



**SEVENTH MEETING
OF THE WORLD AREA FORECAST SYSTEM OPERATIONS GROUP
(WAFSOPSG/7)**

Lima, Peru, 17 to 21 September 2012

INTERNATIONAL CIVIL AVIATION ORGANIZATION

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Agenda Item 1: Opening of the meeting

1.1 Place and duration

1.1.1 The seventh meeting of the World Area Forecast System Operations Group (WAFSOPSG) was held in Lima, Peru, at the facilities of the ICAO South American (SAM) Regional Office from 17 to 21 September 2012.

1.1.2 The meeting was opened by Mr. Franklin Hoyer, the ICAO Regional Director, at 1000 hours on 17 September 2012. The meeting was closed at 1230 hours on 21 September 2012.

1.2 Attendance

1.2.1 The list of participants is given in Appendix A.

1.3 Chairman and officers of the Secretariat

1.3.1 The Chairman of the group, Mr. Dorinel Visoiu, presided over the meeting throughout its duration, together with Mr. Ahmed Hamood Mohamed Al Harthy as Vice-Chairman.

1.3.2 Mr. Raul Romero, Technical Officer Meteorology, ICAO Headquarters, was the Secretary of the meeting, assisted by Ms. Nohora Arias, Regional Officer Meteorology, ICAO SAM Regional Office.

Agenda Item 2: Organizational matters
2.1: Adoption of working arrangements

The meeting adopted appropriate working arrangements.

Agenda Item 2: Organizational matters
2.2: Adoption of the agenda

The following agenda was adopted:

Agenda Item 1: Opening of the meeting

Agenda Item 2: Organizational matters

2.1: Adoption of working arrangements

2.2: Adoption of the agenda

Agenda Item 3: Follow-up of WAFSOPSG/6 conclusions

Agenda Item 4: Review of ICAO provisions related to WAFS

4.1: Review of ANP/FASID procedures

4.2: Status of draft Amendment 76 to Annex 3 related to WAFS

Agenda Item 5: Operation of the WAFS

5.1: WAFS management report

5.2: Other issues related to the operation and implementation of the WAFS

Agenda Item 6: Development of the WAFS

6.1: Cessation of WAFS forecasts in GRIB1 format

6.2: Improved GRIB2 forecasts for CB clouds, icing and turbulence

6.3: Visualization of WAFS forecasts

6.4: Migration plan to accommodate the future global ATM operational concept

Agenda Item 7: Long-term planning of WAFS implementation

Agenda Item 8: Future work programme

Agenda Item 9: Any other business

Agenda Item 3: Follow-up of WAFSOPSG/6 conclusions

3.1 The group recalled that, at the sixth meeting of the World Area Forecast System Operations Group (WAFSOPSG/6), it formulated sixteen conclusions and five decisions. No follow-up action is required on decisions; therefore, they were not addressed.

3.2 The group noted that action was completed on all of the conclusions; therefore, it formulated the following decision:

Decision 7/1 — Follow-up of WAFSOPSG/6 conclusions

That the follow-up action on WAFSOPSG/6 conclusions be considered completed.

Note.— Follow-up action on WAFSOPSG Conclusion 5/11 is also considered completed.

Agenda Item 4: Review of ICAO provisions related to WAFS

4.1 The group recalled that it had been tasked to review the regional procedures contained in the ANP/FASID at every meeting. The group also noted the action taken by the Air Navigation Commission with regard to the draft amendment to WAFS-related provisions in Annex 3 — *Meteorological Service for International Air Navigation* endorsed by WAFSOPSG/6 and the current status of the said draft amendment.

Agenda Item 4: Review of ICAO provisions related to WAFS
4.1: Review of ANP/FASID procedures

4.1.1 The group noted that a draft amendment to the global version of the ANP/FASID procedures related to WAFS had been developed by the Secretariat. The group noted that the proposal mainly addressed the elimination of references to the ISCS in lieu of the withdrawal of the international satellite communications system (ISCS) satellite broadcast by WAFC Washington on 1 July 2012.

4.1.2 The group reviewed these procedures and formulated the following conclusion:

**Conclusion 7/2 — Amendment to WAFS-related procedures
in the ANP/FASID**

That the Secretary forward the WAFS-related procedures as shown in Appendix B to the ICAO Regional Offices concerned for onward transmission to States for comment as necessary with a view to their prompt inclusion in ANP/FASID concerned.

4.1.3 The Secretary informed the group of an ongoing activity at Headquarters and Regional Offices to align the MET parts (Part VI) of all ICAO Regional Air Navigation Plans to ensure, in particular, consistency with the provisions in Annex 3 that are subject to regional air navigation agreement. In this regard, the group was informed that future amendments to the Regional Air Navigation Plans were to be expected in respect of the provision of WAFS forecasts, which, to a great extent, are not subject to regional air navigation agreement. The group was pleased to learn that, as appropriate, the Secretary would update the group of the progress made by the time of the WAFSOPSG/8 Meeting.

Agenda Item 4: Review of ICAO provisions related to WAFS
4.2: Status of draft Amendment 76 to Annex 3 related to WAFS

4.2.1 In view of the three-year amendment cycle of Annex 3, the group was expected to review WAFS-related amendments thereto at every second WAFSOPSG meeting. The group recalled that it undertook a review of WAFS-related elements of draft Amendment 76 to Annex 3 at its sixth meeting (2011). Subsequently, after review, the Air Navigation Commission had agreed with the four WAFSOPSG/6 conclusions related to proposals for amendments to Annex 3, and had agreed that a draft proposed amendment to Annex 3 be transmitted to States and international organizations.

4.2.2 The group noted that when the draft proposed amendment to Annex 3 was circulated to States and international organizations in early 2012 for comment, broad support was expressed as far as the WAFS-related proposals are concerned. Therefore, it may be expected that the final, approved amendment will be similar to the one endorsed by the group at its sixth meeting.

4.2.3 Finally, it was noted that all the WAFS-related elements to be included in draft Amendment 77 to Annex 3 (for applicability in 2016) would have to be prepared in time for the WAFSOPSG/8 Meeting (expected to be convened during the second half of 2013) owing to the planned convening of an ICAO Meteorology (MET) Divisional Meeting in mid-2014.

4.2.4 In a related issue, the group noted that Annex 3, Chapter 11, 11.1.9 sets up the telecommunications facilities to be used for the exchange of operational meteorological information. In this regard, the group agreed that, in light of the cessation, on 1 July 2012, by WAFC Washington of the satellite distribution system serving the North American, Caribbean, Central American, South American and parts of the Asia and Pacific Regions (called the International Satellite Communication System (ISCS)) it would be necessary to update Note 1 to the above-mentioned Annex 3 paragraph. Therefore, the group formulated the following conclusion:

Conclusion 7/3 — Amended Annex 3 provisions regarding telecommunications facilities to be used for the exchange of operational meteorological information

That the Secretary prepare, for review by the WAFSOPSG/8 Meeting, a proposal to be included in draft Amendment 77 to Annex 3 regarding amendment of Note 1 to Chapter 11, 11.1.9, to account for the cessation of ISCS satellite broadcast on 1 July 2012.

Agenda Item 5: Operation of the WAFS
5.1: WAFS management report

5.1.1 The group noted that a WAFS management report for the period March 2011 to June 2012 had been prepared by the WAFC Provider States in response to Conclusion 1/3 and placed on the WAFSOPSG website in advance of the meeting. The group reviewed the management report, noted its content and agreed that the scope of issues covered met the requirements expressed in Conclusion 1/3.

5.1.2 The group congratulated the WAFC Provider States with regard to the main milestones as follows:

- a) implementation of harmonized CB clouds, icing and turbulence forecasts;
- b) successful introduction of a new SIGWX production platform at WAFC London;
- c) changes to WAFC SIGWX PNG forecast charts;
- d) both WAFCs began to include “OCNL CB” in their SIGWX forecasts when appropriate;
- e) ISCS 2G withdrawn at 0400 UTC on 1 July 2012;
- f) prioritization of WAFS GRIB2 over WAFS GRIB1 effective 5 July 2012;
- g) agreement of policies with regard to accessing Secure SADIS FTP and WIFS; and
- h) nine scheduled WAFC SIGWX backup tests were conducted, one scheduled WAFS SIGWX backup test was cancelled and one unscheduled backup was partially successful.

Agenda Item 5: Operation of the WAFS
5.2: Other issues related to the operation and implementation of the WAFS

5.2.1 Implementation of enhanced WAFS performance indicators

5.2.1.1 The group recalled that it had tasked the WAFC Provider States to study the feasibility of the provision of four WAFS performance indicators. In this regard, the group noted information provided by WAFC Provider States as a follow-up of Conclusion 6/5. The WAFC Provider States noted that the provision of enhanced WAFS performance indicators was feasible and provided the information as follows:

- a) Concerning the provision of a performance indicator regarding *the number of times a complete set of SIGWX BUFR messages were not issued by the standard issue time* the group noted the report of feasibility of such provision according to the WAFC Provider States. The monitoring of all SIGWX BUFR bulletins for each forecast was currently done by WAFC London and the group reviewed a proposed reporting format which is provided in Appendix C, Table 2.
- b) Concerning *the number of times a complete set of SIGWX BUFR messages were not issued by the validity time of the data*, the group noted that the provision of this indicator was feasible. However, according to the WAFC Provider States, it was not considered necessary since, if the data has not been made available by the validity time, it may be considered to be unavailable. The group noted that an additional time check could be implemented by the WAFCs, but beyond that, any additional time checks were felt to be superfluous and unnecessary.
- c) Concerning *the number of invalid or incomplete sets of SIGWX BUFR messages transmitted*, the group noted that, according to the WAFC Provider States, this was more complex since it was necessary to define what “invalid or incomplete” meant. The group discussed the points raised regarding this issue.
- d) Concerning *the number of SIGWX correction messages transmitted*, the group noted that it was feasible and that this number was currently monitored by WAFC London. The group reviewed a proposed reporting format which is provided in Appendix C, Table 3.
- e) Concerning *the number of times a complete set of GRIB datasets were not issued by the standard issue time, including the time at which each complete GRIB dataset was made available*, the group noted that this was feasible since WAFC London currently checked for a complete set of GRIB1 bulletins, GRIB2 (standard) parameters and GRIB2 (CB clouds, icing, turbulence) parameters. The group reviewed a proposed reporting format which is provided in Appendix C, Table 1.

5.2.1.2 Taking into account the above-mentioned findings, the member from Australia highlighted the benefit of performance indicators and proposed that the WAFS management report include information relating to the way in which WAFC Provider States are addressing recurring themes and major errors that require correction messages. Accordingly, the group formulated the following conclusion:

Conclusion 7/4 — Implementation of enhanced WAFS performance indicators

That the WAFC Provider States, in coordination with the WAFSOPSG members from Australia and IATA, be invited to finalize targets and implement WAFS performance indicators covering the timely delivery of the following aspects:

- a) complete sets of WAFS SIGWX forecasts; and
- b) the availability of complete sets of WAFS forecasts in GRIB1 and GRIB2 code form;

additionally, the WAFC Provider States be invited to include in the WAFS management report the following measures:

- c) the number of WAFS SIGWX correction messages transmitted; and
- d) the number of occasions that the WAFC harmonization of WAFS gridded global forecasts for CB clouds, icing and turbulence was not successful leading to the issuance of unblended products.

Note.— The above performance indicators would be expected to be recorded from 1 November 2012, and will be reported for the first time in the WAFS management report to WAFSOPSG/8.

5.2.2 Re-transmission protocols/policies for WAFS SIGWX and GRIB2 datasets

5.2.2.1 The group reviewed the report provided by the ad-hoc working group tasked by Conclusion 6/7 concerning re-transmission protocols/policies for WAFS SIGWX and GRIB2 datasets. In this regard, the group noted that historically, there had neither been a common nor agreed policy for the re-transmission of WAFS forecasts for GRIB data or SIGWX data. With regard to SIGWX forecasts, it was noted that, following the introduction in 2009 of text-based SIGWX correction messages used to identify errors in SIGWX forecasts, in the opinion of the WAFCs, the SIGWX forecasts that contain errors should be re-transmitted. However, the group noted that it was necessary to consider certain practical aspects of re-transmission of such data before a practicable policy could be implemented. With regard to WAFS GRIB2 forecasts, the group noted that there were considerations relating to the data volumes that needed to be accounted for. The group additionally noted that WAFS GRIB1 forecasts did not need to be considered, since it was expected that they would be withdrawn before any policy relating to re-transmission agreed by the group could be implemented. Therefore, the group considered the practical aspects relating to the re-transmission of WAFS data. In this regard, the group reviewed current practices and options in detail, and the summary of a policy proposal put forward by the WAFC Provider States.

5.2.2.2 In view of the reasonable needs and expectations of users, together with the principles of the quality management system and the current capabilities of the WAFCs, the group discussed the need to establish re-transmission policies. It was noted, in particular, that the re-transmission of WAFS

SIGWX forecasts that need to be corrected due to errors (distinct from amendments, for which there is no requirement upon the WAFCs) would benefit the user community.

5.2.2.3 In view of the foregoing, and after review of the summary of the policy proposal, the group formulated the following conclusion:

Conclusion 7/5 — Implementation of WAFS re-issuance policy for WAFS GRIB2 and WAFS SIGWX forecasts

That the WAFC Provider States implement a WAFS re-issuance policy for WAFS GRIB2 and WAFS SIGWX forecasts in line with the summary given in Appendix D.

Note 1.— The WAFCs will confirm detailed practical aspects of the policy by 15 March 2013 for publication on the WAFSOPSG website. Implementation is expected to be 16 September 2014.

Note 2.— Implementation will be noted in the WAFS Change Implementation Notice Board, available on the WAFSOPSG website.

Note 3.— The above policy refers only to WAFS SIGWX forecast corrections and does not concern amendments for which there is no requirement.

5.2.3 WAFS Internet-based services

5.2.3.1 The group noted the information provided regarding the cessation by WAFC Washington of the ISCS satellite broadcast on 1 July 2012 and its replacement by WIFS. In addition, the satellite distribution system for information relating to air navigation (SADIS) Provider State and WAFC London had established the Secure SADIS FTP. Both services were introduced in order to provide all WAFS forecasts and operational meteorological data via Internet-based services.

5.2.3.2 In this regard, it was noted that the access to the current Internet-based services (WIFS and Secure SADIS FTP) was regulated and only available to authorized users determined by the user States. It was noted, however, that the WIFS and SADIS FTP systems were not identical since access to each system was different and the file structures were not comparable. The “pull” data retrieval process was common in both systems which meant that users had to check whether a new dataset was available. The group considered a proposal for a “push” service based on users’ information preferences expressed in advance, and the use by both systems (WIFS and Secure SADIS FTP) of identical structures and access procedures. In respect of the “push” service, the group determined that there was no consensus for the proposal.

5.2.3.3 In respect of the proposal for the synchronization of the file structures of the WIFS and the Secure SADIS FTP, the group considered this to be interesting and of value. Accordingly, the group formulated the following conclusion:

Conclusion 7/6 — Alignment of the file structures of WAFS Internet-based services

That, in time for the WAFSOPSG/8 Meeting, the WAFS Provider States, in coordination with the WAFSOPSG member from IATA, consider the possibility of aligning the file structures of the WIFS and the Secure SADIS FTP.

5.2.4 WAFS GRIB1 dataset availability on WAFS Internet-based services

5.2.4.1 The group discussed a proposal related the availability times of the GRIB1 upper-air data on the WAFS Internet-based services (Secure SADIS FTP and WIFS). In this regard, it was noted that, at the WAFSOPSG/6 Meeting, it was believed that it would be necessary to delay the availability of the GRIB1 dataset until well after the GRIB2 was made available, to be in line with the availability times from the SADIS satellite broadcast. It was also thought that this delay on the SADIS FTP and WIFS would be necessary due to production schedules at both WAFS computer centres. Therefore, the WAFSs had presented a time schedule (WAFSOPSG/6 Report, Appendix F refers) and made the statement (WAFSOPSG/6 Report, paragraph 1.2 refers) that the GRIB1 upper-air data would be available approximately one hour after GRIB2 upper-air data.

5.2.4.2 The group noted that, following the successful reprioritization of GRIB1 and GRIB2 data on SADIS and WIFS on 5 July 2012 (Conclusion 6/10 refers), it was noted by the WAFSs that the GRIB1 upper-air data could be made available on the Internet-based services sooner than the one-hour delay described above. After consultation, the two WAFSs were in a position to make the GRIB1 dataset available on the Internet-based services once it had completed its production process, but no earlier than the standard (e.g. wind, temperature, humidity) GRIB2 datasets. In this regard, the group noted a summary table of the GRIB1 and GRIB2 upper-air data availability for both WAFS satellite broadcast and Internet-based services (Appendix D refers).

5.2.4.3 It was also noted that any changes in the availability times and/or future updates to the availability times could be notified to users via the WAFS Change Implementation Notice Board and then reported to the WAFSOPSG in subsequent WAFS management reports. Users of WAFS gridded data would also find the availability times in the appropriate Internet-based service's user guide (i.e. WIFS User Guide and Secure SADIS FTP User Guide). The group agreed that the GRIB1 upper-air data should be made available on the Internet-based services once it has completed its production process, but no earlier than the GRIB2 upper-air data, and that users should be notified of the availability times and/or future updates to the availability times via the WAFS Change Implementation Notice Board. Accordingly, the group formulated the following conclusion:

Conclusion 7/7 — Availability of WAFS forecasts in the GRIB1 code form on the WAFS Internet-based services

That, with effect from 1200 UTC on 4 October 2012, the WAFS Provider States make available the WAFS GRIB1 datasets on the WAFS Internet-based services (SADIS FTP/Secure SADIS FTP and WIFS) as soon as practicable, but not earlier than the availability of the WAFS GRIB2 datasets, in accordance with the availability times shown in Appendix E.

Note 1.— Users will be advised on the time that it is to be expected that WAFS GRIB1 datasets will be made available after GRIB2 datasets, and future updates to the availability times, through a notification on the WAFS Change Implementation Notice Board.

Note 2.— This change does not affect the availability of WAFS GRIB1 and GRIB2 datasets on the SADIS satellite broadcast.

5.2.5 Depiction of surface frontal systems on WAFS SIGWX forecasts

5.2.5.1 The group recalled that it had formed an ad-hoc working group (Conclusion 6/11 refers) to consider issues surrounding the re-instatement of a requirement for surface fronts as an element to be included in WAFS SIGWX forecasts, taking into account the rationale, harmonization issues between the WAFCs, impact, cost and consistency with the WAFS long-term plan. In this regard, the group reviewed a progress report presented by the ad-hoc working group.

5.2.5.2 The group recalled that the elimination of surface fronts in WAFS SIGWX forecasts had been considered and endorsed by the WAFSOPSG/2 meeting (2005) and had subsequently formed part of Amendment 74 to Annex 3 (applicable November 2007). The proposal had been subject to the full consultation process, review by the Air Navigation Commission and adoption by the ICAO Council. Noting queries by some users at the time of the WAFSOPSG/4 meeting (2008), and in view of the consultation and adoption process followed, the group had concluded in 2008 that it would be impossible to re-introduce surface fronts in the WAFS SIGWX forecasts at that stage.

5.2.5.3 As highlighted in the report of the ad-hoc working group, the inclusion of a surface front on WAFS SIGWX charts was a subjective decision by the WAFS forecasters based on whether there was significant en-route weather phenomena associated with it. The inherent uncertainty of such a forecast, together with the pressure of time on the forecasters with a global responsibility, resulted in a number of fronts not being included in the charts, i.e. in those instances where a surface front was not associated with a significant en-route weather phenomena. Moreover, taking into account the more recent development of WAFS gridded data for icing, turbulence and CB clouds, the report of the ad-hoc working group cited that even without depicting the surface fronts, significant en-route weather phenomena that was relevant for the safe and efficient conduct of operations was provided, but without giving the “conceptual model” of the frontal systems.

5.2.5.4 The group considered a multitude of issues surrounding the reinstatement of surface fronts as an element of WAFS SIGWX forecasts, in particular their use as flight planning and situational awareness products, the development and availability of gridded WAFS SIGWX data and the expressed

needs of users. It was noted in the report of the ad-hoc working group that the reinstatement of surface fronts was not supported by IATA since there was no demonstrated safety need; the information was imprecise at best and there was no guarantee that reinstatement of the surface front depiction would continue in the digital age. Accordingly, IATA reinforced its view *against* the reinstatement. The WAFCs Provider States fully supported the IATA position. It was noted that this information could be made available for those who require it from other (non-WAFS) sources.

5.2.5.5 The group also reaffirmed the position that flight planning systems use computerized data directly ingested from the WAFS products, while it is the responsibility of the operator (typically through flight dispatch and flight following services) to obtain the necessary meteorological information for situational awareness.

5.2.5.6 In view of the foregoing, and taking into account the report of the ad-hoc working group, the group (including IATA) rejected a proposal to reinstate the requirement for surface fronts as an element to be included in WAFS SIGWX forecasts.

5.2.6 **Issuance of administrative messages related to changes to WAFS services and updates to WAFS documentation**

5.2.6.1 The group reviewed a proposal prepared by the member from Australia for the issuance, by the WAFS Provider States, of administrative messages to inform users of changes to WAFS services and updates to WAFS documentation. In this regard, the group agreed that the WAFS Provider States had created informative supplementary information on the WAFSOPSG, Satellite Distribution System Operations Group (SADISOPSG) and WIFS websites. Through informal discussions with several users, the member from Australia had determined that some users were not aware of the existence of this supplementary information or that a new version of system documentation was available. According to the users, while the WAFS Provider States had indicated that their respective system documentation did mention that users should periodically review the WAFSOPSG Change Implementation Notice Board, the location of this instruction had proven difficult to find. Furthermore, the name attributed to the location of these documents varied between reference documents and this had caused further confusion for users.

5.2.6.2 In view of the foregoing, the group agreed that WAFS users would benefit from the timely notification, through the issuance of an administrative message, with regard to:

- a) new or updated WAFS guidance documents or system documentation, including details of where the file is located as well as the date or version available; and
- b) changes to WAFS functionality and capability (e.g. new datasets, new data layers, or changes to data resolution or transmissions protocols); and WAFS behaviour (e.g. changes to issue times or occurrence of backup tests).

5.2.6.3 Accordingly, the group formulated the following conclusion:

Conclusion 7/8 — Issuance of administrative messages to inform users of changes to WAFS services and updates to WAFS documentation

That the WAFS Provider States be invited to issue administrative messages on the WAFS satellite broadcast (SADIS 2G) and Internet-based services (Secure SADIS FTP and WIFS) to inform users of the availability of:

- a) new or updated guidance, system documentation or changes to WAFS services provided; and
- b) when harmonized grids are unavailable.

Agenda Item 6: Development of the WAFS
6.1: Cessation of WAFS forecasts in GRIB1 format

6.1.1 The group recalled that the WAFS Provider States expected to cease production and delivery of WAFS upper-air grid point forecasts (e.g. wind and temperature) in GRIB1 code form in November 2013 in line with the long-term plan of the WAFSOPSG. In this regard, it was recalled that WAFS Provider States, in line with Amendment 75 to Annex 3 in November 2010, began the operational transmission of upper-air grid point forecasts in GRIB2 code form which provided users with higher temporal and higher spatial resolution datasets compared to the GRIB1 datasets. At that time, the production and dissemination of upper-air grid point forecasts in GRIB1 code form were retained so that States would have sufficient time to transition to GRIB2 code form. The GRIB2 datasets were transmitted after the GRIB1 datasets on the WAFS broadcast in order to minimize impact on user transition to GRIB2 code form. However, beginning 5 July 2012, as a follow-up of WAFSOPSG Conclusion 6/10, WAFS Provider States made the WAFS GRIB2 datasets available before the GRIB1 datasets. The group noted that by November 2013, users would have had three years to transition to using the GRIB2 code form datasets.

6.1.2 The group noted that users who had not already done so were to have contacted their respective WAFS workstation vendors to ensure their systems were able to receive and decode the WAFS GRIB2 datasets for use in flight planning and documentation. Moreover, States were to have verified that their users of WAFS upper-air grid point forecasts and WAFS workstations were able to receive and decode the WAFS GRIB2 datasets and that flight planning and data retrieval systems had the proper decoder software to process the GRIB2 data, since it was proposed that after November 2013, WAFS upper-air grid point forecasts would only be available in GRIB2 code form. In view of the availability of the WAFS forecasts in the GRIB2 code form, noting that WAFS forecasts in the GRIB1 code form would no longer be compliant with Annex 3 provisions, and taking into consideration that GRIB1 and GRIB2 code forms would have been provided on the WAFS broadcast in parallel for three years (in November 2013), the group agreed that all the formalities regarding the cessation of WAFS forecasts in GRIB1 format had been fulfilled. It was highlighted that a group of European ANSPs and another commercial vendor had expressed concerns about being able to ensure that their systems could correctly process GRIB2 data by November 2013. Nevertheless, the group felt that the WAFS Provider States should proceed to cease production of GRIB1 code form WAFS forecasts in November 2013 and assess the readiness of States, vendors and other providers to meet this date. In this regard, the group felt there was a need for all States to be informed about the cessation. Therefore, the group formulated the following decision and conclusions:

Decision 7/9 — Cessation of WAFS gridded global forecasts in WMO GRIB Edition 1 code form

That the cessation of WAFS gridded global forecasts in WMO GRIB Edition 1 code form, effective 0000 UTC on 14 November 2013, be endorsed given the operational availability of WAFS gridded global forecasts in WMO GRIB Edition 2 code form in accordance with Annex 3.

Conclusion 7/10 — Cessation of WAFS gridded global forecasts in WMO GRIB Edition 1 code form

That the WAFS Provider States be invited to cease the preparation and issuance of WAFS gridded global forecasts in WMO GRIB Edition 1 code form at 0000 UTC on 14 November 2013.

Note 1.— This conclusion is in accordance with WAFSOPSG Decision 7/9.

Note 2.— WAFS gridded global forecasts in WMO GRIB Edition 2 code form will continue to be available on SADIS and WIFS.

Note 3.— The Chair of the WAFSOPSG is to notify the Chair of the SADISOPSG accordingly.

Conclusion 7/11 — Informing user States of the cessation of WAFS gridded global forecasts in WMO GRIB Edition 1 code form

That ICAO, in coordination with WMO:

- a) inform all SADIS and WIFS user States that WAFS gridded global forecasts in WMO GRIB Edition 1 code form (GRIB1) will cease to be available with effect 0000 UTC on 14 November 2013, in lieu of the operational availability of upper-air gridded forecasts in WMO GRIB Edition 2 code form (GRIB2); and
- b) encourage concerned user States that have not already done so to migrate to using the WAFS GRIB2 forecasts.

Note 1.— This follow-up is in accordance with the WAFS 5-year plan endorsed by each meeting of the WAFSOPSG and WAFSOPSG Decision 7/9.

Note 2.— WAFS GRIB2 forecasts provide superior temporal and spatial resolution when compared to WAFS GRIB1 forecasts, are prepared by the WAFSs in accordance with Annex 3, Appendix 3, 1.2 and have been available on the WAFS broadcast since November 2010.

Agenda Item 6: Development of the WAFS
6.2: Improved GRIB2 forecasts for CB clouds, icing and turbulence

6.2.1 Guidance on the intended use of the new gridded WAFS forecasts for CB clouds, icing and turbulence in flight documentation

6.2.1.1 The group recalled that action on Conclusion 5/11 — *Guidance on the intended use of gridded WAFS forecasts for CB clouds, icing and turbulence in flight documentation* was deferred by WAFSOPSG/6 until visualization standards were finalized. In this regard, the group reviewed information presented by the WAFC Provider States which described a concept of use of WAFS SIGWX forecasts and gridded WAFS forecasts for CB clouds, icing and turbulence.

6.2.1.2 With regard to WAFS SIGWX forecasts, the group noted that, according to the report of the WAFC Provider States, its initial concept for the use of SIGWX forecasts in support of flight planning had changed. At one time, SIGWX forecasts were used to decide a flight route, and there was never an effective means to integrate these forecasts into flight planning systems. Current flight routes often were decided many hours before the SIGWX forecasts were produced despite their issuance 17 hours before their validity time. In addition, long-haul flights could not effectively use SIGWX forecasts since large portions of their flights occurred well after the SIGWX forecast validity time. Therefore, the role of the WAFS SIGWX chart was currently primarily to provide flight crews with a general overview of the expected en-route significant weather conditions for situational awareness.

6.2.1.3 The group noted that, according to the WAFC Provider States, WAFS upper-air forecasts in grid point format were ideally suited for flight planning systems ingestion in order to obtain the optimum (time, distance or fuel) flight route for their business models. The addition of upper-air icing forecasts in gridded format provided global icing forecasts for extended diversion time operations.

6.2.1.4 The group also recalled that it had formulated Decision 6/17 regarding the visualization of WAFS upper-air gridded forecasts.

6.2.1.5 In line with the above, the group discussed an outline prepared by the WAFC Provider States of how the WAFS SIGWX and the WAFS upper-air gridded CB clouds, icing and turbulence forecasts were intended to be used given that both were expected to have operational status by November 2013. The outline included the following principles:

- a) the WAFCs produce WAFS upper-air gridded datasets for use in flight planning. These datasets include wind, temperature, humidity, CB clouds, icing and turbulence. These data are provided in digital format (i.e. GRIB2 code form) and are designed to be integrated directly into automatic flight planning systems. The operator may use these data in their flight planning decisions, in accordance with their own business model and safety management systems; and
- b) the WAFCs support the flight documentation requirements of Annex 3 by providing WAFS SIGWX forecasts as well as upper-air wind, temperature and humidity grid point forecasts. The WAFCs do not provide visualizations of upper-air gridded CB clouds, icing and turbulence forecasts in support of flight documentation (Annex 3, Chapter 9 refers).

6.2.1.6 The group considered that the above-mentioned principles should be included as guidance material in the *Manual of Aeronautical Meteorological Practice* (Doc 8896). Accordingly, the group formulated the following conclusion:

Conclusion 7/12 — Use of WAFS SIGWX forecasts and WAFS upper-air forecasts of CB clouds, icing and turbulence

That the intended use of WAFS SIGWX charts for flight documentation, and WAFS upper-air forecasts of CB clouds, icing and turbulence for use in flight planning systems be documented in the next amendment to the *Manual of Aeronautical Meteorological Practice* (Doc 8896).

6.2.1.7 It was noted that WAFS SIGWX charts in PNG format are intended to serve as a backup of the WAFS SIGWX forecasts in binary universal form for the representation of meteorological data (BUFR) code form (WAFSOPSG Conclusion 3/9 refers). In this regard, and acknowledging the availability of WAFS gridded global forecasts for CB clouds, icing and turbulence, the group confirmed the need for the continued provision of WAFS SIGWX in PNG chart and BUFR code form. In a related issue, the group noted that the twenty-second meeting of the ASIA/PAC Air Navigation Planning and Implementation Regional Group (APANPIRG/22), in Conclusion 22/42, had invited the WAFSOPSG to request the WAFC Provider States to provide SIGWX chart verification results, if any, to illustrate the degree of accuracy of these SIGWX charts. Due to the need for further background information for discussion, the group agreed to defer consideration of these issues until the next meeting where further information was expected to be provided.

6.2.2 Training requirements, for States and WAFS users, for the new gridded WAFS forecasts for CB clouds, icing and turbulence

6.2.2.1 The group recalled that it had tasked the WAFC Provider States to review the training requirements for the new gridded WAFS forecasts for CB clouds, icing and turbulence in light of the development of updated guidance on the interpretation of the forecasts. In this regard, the group discussed a progress report provided by the WAFC Providers States, where it was noted that in the process of the development of any training package, it would be important to know what the products would look like and how they would be accessed by the user. Use of the gridded datasets in user flight planning systems typically involved proprietary software, and it was therefore not feasible to conduct training in this aspect of the data provision.

6.2.2.2 To facilitate progress in the development of the training package, the group reviewed a number of examples of visualization options for these products as provided by the United States. Similar examples were expected to be used in the training material. Users would be able to access the training material provided by the WAFC Provider States via the Internet, and the training material was expected to consist of the following elements:

- a) general introduction to the new products;
- b) details about the new products, including levels, frequency, numerical ranges etc.;
- c) background information on the algorithms used;

- d) how to obtain authorized access to the WAFS data via SADIS and/or WIFS;
- e) examples of visualized fields;
- f) recommended thresholds to be used;
- g) concepts of use (guidance on interpretation);
- h) verification of forecasts; and
- i) performance characteristics.

6.2.2.3 The group, in light of the consideration of some examples of visualization options for the gridded forecasts, agreed that it was now possible to proceed with the development of the training package in line with the expected timescale involved with operational use of the gridded WAFS forecasts for icing, turbulence and CB clouds (i.e. November 2013). Concerns were expressed by the group regarding the need to translate the training package into all the ICAO official languages (namely Arabic, Chinese, English, French, Russian and Spanish) in order to allow users in all States to obtain the maximum benefit of the referred material. Accordingly, the group formulated the following conclusion:

Conclusion 7/13 — Training material for the new WAFS gridded global forecasts for CB clouds, icing and turbulence

That:

- a) the WAFS Provider States proceed with the development of computer-based (including voice over) initial training material for WAFS gridded global forecasts for CB clouds, icing and turbulence and, in coordination with the Secretary, make it available on the WAFSOPSG website by April 2013 in order to support implementation under Amendment 76 to Annex 3; and
- b) in view of the importance of the training material referred in a) above, the Secretary be invited to investigate the feasibility of its translation into all official languages of ICAO, and to report back to WAFSOPSG/8 accordingly.

6.2.3 Implementation of harmonized WAFS gridded forecasts

6.2.3.1 The group reviewed a progress report presented by the WAFS Provider States on the development and use of WAFS gridded forecasts as a follow-up action on WAFSOPSG Conclusion 6/15. The group noted that the report described, in detail, a process that was implemented by both WAFSs to improve the harmonization of the gridded forecasts of CB clouds, icing and turbulence. The group also noted that the report addressed the algorithms used by the WAFSs to produce the gridded forecasts of CB clouds, icing and turbulence and then described the harmonization methodology and the harmonization system as implemented by both WAFSs. The progress report also presented verification results of the CB and turbulence forecasts which were undertaken by WAFS London.

6.2.3.2 The group noted that several changes to the algorithms had been implemented since WAFSOPSG/6 following a testing and verification period. Further changes were likely to the algorithms in future, leading to further improvements in skill.

6.2.3.3 Each WAFC performed the harmonization process in parallel. The harmonization system performed well at both WAFCs since its implementation in November 2011, with only a limited number of failures to harmonize since inception. A failover system was deployed by a WAFC such that if the other centre's data was not received by an agreed cut-off time, the raw (or unharmonized) data was transmitted instead.

6.2.3.4 The group recalled that the WAFC Provider States had reported to WAFSOPSG/6 that they were expected to resolve the differences between their two individual gridded forecasts for icing through harmonization. In this regard, the group noted a progress report provided by the WAFC Provider States which stated that the final forecast was provided in two sets, a mean grid output and a maximum grid output, that provided the user with the average of the two individual grids and the maximum of the two grids. The group learned that the two WAFCs had posted a user's guide for the grids on the WAFSOPSG website and first made the harmonized WAFS forecasts available in November 2011.

6.2.4 **Guidance on the harmonized WAFS grids for cumulonimbus clouds, icing and turbulence forecasts**

6.2.4.1 The WAFC Provider states informed the group, as a follow-up of Conclusion 6/12, that an updated guidance document on the harmonized WAFS grids for cumulonimbus clouds, icing and turbulence forecasts had been placed on the WAFSOPSG website on 14 September 2012. A short presentation was provided to the meeting by the WAFC Provider States which described the contents of the document. The group was invited to review the guidance and provide feedback to the WAFCs for inclusion in any future update of the guidance.

6.2.5 **Verification and harmonization of WAFS gridded forecast for icing**

6.2.5.1 A report of the WAFC Provider States provided a necessary outline of the methodology used for the verification of WAFS gridded forecasts for icing and the results thereof. In respect of the verification methodology used, the group noted that the direct observation of icing is very difficult since operators will tend to plan flights to avoid forecast areas of icing and the cruising level of commercial turbine powered aircraft are typically well above optimum icing altitudes and was not directly detectable from radar and satellite observation. The WAFC Provider States had evaluated data that inferred icing such as aircraft reports, radar, satellite and initial model analysis in order to create a current icing potential grid (operational for the continental United States area only at present but is expected to be extended globally over the coming months) that could be used to verify the WAFS gridded icing forecasts against. In respect of the verification results, when undertaking a comparison of WAFC London, WAFC Washington and the harmonized WAFS gridded icing forecasts (mean icing potential and maximum icing potential) against the current icing potential at a threshold of 0.1 (which was the recommended icing potential threshold used for extended range operations by twin-engine aeroplanes flight planning determined at WAFSOPSG/6) the WAFC Provider States determined that the harmonized WAFC London/WAFC Washington maximum icing potential forecast provided a more conservative forecast than either of the two individual (WAFC London or WAFC Washington) maximum icing potential forecasts.

6.2.5.2 Noting that the report of the WAFC Provider States provided a verification case study for only one flight level and one time step, namely FL100 at T+24 across a 7-month period (5 November 2011

to May 2012), the group noted that verification statistics had been calculated by the two WAFCs for all flight levels and all forecast time steps that are available in the WAFS gridded icing forecast dataset, i.e. FL 060 (800 hPa), 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 240 (400 hPa) and 300 (300 hPa); and T+6, 9, 12, 15, 18, 21, 24, 27, 30, 33 and 36.

6.2.5.3 The group considered the utility of making the complete set of verification statistics available on the public Internet websites hosted by WAFCs London and Washington. In addition, the group considered the utility of extending the verification to the global scale where suitable observational data upon which the WAFS gridded icing forecasts could be verified. In this regard, the group addressed two issues further in 6.2.6 below.

6.2.6 **Removal of the Note to Annex 3, Appendix 2, paragraph 1.2.2 Conclusion 6/3) regarding the trial nature of WAFS gridded forecasts for CB clouds, icing and turbulence**

6.2.6.1 The group noted the information provided by China which discussed the verification results of trial WAFS gridded global clear air turbulence (CAT) forecasts, their performance and issues regarding the proposed removal of the trial status of the WAFS gridded forecasts for CB clouds, icing and turbulence.

6.2.6.2 The group noted the expressed concerns that the verification results presented by the WAFS Provider States had only been performed for a selected portion of the globe. The verification on CAT potential conducted by China had suggested that performance could be significantly lower, in particular in relation to turbulence caused by mountain waves in other parts of the world. Using the recommended threshold of 4 and 6 for CAT, based on the verification results by WAFS London, about half the cases would go undetected. As the verification had not been done extensively, it was considered premature, by China, to confirm or otherwise, whether the gridded forecast of CB clouds, icing and turbulence had met the operational requirement, and thus the concern expressed by a group member that the pre-conditions, namely “the expected positive results of the verification”, for the removal of the experimental label “trial forecast” was not fully demonstrated in all ICAO Regions.

6.2.6.3 The group further noted a concern about the readiness to ingest the gridded WAFS forecasts of CB clouds, icing and turbulence into flight planning systems, given the very limited training and guidance material available, in particular, on how the data was to be used and for establishing the risk involved. The consequential procedural changes would have to be studied further. Moreover, the user’s attention should be drawn that the performance of these gridded forecasts are, at present, not of the same quality as the gridded forecasts of wind and temperature. In this regard, the group was reminded of the discussion held under 6.2.1.5 on the need to understand the difference in the use of the gridded data and SIGWX charts.

6.2.6.4 Regarding the thresholds to be adopted, while it was noted that some guidance had since been included in Version 2.5 (September 2012) of the *Guidance on the Harmonized WAFS Grids for Cumulonimbus Clouds, Icing and Turbulence Forecasts* (available on the WAFSOPSG website), the choice of these thresholds were not substantiated on a scientific basis. Moreover, operators could choose their own thresholds in accordance with their own business model and safety management system.

6.2.6.5 The Secretary drew the attention of the group to WAFSOPSG Conclusion 6/3 regarding a proposal for amendment of Annex 3 which included removal of the Note to Appendix 2, paragraph 1.2.2 pertaining to the trial nature of the forecasts. In this regard, the Air Navigation Commission, after review of the WAFSOPSG/6 Report, endorsed the conclusion and the removal of the note to Appendix 2,

paragraph 1.2.2 be included as part of Amendment 76 to Annex 3. Consequently, State Letter AN 10/1-12/8 requesting comments from States and international organizations on proposed Amendment 76 to Annex 3 was dispatched on 24 February 2012. It was to be expected that the replies from States and international organizations would be reviewed by the Air Navigation Commission in October 2012, with a view to providing advice to the ICAO Council which would consider the said proposal in March 2013.

6.2.6.6 The group recalled that the WAFS, historically conceived by the ICAO Area Forecast Panel, initially involved the issue of upper-air wind and temperatures forecasts in GRID code form with a resolution of 5 degrees latitude by 5 degrees longitude. States receiving the GRID forecasts were initially able to modify the forecasts for their area of responsibility based on aircraft reports and other observational data. Through improvements in models, observational data and feedback from States and aircraft operators, as well as changing requirements of users, the WAFCs have continued to improve the accuracy, and spatial and temporal resolution of the WAFS upper air forecasts. In addition, a number of other elements such as humidity, tropopause, icing, turbulence and CB clouds have been added to the WAFS dataset. At present, the spatial and temporal resolution of WAFS gridded global forecasts was 1.25 degrees by 1.25 degrees at 3-hour time steps (T+6 to T+36 hours) respectively, four times per day, and the users (IATA) had indicated an expected future requirement for finer spatial and temporal resolutions. The group appreciated that all of this illustrated the evolutionary nature of WAFS.

6.2.6.7 In view of the foregoing, the group was advised by IATA that, in representing the primary users of WAFS gridded global forecasts, and since they were the original requestors of such forecasts, they were the way of the future and would assist to lead to a global harmonization of airspace through initiatives of global ATM. Therefore, IATA, on behalf of its member airlines, reaffirmed the operational acceptance of the new WAFS gridded global forecasts for CB clouds, icing and turbulence.

6.2.6.8 In view of the foregoing and the fact that there was an amendment proposal to Annex 3 being reviewed which included the removal of the note to Appendix 2, paragraph 1.2.2 regarding the trial nature of WAFS gridded forecasts for CB clouds, icing and turbulence, the group agreed to reaffirm Conclusion 6/18 and to study an extension of verification using more comprehensive datasets. The group agreed that the that verification should be performed on both harmonized and unharmonized grids and verification statistics should be generated for each region of the globe. Additionally, the group noted that there was no intention at this time, by the WAFS Provider States, to remove the WAFS SIGWX forecasts in PNG chart and BUFR code form following the implementation of the new WAFS gridded forecasts. Accordingly, the group formulated the following conclusion:

Conclusion 7/14 — Implementation and further verification of WAFS gridded global forecasts for cumulonimbus clouds, icing and turbulence

That, in view of the successful harmonization of the WAFS gridded global forecasts for cumulonimbus clouds, icing and turbulence, and the ongoing verification results, as well as the availability of updated guidance material, the WAFSOPSG reaffirmed Conclusion 6/18 regarding the removal, as part of Amendment 76 to Annex 3, of Note 1 to Appendix 2, 1.2.2 h) regarding the experimental nature (“trial forecasts”) of the gridded forecasts. Consequently, the WAFC Provider States:

- a) in collaboration with all ICAO planning and implementation regional groups (PIRGs), WMO and IATA, be invited to extend the verification of WAFS gridded global forecasts of cumulonimbus clouds, icing and turbulence using more comprehensive datasets for the monitoring of the quality of the products; and
- b) be invited to publish the cumulonimbus clouds, icing and turbulence verification results on the WAFCs websites.

Note.— The WAFC Provider States are to report on progress in respect of a) and b) to the WAFSOPSG/8 meeting accordingly.

Agenda Item 6: Development of the WAFS
6.3: Visualization of WAFS forecasts

6.3.1 WAFS probabilistic forecasts for icing and turbulence

6.3.1.1 The group recalled that it had formulated Conclusion 6/16 requesting the Member from IATA to develop, in scientific consultation with WMO, a detailed concept of operations including operational flight planning requirements for WAFS provision of probabilistic forecasts of icing and turbulence expressed in terms of indices. In this regard, the group reviewed a progress report.

6.3.1.2 The group noted the considerations outlined in the report concerning the characteristics of icing and turbulence, and aircraft performance. The group also noted that an operator needs to host a flight-planning system to ingest the algorithms and be able to apply aircraft specific data, such as, but not restricted to, eddy dissipation rate (EDR) to achieve generic areas of turbulence, turbulence level expected, icing and severe icing areas, etc. and to support visualization by the flight planning systems.

6.3.1.3 Specifically, with regard to probabilistic forecasts, the group noted that the user requirement was to improve the accuracy of turbulence and icing forecasts provided within the framework of the WAFS and that one method which deserved consideration was the expanded use of probabilistic forecasts. It was noted that IATA accepted that there was a level of difficulty associated with implementing this initiative; however, the benefit of using probabilities to denote the level of certainty was compelling from the user's standpoint. This was reinforced by improvements to flight planning systems which could ingest and manage "user configured" algorithms to assist in the determination of probability values which would indicate a different action to occur (for a given forecast period and lead time) prior to arriving in the area concerned.

6.3.1.4 The group agreed that the application of the probability forecasts by the WAFSs, given the improvements to flight-planning systems, would assist and potentially provide greater benefit to users and would be considered further in the context of Agenda Item 6.4.

Agenda Item 6: Development of the WAFS
6.4: Migration plan to accommodate the future global ATM operational concept

6.4.1 MET information for the global ATM operational concept

6.4.1.1 The group recalled that it had requested the WAFC Provider States to provide an update on developments concerning WAFS support required for the integration of meteorological information within the global ATM operation concept. In this regard, the group reviewed a progress report presented by the WAFC Provider States as a follow-up of Conclusion 6/19.

6.4.1.2 The group recalled that the WAFS had provided the framework for a four-dimensional (4-D) meteorological information database since the introduction of the grid point wind and temperature forecasts in Amendment 65 to Annex 3 in 1983. Through continuous improvement, ever since, Amendment 75 to Annex 3 had specifically added turbulence, icing and CB clouds in grid point format to WAFS global upper-air forecasts. The group noted the current WAFS capabilities concerning elements provided by the system, spatial and temporal resolution and issuance times, and assessed if the data currently provided would be sufficient for the needs of future performance-based navigation. In this regard, taking into account ongoing work in ICAO's Meteorological Aeronautical Requirements and Information Exchange Project Team (MARIE-PT) and considering the expected outcome of the 12th Air Navigation Conference to be held at ICAO Headquarters in November 2012, the group considered looking at the future operational requirements for the WAFS and providing direction to the WAFC Provider States in order to assess their means and capabilities to meet new requirements. The group also expressed the wish to revisit this possible task when reviewing the long-term planning of WAFS implementation under Agenda Item 7. The group agreed at this point to take into consideration the views expressed by IATA under Agenda Item 6.3. Accordingly, the group formulated the following conclusion:

Conclusion 7/15 — Development of a concept of operations for the WAFS

Recognizing the ongoing work of the MARIE-PT in support of the global ATM operational concept, that ICAO, in collaboration with the WAFC Provider States and the members from Australia, China, France, New Zealand, Oman, ASECNA, IATA, IFALPA and WMO, be invited to coordinate with the Meteorological Aeronautical Requirements and Information Exchange Project Team (MARIE-PT) on the development of a concept of operations for the WAFS that takes into consideration service functions and performance requirements.

6.4.1.3 In a related issue, the group noted that Amendment 76 to Annex 3 would introduce enabling clauses for the exchange of METAR, SPECI, TAF and SIGMET in XML/GML digital code form. In this regard, it was expected that such provisions could be seen as early steps in the migration of all meteorological information to support the future system-wide information management (SWIM) environment.

Agenda Item 7: Long-term planning of WAFS implementation

7.1 The group recalled that it had formulated Conclusion 3/16 calling for the WAFC Provider States to elaborate and keep up to date a concise long-term plan for the major developments of the WAFS covering a period of five years for review and endorsement by the group. Such a plan was considered necessary to facilitate long-term planning by the WAFS user States for maintaining and upgrading their WAFS equipment (including workstations). The group reviewed an update to the long-term plan prepared based on information provided by the WAFC Provider States.

7.2 At WAFSOPSG/6, a WAFS five-year plan updated by the WAFC Provider States taking into account the latest developments and additional expected milestones for the year 2015 was endorsed by the group. It was noted that major developments (such as: the introduction of gridded forecasts for cumulonimbus clouds, icing and turbulence; the amendment cycle of Annex 3; and the planned conjoint ICAO/WMO Meteorological (MET) Divisional Meeting (tentatively expected to be convened in 2014)), had been taken into account in the WAFS five-year plan covering the years 2011 to 2015 as endorsed by WAFSOPSG/6.

7.3 With regard to the update to the long-term plan (2012 to 2016), the group noted that the early part of the plan included a number of implementation activities that were required to be completed in time for the applicability of Amendment 76 to Annex 3 (14 November 2013). The timing of these changes were amended as a result of discussions at this meeting.

7.4 The group also considered how the WAFS should be aligned with the evolving requirements of the global ATM operational concept, especially in the light of the development of the network-centric approach to future data needs. The group agreed that this issue had been considered under Agenda Item 6.4.

7.5 The group recalled the information provided by the WAFC Provider States in the context of developing the WAFS long-term plan for 2012-2016.

7.6 Finally, in light of the discussions under the preceding agenda items, the group reviewed the proposed plan and provided necessary updates, and formulated the following decision:

Decision 7/16 — WAFS long-term plan for 2012-2016

That the concise long-term plan for the WAFS covering a period of five years, given in Appendix F, be endorsed.

Agenda Item 8: Future work programme

8.1 It was noted that, at every WAFSOPSG meeting, the group was expected to review its work programme and update it as necessary.

8.2 Work programme (deliverables)

8.2.1 Terms of reference

8.2.1.1 The terms of reference of the group were reviewed by the group. (The terms of reference are included in Appendix G for information since they reflect the overall tasks of the group and needed be revised only when major changes are introduced to the WAFS programme.) The group agreed that no changes needed to be introduced at this time.

8.2.2 Work programme

8.2.2.1 A work programme of the group was reviewed by the group.

8.2.2.2 Based on the discussions under Agenda Items 4, 5 and 6, the group updated the work programme and formulated the following decision:

Decision 7/17 — Update of the work programme of the WAFSOPSG

That the work programme (deliverables) of the WAFSOPSG be replaced with that shown in Appendix H.

Agenda Item 9: Any other business

9.1.1 The group reviewed an IATA proposal regarding the increased availability of ADS-C reports and the need to perform an appropriate quality management process on such reports. In this regard, the group recalled that WAFSOPSG Decision 4/21 decided not to address automatic dependent surveillance (ADS) MET data to quality management due to the fact that other sources of data (e.g. aircraft meteorological data relay (AMDAR) data) was rapidly increasing and that ADS MET data was expected to be a tiny percentage of the total MET data. However, the group was informed that the situation had changed, and that ADS-C had rapidly increased in conjunction with future air navigation system/controller-pilot data link communications (FANS/CPDLC). In accordance with PANS-ATM, Chapter 4 and Appendix 5, it was noted that these messages go directly to the ANSPs, where they are decoded to provide aircraft surveillance. Although the original report contains the aircraft registration, the final decoded report only gives the flight number. This decoded report is then passed to the WAFCs in accordance with Annex 3, Chapter 5 without any quality control process. The group noted that quality management experience had shown that monitoring aircraft by registration was essential to tracking down subtle but significant temperature and wind errors, and for reporting back to the operator a problem with a particular aircraft.

9.1.2 The group considered, in view of the increased availability of ADS-C reports, the need for implementation of procedures to ensure that all ADS MET reports, including those obtained during en-route and terminal area phases of operation, were automatically forwarded by the ANSP to the WAFCs and that such reports should be subject to an appropriate quality management process. Accordingly, the group formulated the following conclusions:

Conclusion 7/18 — Forwarding of ADS reports relating to meteorological information to WAFCs

That the relevant ICAO groups, in coordination with the WAF Provider States, ensure that all ADS reports relating to meteorological information, including those obtained during en-route and terminal area phases of operation, are automatically forwarded by the ANSP to the WAFCs in accordance with Annex 3, Chapter 5 and Appendix 4.

Conclusion 7/19 — Quality management of ADS reports relating to meteorological information

That the Secretary investigate issues concerning the quality management of ADS reports relating to meteorological information and provide a report in time for WAFSOPSG/8.

9.2 **Transition to new WAF SIGWX production platform by WAF London, October 2011**

9.2.1 The group was informed that, on 11 October 2011, WAF London had replaced its very successful and reliable Horace SIGWX production platform due to its age and due to newer technology with greater development potential becoming available. The Horace replacement, named “SWIFT”, was a platform that would provide many years use going forward and would be adaptable to future requirements in a way that Horace would not.

9.2.2 Many months of testing had taken place, both internally at WAFC London, and externally with the assistance of a number of stakeholders. Samples of the new PNG charts from WAFC London had been made available to all users from February 2011. Administration notices were dispatched advising of the change between February 2011 and October 2011. The change was also notified on the WAFC Change Implementation Notice Board, and in the WAFC London Newsletter.

9.2.3 An essential component of the testing was the assistance provided, voluntarily, by several stakeholders. WAFC London wished to formally acknowledge that assistance. In alphabetical order, the following organizations provided extremely valuable feedback on the WAFC London test products:

- Corobor
- GST
- IBL Software Engineering
- IRAM (Institute of Radar Meteorology)
- LHS (Lufthansa Systems)
- MapMakers Group Ltd
- Meteo France International
- MeteoStar
- NetSys International
- Telvent (ALMOS Systems)

9.2.4 Prior to the transition, WAFC London had liaised with WAFC Washington in order for WAFC Washington may to be put on increased readiness to perform backup functions in the event of product problems at WAFC London. WAFC London wished to formally acknowledge its appreciation of WAFC Washington's assistance in this regard.

9.2.5 As alluded to in 9.2.1, WAFC London transitioned to its new SIGWX production platform on 11 October 2011. Overall the transition was successful, although there were some initial teething problems that had not been captured in the testing phase. Workarounds were introduced as quickly as possible, and more formal software updates were subsequently implemented. Downstream impacts on end-users was kept to a minimum accordingly.

9.3 **Replacement of references to ISCS by WIFS**

9.3.1 The group noted SADISOPSG Conclusion 17/30, reproduced below for reference:

Conclusion 17/30 — Replace references to ISCS by WIFS in SADIS-related documentation

That the Secretary, in coordination with the SADIS Provider State and the ISCS/WIFS Provider State, taking into account the cessation of the ISCS broadcast on 1 July 2012, be invited to:

- a) undertake a review of all SADIS documentation on the SADISOPSG website so as to identify legacy references to the International Satellite Communications System (ISCS); and*
- b) subject to completion of a), replace all references to ISCS by the WAFS Internet File Service (WIFS) unless they are to be maintained for historical context.*

Note.— Updated SADIS documentation is to be placed on the SADISOPSG website.

9.3.2 In this regard, the group agreed that there was a need to review all legacy references to ISCS in guidance material and operational information available on the WAFSOPSG website. Consequential to this review, the group formulated the following conclusion:

Conclusion 7/20 — Replacement of references to ISCS by the WAFS Internet File Service (WIFS) in WAFS-related documentation

That the Secretary, in coordination with the WAFS Washington Provider State, be invited to review all the documentation available on the WAFSOPSG website in order to identify legacy references to the ISCS and replace (or remove) such references to ISCS with the WAFS Internet File Service (WIFS) unless they are to be maintained for historical context.

Note.— Updated WAFS documentation is to be placed on the WAFSOPSG website.

9.4 **Withdrawal of the BUFR Edition 3 and CREX Edition 1 from the WMO Manual on Codes**

9.4.1 The urgent attention of the group was drawn to an outcome of the Fifteenth Session of the WMO Commission for Basic Systems (CBS-XV, 10 to 15 September 2012, Jakarta) which reinforced a decision of the Thirteenth Session of the CBS (CBS-XIII, St. Petersburg, 23 February to 3 March 2005) to withdraw BUFR Edition 3 and CREX Edition 1 from the *Manual on Codes* (WMO Publication No. 306) as of 7 November 2012. The group was informed that this decision of CBS-XV was despite a recommendation of the Third Meeting of the WMO Inter-Programme Expert Team on Data Representation and Codes (IPET-DRC/3, Melbourne, 2011) which had proposed the continuance of support for BUFR 3 beyond November 2012.

9.4.2 The group discussed the implications of this decision in the context of WAFS SIGWX forecasts in BUFR code form (Annex 3, Appendix 2, 1.3.1.2 refers), which were presently provided in BUFR Edition 3. The group noted that in the near term, the withdrawal of WMO support for BUFR Edition 3 was expected to have little or no impact on the WAFS Provider States and on WAFS users, since the preparation and availability of WAFS SIGWX in BUFR Edition 3 would continue for the foreseeable future. However, in the medium to longer term, recognizing that future changes to the WAFS SIGWX in BUFR Edition 3 may prove difficult if not impossible due the lack of definition in the *Manual on Codes*, the group identified the need to consider whether the WAFS should migrate to BUFR Edition 4, or perhaps a digital code form such as the extensible mark-up language (XML)/geography markup language (GML) which would support the future interoperability of WAFS SIGWX forecasts within the system-wide information management (SWIM) environment of the global air traffic management system. It was agreed that the WAFS Provider States would monitor the ramifications of this issue in the context of the WAFS and as necessary would report back at the next meeting.

9.5 **Date and venue of WAFSOPSG/8 Meeting**

9.5.1 The group recalled that it is intended to convene WAFSOPSG meetings every eighteen months, and that the meetings are to be held at the ICAO Regional Offices on a rotational basis to ensure regional participation. In this regard, the group noted that it was expected that a conjoint ICAO-WMO MET Divisional Meeting would be held in Montreal, Canada in July 2014. All Secretariat documentation for the said meeting would need to be available by late 2013; therefore, all WAFSOPSG proposals to be included in the Secretariat divisional meeting working papers would need to be available before that date. The group therefore agreed that, under these circumstances, the eighth meeting of the WAFSOPSG should be held, at a location to be determined, in September 2013.

APPENDIX A

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APPENDIX B

DRAFT REGIONAL PROCEDURES IN THE ANP/FASID

BASIC ANP

WORLD AREA FORECAST SYSTEM (WAFS)
(FASID Table[s] MET 5 [and MET 6])

1. FASID Table MET 5 sets out the [AFI, ASIA/PAC, CAR/SAM, EUR, MID, NAT] Region[s] requirements for WAFS forecasts to be provided by WAFC [London, Washington]. [WAFSOPSG Conclusion 1/2]
2. For back-up purposes, each WAFC should have the capability to produce WAFS forecasts for all the required areas of coverage. [WAFSOPSG Conclusion 5/2]
3. WAFS forecasts should be made available by WAFC [London, Washington] using the [satellite distribution system for information relating to air navigation (SADIS), including the Secure SADIS FTP Service; ~~international satellite communications system (ISCS1, ISCS2)~~ WAFS Internet File Service (WIFS)] ~~covering the reception area shown in FASID Chart CNS [4] or using the satellite and Internet service.~~ [WAFSOPSG Conclusion 6/27/2]

Editorial note.— Insert “or using the [SADIS, ~~ISCS~~, WIFS] service” in the corresponding CNS procedure contained in Part IV of the ANP.

4. Each State should make the necessary arrangements to receive and make full use of operational WAFS forecasts made available by WAFC [London, Washington]. The lists of the authorized users of the [SADIS, WIFS, ~~ISCS1, ISCS2~~] services in the [AFI, ASIA/PAC, CAR/SAM, EUR, MID, NAT] Region[s] and the locations of the operational VSATs and/or Internet-based services are available from the following websites:

- <http://www2.icao.int/en/anb/met/sadisopsg/www.icao.int/safety/meteorology/sadisopsg/> (click “Operational Information” and then “Status of implementation of SADIS”) for SADIS;
- www.weather.gov/iseswww.aviationweather.gov/wifs/ (click: “Documents” and then “Status of implementation of ~~ISCS~~WIFS listed by ICAO regions”) for ~~ISCS~~WIFS.

[WAFSOPSG Conclusion 6/27/2]

Editorial note.— Insert only in the ASIA/PAC Basic ANP the following paragraph.

5. FASID Table MET 6 lists the primary Internet-based service (SADIS FTP and/or WIFS) from which States/users in the ASIA/PAC Region should obtain WAFS forecasts made available by WAFC London and WAFC Washington. [WAFSOPSG Conclusion 6/4]

FASID**WORLD AREA FORECAST SYSTEM (WAFS)**
(FASID Table[s] MET 5 [and MET 6])

1. FASID Table[s] MET 5 [and MET 6 set] sets out the [AFI, ASIA/PAC, CAR/SAM, EUR, MID, NAT] Region[s] requirements for WAFS forecasts, to be provided by WAFC [London, Washington].

FASID TABLE MET 5 — REQUIREMENTS FOR WAFS FORECASTS*EXPLANATION OF THE TABLE**Column*

- 1 WAFS forecasts required by the [AFI, ASIA/PAC, CAR/SAM, EUR, MID, NAT] States, to be provided by WAFCs [London, Washington].
- 2 Area of coverage required for the WAFS forecasts, to be provided by WAFC [London, Washington].

FORECAST REQUIRED	AREAS REQUIRED
1	2
SWH forecasts (FL 250-630) in the BUFR code form	GLOBAL
SWM forecasts (FL 100-250) in the BUFR code form	[NIL or ASIA SOUTH, EUR, MID, NAT]
Forecasts of upper-air wind, temperature and humidity, cumulonimbus clouds, icing, and clear-air and in-cloud turbulence, and of geopotential altitude of flight levels in the GRIB code form	GLOBAL

Note 1.— SWM forecasts are provided for limited geographical areas as determined by regional air navigation agreement. Areas “ASIA SOUTH”, “EUR” and “MID” provided by WAFC London; area “NAT” provided by WAFC Washington.

Note 2.— WAFCs will continue to issue forecasts of SIGWX in PNG chart form for back-up purposes for fixed areas of coverage as specified in Annex 3.

Note 3.— Forecasts of cumulonimbus clouds, icing, and clear-air and in-cloud turbulence are labelled as “trial forecasts” and are currently distributed through the Internet-based services.

Editorial Note.— *Insert only in the ASIA/PAC FASID the following table.*

**FASID TABLE MET 6 — PRIMARY INTERNET-BASED SERVICE IN THE
ASIA/PAC REGION FOR WAFS FORECASTS**

EXPLANATION OF THE TABLE

Column

- | | |
|---|---|
| 1 | States for which WAFS forecasts are made available by WAFC London and WAFC Washington |
| 2 | Primary Internet-based service for WAFS dissemination |

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State	Primary Internet-based service for WAFS dissemination
1	32
Afghanistan	SADIS FTP
Australia	Either
Bangladesh	SADIS FTP
Bhutan	SADIS FTP
Brunei Darussalam	Either
Cambodia	Either
China	Either
Hong Kong, China	Either
Macao, China	Either
Cook Islands	WIFS
Democratic People's Republic of Korea	Either
Fiji	WIFS
India	SADIS FTP
Indonesia	Either
Japan	Either WIFS
Kiribati	WIFS
Lao People's Democratic Republic	Either
Malaysia	Either
Maldives	SADIS FTP
Marshall Islands	WIFS
Micronesia (Federated States of)	WIFS
Mongolia	Either
Myanmar	Either
Nauru	WIFS
Nepal	SADIS FTP
New Zealand	WIFS
Pakistan	SADIS FTP
Palau	Either

State	Primary Internet-based service for WAFS dissemination
Papua New Guinea	WIFS
Philippines	Either
Republic of Korea	Either
Samoa	WIFS
Singapore	Either
Solomon Islands	WIFS
Sri Lanka	SADIS FTP
Thailand	Either
Timor-Leste	Either
Tonga	WIFS
Tuvalu	WIFS
Vanuatu	WIFS
Viet Nam	Either

Note.— The determination of the primary Internet-based service (SADIS FTP and/or WIFS) from which States/users should obtain WAFS forecasts is based on the geographic areas of coverage of the SADIS and WIFS footprints.

APPENDIX C

EXAMPLE FORMATS OF WAFS PERFORMANCE INDICATORS

**Table 1. WAFS London GRIB1 and GRIB2 Data availability on MetSwitch
Timeliness of all GRIB1 and GRIB2 bulletins on MetSwitch since 0600 Z data time on 16 August 2011**

Note.— Monitoring of GRIB2 trial and evaluation parameters (CB, ice, turbulence) was not available until January 2012.

<i>Note.— The timecheck times provided are examples. The precise times are to be agreed and will be different following the re-prioritization of GRIB1 and GRIB2 (5 July 2012).</i>		GRIB1	GRIB1	GRIB2 Standard Parameters	GRIB2 Standard Parameters	GRIB2 Trial Parameters	GRIB2 Trial Parameters
		HH+04:00	HH+06:00	HH+05:00	HH+06:00	HH+05:30	HH+06:00
Aug-11	Bulletins Received	145824	148176	41599	41599	N/A	N/A
	Required	148176	148176	42273	42273	N/A	N/A
	Missing	2352	0	674	674	N/A	N/A
	% available by stated time	98.41	100.00	98.41	98.41	N/A	N/A
Sep-11	Bulletins Received	282240	282240	80520	80520	N/A	N/A
	Required	282240	282240	80520	80520	N/A	N/A
	Missing	0	0	0	0	N/A	N/A
	% available by stated time	100.00	100.00	100.00	100.00	N/A	N/A
Oct-11	Bulletins Received	291648	291648	83204	83204	N/A	N/A
	Required	291648	291648	83204	83204	N/A	N/A
	Missing	0	0	0	0	N/A	N/A
	% available by stated time	100.00	100.00	100.00	100.00	N/A	N/A

<i>Note.— The timecheck times provided are examples. The precise times are to be agreed and will be different following the re-prioritization of GRIB1 and GRIB2 (5 July 2012).</i>		GRIB1	GRIB1	GRIB2 Standard Parameters	GRIB2 Standard Parameters	GRIB2 Trial Parameters	GRIB2 Trial Parameters
		HH+04:00	HH+06:00	HH+05:00	HH+06:00	HH+05:30	HH+06:00
Nov-11	Bulletins Received	290864	291648	83204	83204	N/A	N/A
	Required	291648	291648	83204	83204	N/A	N/A
	Missing	784	0	0	0	N/A	N/A
	% available by stated time	99.73	100.00	100.00	100.00	N/A	N/A
Dec-11	Bulletins Received	289296	291648	83204	83204	N/A	N/A
	Required	291648	291648	83204	83204	N/A	N/A
	Missing	2352	0	0	0	N/A	N/A
	% available by stated time	99.19	100.00	100.00	100.00	N/A	N/A
Jan-12	Bulletins Received	289608	291648	83204	83204	44989	45177
	Required	291648	291648	83204	83204	45177	45177
	Missing	2040	0	0	0	188	0
	% available by stated time	99.30	100.00	100.00	100.00	99.58	100.00

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<i>Note.— The timecheck times provided are examples. The precise times are to be agreed and will be different following the re-prioritization of GRIB1 and GRIB2 (5 July 2012).</i>		GRIB1	GRIB1	GRIB2 Standard Parameters	GRIB2 Standard Parameters	GRIB2 Trial Parameters	GRIB2 Trial Parameters
		HH+04:00	HH+06:00	HH+05:00	HH+06:00	HH+05:30	HH+06:00
Feb-12	Bulletins Received	271539	272832	77165	77836	46398	46805
	Required	272832	272832	77836	77836	47212	47212
	Missing	1293	0	671	0	814	407
	% available by stated time	99.53	100.00	99.14	100.00	98.28	99.14
0600 Z 16/08/2011 to 1800 Z 29/02/2012	Bulletins Received	1861019	1869840	532100	532771	91387	91982
	Required	1869840	1869840	533445	533445	92389	92389
	Missing	8821	0	1345	674	1002	407
	% available by stated time	99.53	100.00	99.75	99.87	98.92	99.56

**Table 2. WAFC London SIGWX BUFR and PNG Data availability on MetSwitch
Timeliness of all WAFC London SIGWX BUFR and PNG data on MetSwitch since 0600 Z data time on 1 November 2011**

		WAFC London SIGWX BUFR HH+06:55	WAFC London SIGWX BUFR HH+07:30	WAFC London SIGWX BUFR HH+08:55	WAFC London SIGWX PNG HH+06:55	WAFC London SIGWX PNG HH+07:30	WAFC London SIGWX PNG HH+08:55
Nov-12	Bulletins received	1359	1364	1364	1212	1240	1240
	Bulletins required	1364	1364	1364	1240	1240	1240
	Missing	5	0	0	28	0	0
	%delivered	99.63	100	100	97.74	100	100
Dec-12	Bulletins received	1354	1359	1364	1212	1240	1240
	Bulletins required	1364	1364	1364	1240	1240	1240
	Missing	10	5	0	28	0	0
	%delivered	99.26	99.63	100	97.74	100	100
Jan-12	Bulletins received	1320	1336	1364	1201	1219	1240
	Bulletins required	1364	1364	1364	1240	1240	1240
	Missing	44	28	0	39	21	0
	%delivered	96.77	97.94	100	96.85	98.30	100
Feb-12	Bulletins received	1276	1276	1276	1150	1160	1160
	Bulletins required	1276	1276	1276	1160	1160	1160
	Missing	0	0	0	10	0	0
	%delivered	100.00	100.00	100.00	99.14	100.00	100.00
01/11/2011 to 29/02/2012	Bulletins received	5309	5335	5368	4775	4859	4880
	Bulletins required	5368	5368	5368	4880	4880	4880
	Missing	59	33	0	105	21	0
	%delivered	98.90	99.38	100	97.84	99.56	100

**Table 3. WAFIC London SIGWX correction bulletins (FXUK65 EGRR) issued
Example format for reporting WAFIC London correction messages**

Month	January 11	February 11	March 11	April 11	May 11	June 11	July 11	August 11	September 11	October 11	November 11	December 11
Number	2	6	0	2	4	2	3	2	2	2	5	1

APPENDIX D

**SUMMARY OF THE PROPOSAL FROM THE WAFC PROVIDER STATES
REGARDING THE IMPLEMENTATION OF POLICIES FOR THE RE-ISSUANCE
OF WAFS FORECASTS IN GRIB2 CODE FORM AND WAFS SIGWX FORECASTS**

The following is a summary of the WAFC proposal regarding the implementation of re-issue policies for WAFS GRIB2 and WAFS SIGWX.

Table 4. Summary of the proposed re-transmission policy for WAFS GRIB2 and WAFS SIGWX.
(Certain caveats and controls apply.)

	Corrections to forecast product	Time limit beyond which no corrections will be issued	Re-transmits due to corrupt or missing data¹	Time limit beyond which no re-transmit will be issued	Amended forecasts
WAFC London SIGWX BUFR	Yes. Always issued as a complete set of forecasts (all PNGs/all BUFR)	3 hours before fixed validity time of the effected forecast; i.e. up to 211500 UTC for forecast valid 211800 UTC	Yes. Always issued as a complete set of forecasts (all PNGs/all BUFR)	3 hours before fixed validity time of the effected forecast; i.e. up to 211500 UTC for forecast valid 211800 UTC	No
WAFC London SIGWX PNG					
WAFC Washington SIGWX BUFR	Yes. Always issued as a complete set of forecasts (all PNGs/all BUFR)	3 hours before fixed validity time of the effected forecast; i.e. up to 211500 UTC for forecast valid 211800 UTC	Yes. Always issued as a complete set of forecasts (all PNGs/all BUFR)	3 hours before fixed validity time of the effected forecast; i.e. up to 211500 UTC for forecast valid 211800 UTC	No
WAFC Washington SIGWX PNG					
WAFC London WAFS GRIB2	N/A	N/A	Yes. Always issued as a complete set of data (all GRIB2 files)	Only issued between T+06:30 and T+08:30. Re-transmit never commencing after T+07:00 ²	N/A
WAFC Washington WAFS GRIB2	N/A	N/A	Yes. Always issued as a complete set of data (all GRIB2 files)	Only issued between T+06:30 and T+08:30.	N/A

¹ Only for data loss/corruption resulting within processes for which the WAFCs are responsible. Data loss/corruption caused by user's equipment or systems, or due to intermediate third party infrastructure (i.e. user's ISP), will not trigger any re-transmission of data from the WAFCs

² In order to ensure that re-transmit does not interfere with the distribution of the next scheduled WAFC London GRIB2 transmission over SADIS.

It would be expected that:

- a) re-issuance would only be made if the cause of any missing/corrupt data was due wholly to systems and infrastructure under the control and responsibility of the WAFCs. Missing/corrupt data due to local user equipment and/or third party infrastructure would not warrant re-issue of data;
- b) all data from a dataset that is corrected or re-issued will be sent, and bulletins of that dataset will be identified with the same 'CCx' indicator for the symbolic 'BBB' section of the WMO AHL. A partial re-issuance of a dataset will not be made;
- c) with regard to SIGWX forecast re-issuances, only corrections to errors at the time of production will be issued. Amendments to forecasts due to unexpected evolution of the atmosphere or as a result of information that could not have been known at the time of issuance will not be issued;
- d) users should develop their own backup/reversion policies consistent with their business plan (i.e. using a previously issued dataset, or use output from the alternative WAFc);
- e) administrative messages with a specific WMO AHL will be developed with strict formatting that will allow systems to automatically know there has been a re-issue of WAFc products; and
- f) for SIGWX corrections, the existing FXUK65 EGRR and FXUS65 KKCI will continue to be issued in order to provide a simple indication of where corrections have been made; and also, where considered necessary, for voice communication to flight crews.

APPENDIX E

AVAILABILITY TIMES^{1,2} OF WAFS FORECASTS IN GRIB1 AND GRIB2 CODE FORM

	Time that DT 0000 UTC data will be made available on:			Time that DT 0600 UTC data will be made available on:			Time that DT 1200 UTC data will be made available on:			Time that DT 1800 UTC data will be made available on:		
	SADIS 2G	WIFS	Secure SADIS FTP ³	SADIS 2G	WIFS	Secure SADIS FTP	SADIS 2G	WIFS	Secure SADIS FTP	SADIS 2G	WIFS	Secure SADIS FTP
GRIB2	0330-0430	0335-0410	0330-0355	0930-1030	0935-1010	0930-0955	1530-1630	1535-1610	1530-1555	2130-2230	2135-2210	2130-2155
GRIB1	0430-0500	0400-0435	0345-0420	1030-1100	1000-1035	0945-1020	1630-1700	1600-1635	1545-1620	2230-2300	2200-2235	2145-2220
GRIB2 CB, icing and turbulence	N/A ⁴	0500-0510	0520-0530	N/A	1100-1110	1120-1130	N/A	1700-1710	1720-1730	N/A	2300-2310	2320-2330

Note 1.— All these times are well within the availability requirement in Annex 3, Appendix 2, 1.2.1, which is 6 hours after standard time of observation.

Note 2.— The overlapping availability times on WIFS and Secure SADIS FTP allow for some day-to-day variability in availability. In all cases, GRIB2 will be available before GRIB1.

Note 3.— The timings for SADIS FTP (due to be withdrawn 30 November 2012) are the same as that for Secure SADIS FTP.

Note 4.— WAFS GRIB2 forecasts for CB clouds, icing and turbulence are not currently disseminated via satellite.

APPENDIX F

LONG-TERM PLAN OF THE WAFS (2012 TO 2016)

WAFS milestones	WAFSOPSG meeting schedule	Annex 3 amendment cycle
<p>October 2012</p> <p>Adjustment to the time of availability of the WAFS forecasts in GRIB1 code form or the Internet-based services (Conclusion 7/7 refers)</p>		
<p>April 2013</p> <p>WAFS London provides computer-based initial training material on the intended use of WAFS gridded forecasts of CB clouds, icing and turbulence (Conclusion 7/13 refers)</p>		
<p>September 2013</p> <p>Initial concept of operations for the WAFS</p>	WAFSOPSG/8	
<p>November 2013</p> <p>a) WAFS forecasts for CB clouds, icing and turbulence, in grid point format, become operational for flight planning</p> <p>b) Cessation of WAFS forecasts in the WMO GRIB1 code format (Decision 7/9 refers)</p> <p><i>Note.— WAFS forecasts in WMO GRIB1 code form will continue.</i></p>		Amendment 76
<p>July 2014</p> <p>Presentation of concept of operations for the WAFS</p>	ICAO MET Divisional Meeting	
<p>September 2014</p> <p>Implementation of re-issuance policy for WAFS forecasts in WMO GRIB2 code form and WAFS SIGWX forecasts (Conclusion 7/5 refers)</p>		
<p>2015</p> <p><i>No milestone currently expected.</i></p>	WAFSOPSG/9	
<p>2016</p> <p><i>No milestone currently expected.</i></p>	WAFSOPSG/10	Amendment 77

APPENDIX G

TERMS OF REFERENCE

- a) provide advice and guidance to the WAFC Provider States concerning the operation of the WAFS and its effectiveness in meeting current global and, where appropriate, regional operational requirements;
- b) develop proposals for the development of the WAFS in order to ensure that it continues to meet evolving global and, where appropriate, regional operational requirements;

Note.— Such proposals for requirements should be made under ICAO procedures for the amendment of Annex 3.

- c) monitor, assess and provide advice on technological developments relevant to the WAFS to ensure that full advantage may be taken of such technologies to maintain and, where possible, improve the cost-effectiveness of the WAFS, and develop appropriate proposals, as necessary, for the adoption of such technologies;
- d) liaise with the MET advisory groups to the PIRGs regarding progress by States in their capability to receive/decode/process WAFS output products in the GRIB and BUFR code forms, and any other binary codes that may be used in the WAFS in the future. Based on information received, provide advice as necessary to ICAO, and through ICAO to WMO, regarding training and/or guidance material that may be required to ensure that all States have the opportunity to use WAFS output products regardless of the present or future mode of coding and/or transmission;
- e) advise the WAFCs in the development and use of appropriate WAFS output performance indicators;
- f) monitor the WAFS output to ensure that both the appearance of the output and location of systems in areas of overlap are harmonized;
- g) liaise with the SADISOPSG and the MET advisory groups to the PIRGs regarding the global distribution of WAFS data and products; and
- h) make regular progress reports to the Air Navigation Commission.

COMPOSITION

The WAFSOPSG should comprise representatives from the world area forecast centre (WAFC) Provider States, one of the ex-regional area forecast centre (RAFC) Provider States from each region, user States that provided members to the World Area Forecast System (WAFS) Study Group, a user State from each region, the International Air Transport Association (IATA), the International Council of Aircraft Owner and Pilot Associations (IAOPA), the International Federation of Air Line Pilots' Associations (IFALPA) and the World Meteorological Organization (WMO).

APPENDIX H

DELIVERABLES OF THE WAFSOPSG

<i>Task number</i>	<i>Name</i>	<i>Description</i>	<i>Source</i>
WAFSOPSG-01 (O)	WAFS management reports; reports related to the roll-out of WAFS	Every 18 months, issuance of reports related to: a) W AFC management; b) roll-out of the international satellite communications system; c) roll-out of the plan to migrate to GRIB2; d) roll-out of other aspects of WAFS, as necessary; and e) QMS	MET/02: 1/6; 161-12
WAFSOPSG-02 (O)	Updated ICAO provisions	Development of updated ICAO provisions (Annex 3 SARPS, guidance material and regional procedures) to ensure their compatibility with the evolving world area forecast system	MET/02: 1/6; 161-12; 192-xx
WAFSOPSG-03 (D)	Improvements to resolutions of WAFS forecasts	Improvements to spatial and temporal resolution of WAFS forecasts in the GRIB2 code form by considering adding a vertical level at FL 410 (175 hPa)	129-21; NAT SPG 40/4; WAFSOPSG 3/17; 174-1; 182-8 & 9; 192-xx
WAFSOPSG-04 (D)	Improved WAFS products for cumulonimbus clouds, icing and turbulence	Improved forecast algorithms and WAFS output products for cumulonimbus clouds, icing and turbulence making use of improved model resolution; also consider adding gridded forecasts for terrain-induced turbulence.	MET/02: 1/10; 161-12; WAFSOPSG 3/17; 174-1; APANPIRG 19/43 b); 180-7; WAFSOPSG 1/26; 165-9; 182-8 & 9
WAFSOPSG-05 (D)	Improved visualization of WAFS forecasts in flight documentation	Development of an improved visualization of WAFS forecasts in flight documentation	WAFSOPSG 3/13 b) & 3/19; 174-1
WAFSOPSG-06 (D)	Concept of operations for the WAFS	Development of a concept of operations for WAFS in coordination with MARIE-PT	WAFSOPSG 5/19; 183-1 WAFSOPSG 7/15

O = operational task related to world area forecast system (WAFS)
D = development task related to WAFS