Navigation Meeting* (Doc 9702), supplemented by information appropriate to the AFI Region which is contained in the reports of the other regional air navigation meetings.

4. RAN meeting recommendations or conclusions, AFI Planning and Implementation Regional Group (APIRG) conclusions and ICAO operations groups conclusions shown in brackets below a heading indicate the origin of all paragraphs following that heading. RAN Meeting recommendations or conclusions, APIRG conclusions and ICAO operations groups conclusions shown in brackets below a paragraph indicate the origin of that particular paragraph.

Meteorological service required at aerodromes and requirements for meteorological watch offices
(FASID Tables MET 1A and MET 1B)

5. The service to be provided at the international aerodromes listed in the Appendix to Part III of the Basic AFI, ANP is set out in FASID Table MET 1A.

6. The service to be provided for flight information regions (FIRs), upper flight information regions (UIRs), control areas (CTAs) and search and rescue regions (SRRs) is set out in FASID Table MET 1 B.

7. Hourly routine observations should be made at all aeronautical meteorological stations, to be issued as local routine reports and METAR, together with special observations to be issued as local special reports and SPECI.

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8. TAF should normally be issued at intervals of 6 hours, with the period of validity beginning at one of the main synoptic hours (00, 06, 12, 18 UTC). The period of validity should be of 24 hours' duration to meet the requirements indicated in FASID Table MET 1 A. The filing time of the forecasts should be ~~[~~two~~]~~ hours before the start of the period of validity.

9. The forecast maximum and minimum temperature together with their respective times of occurrence should be included in TAF for certain aerodromes as agreed between the meteorological authorities and the operators concerned.

10. Trend forecasts should be provided at the aerodromes as indicated in FASID Table MET 1A.

11. Meteorological service should be provided on a 24-hours basis, except as otherwise agreed between the meteorological authority, the air traffic services authority and the operators concerned.

12. At aerodromes with limited hours of operation, METAR should be issued at least [1,2] hour(s) prior to the aerodrome resuming operations to meet pre-flight and in-flight planning requirements for flights due to arrive at the aerodrome as soon as it is opened for use. Furthermore, TAF should be issued with adequate periods of validity so that, they cover the entire period during which the aerodrome is open for use.

13. When a meteorological watch office (MWO) is temporarily not functioning or is not able to meet all its obligations, its responsibilities should be transferred to another MWO and a NOTAM should be issued to indicate such a transfer and the period during which the office is unable to fulfil all its obligations.

14. Details of the service provided should be indicated in Aeronautical Information Publications in accordance with the provisions of Annex 15.

15. As far as possible, English should be among the languages used in meteorological briefing and consultation.

16. FASID Tables MET 1A and MET 1B should be implemented as soon as possible, with the understanding that only those parts of the briefing and documentation called for in column 7 of FASID Table MET 1A that are required for current operations need to be available, and that the implementation of new MWO or changes to the area served by existing MWO indicated in FASID Table MET 1B, columns 1 and 3 respectively, should take place coincidentally with the implementation of, or changes to, the FIR/UIR/CTA/SRR concerned.

Aircraft observations and reports
(FASID Table MET 1B)

17. The meteorological authority should adopt the approved list of ATS/MET reporting points, as it relates to points located within and on the boundaries of the FIR for which the State is responsible. Those ATS/MET reporting points should be published in the Aeronautical Information Publication (AIP), under GEN 3.5.6 — *Aircraft reports*, of the State concerned.

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Note. — The approved list of ATS/MET reporting points is published and kept up to date by the ICAO Regional Offices concerned, on the basis of consultations with ATS and MET authorities in each State and the provisions of Annex 3 in this respect.

18. The meteorological watch office (MWO) designated as the collecting centre for air-reports received by voice communications within the FIR/UIR for which they are responsible, is shown in FASID Table MET 1B, Column 1.

SIGMET and AIRMET information

(FASID Tables MET 3 A and 3 B)

19. 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 should 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.

20. In order to assist MWOs in the preparation of the outlook included in SIGMET messages for tropical cyclones, tropical cyclone advisory centre(s) (TCAC) Réunion has/have been designated to prepare the required advisory information and disseminate it to the MWOs concerned in the AFI Region. FASID Table MET 3A sets out the area(s) of responsibility, the period(s) of operation of the TCAC(s) and the MWOs to which the advisory information should be sent. Advisory information should be issued for those tropical cyclones in which the surface wind speed averaged over 10 minutes is expected to equal or exceed 63 km/h (34 kt).

21. In order to assist MWOs in the preparation of the outlook included in SIGMET messages for volcanic ash, volcanic ash advisory centre (VAAC) Toulouse has been designated to prepare the required advisory information and disseminate it to the MWOs and area control centres (ACCs) concerned in the AFI Region following notification/detection of the ash cloud. FASID Table MET 3 B sets out the area(s) of responsibility of the VAAC(s) and the MWOs and ACCs to which the advisory information should be sent.

22. In order for the VAACs to initiate the monitoring of volcanic ash from satellite data and the forecast of volcanic ash trajectories, MWOs should notify the relevant VAAC 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. Selected State volcano observatories have been designated for direct notification of significant pre-eruption volcanic activity, a volcanic eruption and/or volcanic ash in the atmosphere to their corresponding ACC, MWO and VAAC. FASID Table MET 3C sets out the selected State volcano observatories and the VAACs, MWOs and ACCs to which the notification should be sent.

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23. AIRMET messages are not required to be issued by MWOs.

Exchange of operational meteorological information
(FASID Tables MET 2A and 2B)

International OPMET data banks

24. The International OPMET data bank(s) in [Toulouse Brussels* and Vienna*] has/have been designated to serve States in the AFI Region to access OPMET information which is required but not received.

Note.— A list of the OPMET information available at the international OPMET data banks designated to serve the AFI Region, together with the procedures to be used in communicating with the data banks are contained in the Catalogue of international OPMET data available at the OPMET data bank of Toulouse, Brussels* and Vienna* published by the ICAO Regional Offices concerned.*

*Note.— * Until such time that Dakar and Pretoria data banks are implemented.*

Exchange of METAR, SPECI and TAF

25. METAR, SPECI and TAF which should be available at meteorological offices, area control centres and flight information centres is contained in FASID Table MET 2A. This table should be updated, as necessary, by the ICAO Regional Offices concerned on the basis of changes in the pattern of aircraft operations and in accordance with the Statement of Basic Operational Requirements and Planning Criteria, in consultation with those States and international organizations directly concerned.

26. The exchanges indicated in FASID Table MET 2A should be implemented as soon as possible to meet the requirements of current aircraft operations. The availability at meteorological offices of the required OPMET information should be reviewed continuously. Any changes in this respect (i.e. additional OPMET information needed or OPMET information no longer required) should be notified to the corresponding meteorological authority which, in turn, should amend its corresponding address lists and inform the ICAO Regional Offices.

Exchange of SIGMET information and air-reports

27. The exchange requirement for SIGMET and special air-reports are contained in FASID Table MET 2 B. This table should be updated, as necessary, by the ICAO Regional Offices concerned on the basis of changes in the pattern of aircraft operations, and in accordance with the Statement of Basic Operational Requirements and Planning Criteria, and in consultation with those States and international organizations directly concerned.

28. Each MWO should arrange for the transmission to all aerodrome meteorological offices within its associated FIR of its own SIGMET messages and relevant SIGMET messages for other FIRs, as required for briefing and, where appropriate, for flight documentation.

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29. Each MWO should arrange for the transmission to its associated ACC/FIC of SIGMET messages and special air-reports received from other MWOs.

30. Each MWO should arrange for the transmission of routine air-reports received by voice communications to all meteorological offices within its associated FIR. Special air-reports which do not warrant the issuance of a SIGMET should be disseminated by MWO in the same way as SIGMET messages, in accordance with FASID Table MET 2B.

World area forecast system (WAFS)
(FASID Tables MET 5, MET 6 and MET 7)

31. FASID Table MET 5 sets out the AFI Region requirements for WAFS forecasts to be provided by WAFC London.

32. The levels for which forecasts of SIGWX in chart form are to be provided by the WAFC London and the areas to be covered by these charts are indicated in FASID Table MET 5.

Note.— WAFCs will continue to issue forecasts of SIGWX in chart form until 30 November 2006.

33. FASID Table MET 6 sets out the responsibilities of WAFCs London for the production of WAFS forecasts. For back-up purposes, each WAFC should have the capability to produce WAFS forecasts for all the required areas of coverage.

34. The projection of the WAFS forecasts in chart form and their areas of coverage should be as indicated in FASID Charts MET 4, MET 5 and MET 6 associated with FASID Table MET 6; their scale should be 1:20 X 10^6, true at 22.5^0 in the case of charts in the Mercator projection, and true at 60^0 latitude in the case of charts in the polar stereo-graphic projection.

Note.— WAFCs will continue to issue forecasts of SIGWX in chart form until 30 November 2006.

35. WAFS products should be disseminated by WAFC London, using the satellite distribution system for information relating to air navigation (SADIS), and FTP internet service covering the reception area shown in FASID Chart CNS 4.

36. The amendment service to the SIGWX forecasts issued by WAFCs London should be by means of amended BUFR files disseminated through SADIS.

37. Each State should make the necessary arrangements to receive and make full operational use of WAFS products disseminated by WAFC London. FASID Table MET 7 lists the authorized users of the SADIS satellite broadcast in the AFI Region and location of the operational VSATs.

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Appendix F

Terms of Reference, Work programme and composition of the Meteorology Sub-Group (MET/SG)

1. Terms of Reference

a. To keep under review, the adequacy of meteorological facilities and services to meet new technological developments in the air navigation field and make proposals as appropriate for implementation by States to APIRG.

2. To identify, State by State, those specific deficiencies and shortcomings that constitute major obstacle to the provision of efficient and reliable meteorological facilities and services to meet the requirements of air navigation in the AFI Region and recommend specific measures to eliminate them.

2. Work Programme

No.	Task description	Priority	Target Date
1	Establish and maintain detailed lists, State by State of the specific deficiencies of facilities for the provision of atmospheric measurements pertaining to surface wind, pressure, visibility/runway visual range, cloud base, temperature and dew point temperature considered critical for flight safety.	A	Continuing
2	Monitor the exchange of OPMET information through the AMBEX scheme in the AFI Region and between the AFI and ASIA/PACIFIC and EUR Regions	A	Continuing
3	Plan for the introduction of efficient inter-regional OPMET exchanges in coordination with the CNS Sub-group as required	B	Continuing
4	Monitor the degree of implementation of very small aperture terminals (VSATs) for the reception of WAFS products (AFI/7 Rec. 14/12)	B	Continuing
5	Monitor the quality of WAFS high significant weather charts in the AFI Region, provide feed back to WAFC, London as appropriate	B	Continuing
6	Monitor the implementation of regional procedures for the issuance of volcanic ash and tropical cyclone advisories (AFI/7 Rec. 7/3 and 7 /4)	A	Continuing

Appendix F

No.	Task description	Priority	Target Date
7	Review on a continuing basis the contents of Tables MET 1A and 1B and Tables MET 2A and MET 2B to ensure their validity in light of operational requirements and develop proposals to update them if necessary.	B	Continuing
8	Review the meteorological procedures in the introductory text to Part VI – Meteorology of the Basic AFI Regional Plan/FASID, as well as Meteorological related issues in other sections of the Plan and relevant regional supplementary Meteorology procedures (SUPPs) in the Doc 7030, in the light of procedures employed in other regions and develop amendment proposals as appropriate, coordinating where necessary with other APIRG Sub-Groups.	A	Continuing
9	Monitor developments in the CNS/ATM Systems with regard to meteorological requirements in the AFI Region and in coordination with the AFI ATM sub-group.	B	Continuing
10	Develop guidelines for the use of GRIB and BUFR codes in the AFI Region.	A	Continuing
11	Monitor the implementation in the AFI Region of quality assurance/performance relating to the MET field	A	Continuing
12	Monitor training and qualification of aeronautical MET personnel	A	Continuing

Priority:

A High priority tasks on which work should be speeded up;

B Medium priority tasks, on which work should be undertaken as soon as possible, but without detriment to priority A tasks;

C Lesser priority tasks, on which work should be undertaken as time and resources permit, but without detriment to priority and A and B tasks.

3. **Composition**

Algeria, Burkina Faso, Cameroon, Congo, Côte d'Ivoire, Egypt, Eritrea, Ethiopia, France, Gabon, The Gambia, Ghana, Guinea, Kenya, Madagascar, Morocco, Niger, Nigeria, Senegal, South Africa, Spain, Tunisia, United Kingdom, Zambia, ASECNA, IATA and WMO.

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