AERODROME METEOROLOGICAL OBSERVING SYSTEMS STUDY GROUP(AMOSSG)

SIXTH MEETING

Exeter, United Kingdom, 17 to 20 October 2006

SUMMARY OF DISCUSSIONS

1. HISTORICAL

1.1 The sixth meeting of the Aerodrome Meteorological Observing Systems Study Group (AMOSSG) was held at the Met Office in Exeter, United Kingdom, 17 to 20 October 2006.

1.2 The meeting was opened by Doug Johnson, Head of Transport Programme at the Met Office, who welcomed the group to Exeter and in particular to the Met Office.

1.3 The names and addresses of the participants are listed in **Appendix A**. Bryan Boase was elected Chairman of the meeting. The meeting was served by the Secretary of the AMOSSG, Neil Halsey, Technical Officer in the MET Section of the Air Navigation Bureau (ANB) of ICAO.

1.4 The meeting considered the following agenda items:

1) Opening of the meeting

2) Election of Chairman

3) Adoption of working arrangements

4) Adoption of the agenda

5) Aerodrome observation requirements

6) Aerodrome forecast requirements

7) Review of the manual on automatic meteorological observing systems at aerodromes

8) Migration to BUFR coded OPMET messages

9) Future work programme

10) Any other business

11) Closure of the meeting

1.5 A list of study notes and information papers issued for the meeting is given at **Appendix B**.

2. AGENDA ITEMS 1 TO 4: OPENING OF THE MEETING; ELECTION OF CHAIRMAN; ADOPTION OF WORKING ARRANGEMENTS; ADOPTION OF THE AGENDA

2.1 These items are covered under Section 1: Historical.

3. AGENDA ITEM 5: AERODROME OBSERVATION REQUIREMENTS

3.1 Amendment 74 to Annex 3

3.1.1 The group recalled that it had assisted the Secretariat in developing elements for draft Amendment 74 to Annex 3 — *Meteorological Service for International Air Navigation* which was expected to be applicable in November 2007, subject to the final review of the Air Navigation Commission and subsequent adoption by the Council. The proposed changes related to aerodrome observations concerned:

a) the enabling of the use of automatic observing systems for METAR/SPECI during the operational hours of an aerodrome;

b) the removal of the attainable accuracy of measurement from Attachment A to Annex 3;

c) the definition of “vicinity”;

d) the alignment of the criteria (for issuance) of SPECI with those for including change groups in TAF;

e) the inclusion of TCU clouds in the criteria for CAVOK;

f) the reduction of the limits which prompt the reporting of wind variations in local reports when noise abatement procedures are applied;

g) the rounding down of the observations of the height of cloud base;

h) the waiving of the requirement of issuing SPECI whenever METAR are issued half-hourly; and

i) the alignment of runway designators in OPMET messages with Annex 14.

3.1.2 The group noted that the draft amendments made concerning Appendix 3, 2.3.2 j), 4.1.5.2 c), 4.5.4.2 e) and f), 4.5.4.4 c), 4.8.1.3, Tables A3-1 and A3-2 were being proposed for a delayed applicability date of 5 November 2008. Once again this was subject to the final review of the Commission and subsequent adoption by the Council and was in response to comments made by States to the State letter AN 10/1-06/02 to allow more time to implement the provisions concerning changes to the aeronautical meteorological codes. This date coincided with the applicability date used by WMO in 2008 for amendments to the codes as it was WMO that was responsible for changes to those codes under the *Working Arrangements between the International Civil Aviation Organization and the World Meteorological Organization* (Doc 7475).

3.1.3 The group recalled the extensive work that had been carried out at the AMOSSG/4 and AMOSSG/5 Meetings in developing the proposals contributing towards draft Amendment 74 to Annex 3 as described above. To this end a number of the tasks of the group were expected to be completed following the adoption of Amendment 74 to Annex 3.

3.1.4 It was also noted by the group that the following three new tasks had been suggested to be progressed with the assistance of the group subject to the approval of the Air Navigation Commission:

a) to study the classification of systems where a human observer provides back-up to an automatic observing system with a view to determining the need for any further provisions or guidance material;

b) to consider the need to upgrade the requirements for issuing SPECI to a Standard considering the safety implications of the provision concerned; and

c) study the situation where the direction in which the minimum visibility occurs is not possible to determine in situations where the minimum visibility is to be reported as well as the prevailing visibility.

They stemmed from the comments received by States on the proposals contained in Amendment 74 to Annex 3.

3.1.5 The group agreed that, if approved by the Air Navigation Commission, the tasks listed above would be considered at the next meeting of the group including any consideration of amendment proposals to Annex 3 or the need for additional guidance material. It was further agreed that **Michel** would provide further information concerning item c) above in order to assist the discussions at the next meeting.

3.2 Information included in meteorological reports

Reporting present and recent weather

3.2.1 The group reviewed the provisions in Chapter 4 and Appendix 3 of Annex 3 relating to the reporting of present weather and recent weather in the light of any developments in the ability of

automatic observing systems to carry out such observations and agreed that no changes were necessary at this time but that a further review would be undertaken at the next meeting of the group.

General review of Chapter 4 and Appendix 3 in view of upgrading Recommended Practices to Standards

3.2.2 The group agreed that a more general review should be undertaken by the group of those provisions that were Recommended Practices to consider whether any of these should be upgraded to Standards as a part of Amendment 75 to Annex 3 which would be expected for applicability in November 2010. It was agreed that it was necessary to carry out such a review to move towards aligning the proportion of Standards to Recommended Practices in Annex 3 to that of the other ICAO Annexes and to promote the global implementation of ICAO provisions, particularly in the EUR Region where some States were likely to not implement Recommended Practices under the Single European Sky legislation. The group agreed that an ad-hoc group should be established whose task outline and membership are given at **Appendix C**. The group agreed that the ad hoc group should consider the methodology to be used in order to develop a suggested list of provisions suitable for upgrade but it noted the suggestion to use the following criteria as overall goals for such a process. Such provisions to be upgraded should contribute to the:

a) support and improvement of the overall safety and efficiency of international aviation (in that order);

b) comprehensive coverage of all relevant requirements and practices of meteorological services for international aviation;

c) provision of a basis for the users of meteorological information to be made aware of significant differences in practices among the States (i.e, compels the filing of a State difference for deviations that are of significance to aviation);

d) modernization and continuous improvement on matters of significance to aviation (a standard is a far more effective incentive than a recommendation);

e) maintenance of the maximum practicable degree of continuity with the current provisions of the Annex; and

f) proceeding towards a mature “end state” in the shortest period of time possible.

3.2.3 In order to assist the group it was suggested that a simple triage process could be carried out to identify those Recommended Practices that were most likely candidates to be upgraded to Standards and those which would be least likely to be able to be upgraded as a first step. Following this a more in depth process could be agreed by the group.

Proposals to amend provisions related to the reporting of prevailing visibility and cloud height

3.2.4 The group may wish to note that the European Air Navigation Planning Group (EANPG) at its forty-seventh Meeting held in Paris, France, 29 November to 1 December 2005 formulated Conclusion 47/33 calling for ICAO to consider reviewing the criteria for reporting of minimum visibility when the prevailing visibility is less than 5 000 m to meet the requirements at aerodromes with mixed IFR and VFR operations and Conclusion 47/34 calling for ICAO to consider amending Annex 3

concerning reporting of cloud base and vertical visibility values up to 300 ft in steps of 50 ft or less in local routine and special reports at aerodromes where low visibility procedures (LVP) are in use.

3.2.5 As a result of the above conclusions the group considered the requirements for reporting minimum visibility when the prevailing visibility is below 5 000 m at aerodromes where mixed IFR and VFR operations take place and instructed the **Secretary** to develop an appropriate amendment to Annex 3 in time for the next meeting for further consideration by the group. The group was aware that such a change to the provisions would de facto lead to a more systematic reporting of minimum visibility which may be contrary to the wishes of some users. Similarly, the group considered the increments used for the reporting of the height of cloud base and vertical visibility at levels below 100 m (300 ft) when LVP is applied and tasked the **Secretary** with developing a draft amendment to Annex 3 for consideration by the group at the next meeting.

Introduction of liquid water content in METAR/SPECI

3.2.6 The group discussed a proposal to introduce provisions to include the liquid water content as an additional element in METAR/SPECI or local reports to assist in the decision making process for de-icing aircraft. It was noted that the current precipitation reporting did not enable the correct decision to be taken in many cases as the correlation between the intensity of precipitations, the precipitation type and the liquid water content was not well known and that it was the liquid water content that was directly related to the severity of airframe icing. It was pointed out to the group that METAR would not be the appropriate mechanism to assist in aerodrome operations such as aircraft de-icing as it was intended for flight planning purposes but that an aerodrome warning could be considered (to be included as an optional parameter) for those States in a position to assess the liquid water content of any precipitation or fog event. The group agreed that the **Secretary** should produce a draft amendment proposal to Annex 3 to introduce the liquid water content together with the precipitation type as an optional parameter in aerodrome warning in the case where icing conditions were in evidence. This amendment proposal would be produced for consideration by the group at the next meeting.

3.2.7 The group agreed that the advice of WMO should be sought on the correlation between liquid water content and precipitation type and intensity inter alia to enable better reporting in local reports and METAR/SPECI and tasked that the **WMO representative** on the group with seeking such guidance by validating or reconstructing the provisional table given below which had been derived from Transport Canada regulations (values of liquid water content expressed in g/dm^2/hour):

Table. Correlation between precipitation type/intensity and liquid water content. (units: g/dm^2/hour or 0.1 mm/hour)

Type	Light	Moderate	Heavy
Freezing Drizzle	< 2.5	2.5 to 5.1	>5.1 with maximum value of 12.7
Freezing Rain	>12.7 to25	>25 to 76	>76
Snow	<10	10 to 25	>25
Freezing Fog*	<2	2 to 5	>5
Rain on cold soaked wing	A range of 5 to 76 is used for all cases		

This guidance will allow the group to consider the intensity thresholds for frozen precipitation that impact users.

Number of visibility reports in local reports

3.2.8 The group noted that the increase in the number of observations of visibility in the local reports was not reflected in the provisions of Annex 11 — *Air Traffic Services* relating to automatic terminal information service (ATIS) as no information was given regarding which measurement should be included in the broadcast. It was agreed that a draft amendment proposal to Annex 11 should be developed by the **Secretary** for consideration at the next meeting. It was further agreed that such an amendment may also relate to other parameters required in ATIS broadcasts, as appropriate.

Reporting CB obscured by clouds

3.2.9 The group noted that some difficulties were being experienced in the reporting of CB in cases where the CB was obscured by other cloud making it impossible for a human observer to identify the cloud amount or the height of the cloud base. Three options were considered as given below:

a) to use solidi to represent the cloud amount and the height of cloud base, i.e. //////CB;

b) to report the CB as OVC and use the base of the lowest visible cloud as the base of the CB; and

c) to not report the CB.

The group agreed that the first option would be the most appropriate as the use of solidi for reporting clouds by automatic systems was already included in Amendment 74 to Annex 3 and that this solution also provided the most accurate description of the actual situation. It was also agreed that guidance material in the *Manual of Aeronautical Meteorological Practice* (Doc 8896) would be necessary and tasked the **Secretary** with producing such guidance material for consideration by the group at the next meeting as well as developing a draft amendment to Annex 3 enabling the use of solidi in this case for human observers in addition to automatic systems for which the use of solidi was already enabled.

Time of observation

3.2.10 The group noted that many different interpretations of the Annex 3 provisions concerning the actual time of report for METAR and local reports were being used in States. However, the group agreed that being more proscriptive in the Annex 3 provisions, in the case of automatic or semi-automatic systems being used, would not be useful as many State practices would be difficult to change and such a move would merely lead to a proliferation of State differences without adding to safety or efficiency. The group therefore agreed that no action was necessary.

Reporting of winds

3.2.11 The group noted that operational difficulties had been experienced regarding the reporting of winds which had led to the provision of crosswind and tailwind components being provided as supplementary information to enable a more efficient runway selection process. It was pointed out that the assumption that a reported gust had the same directional component as the reported mean speed could lead to significant errors in the calculation of the crosswind and tailwind components and then to an incorrect evaluation of the suitability for a particular runway to be used for operations. It was agreed that no requirement on a global basis could be defined by the group as it would be an airline or air traffic operational requirement. The group further agreed that the advice of air traffic management (ATM)

Section in ICAO should be sought regarding this issue and tasked the **Secretary** with establishing such a coordination process and to report back to the group at the next meeting.

Provision of information to ATS units

3.2.12 The group noted that problems had been encountered in the interpretation of the provisions in Annex 3 for meteorological information to be supplied to air traffic services given in Chapter 10 and Appendix 9. The problems related to the circumstances under which the information should be supplied and whether the information is requested, as necessary, or supplied, or pushed, by the meteorological service provider who was more aware that potential problems caused by meteorological conditions were likely to occur. The group agreed that the **Secretary** should develop a draft amendment to Annex 3 concerning the provisions for meteorological information to ATC and coordinate with **Michel** before providing an amendment proposal for consideration by the group at the next meeting.

3.3 Capability of automatic observing equipment to meet aeronautical requirements

3.3.1 The group recalled that draft provisions were included in Amendment 74 to Annex 3 to allow the use of fully automatic observing systems during the operational hours of an aerodrome following appropriate consultation. It had also been pointed out at the AMOSSG/5 Meeting that consideration had not been given, at that time, to the provisions concerning local routine and special reports which did not contain any options concerning the use of automatic observing systems. To this end the group considered the possibility of developing provisions for the use of such systems for local routine and special reports concentrating on the differences that exist in the requirements, as opposed to those for METAR and SPECI. Those differences largely surrounded the area of coverage under which the observation was applied, namely for the particular runways being used as opposed to the aerodrome in general. The group agreed that the provisions in Annex 3 should be developed to allow the use of fully automatic observing systems in line with those provisions for METAR but that careful consideration should be given to ensure that all of the proposed changes prove to be consistent. To this end the group agreed that the **Secretary** should produce a draft amendment proposal to Annex 3 and circulate it to the group by the end of June 2007 to enable comments from the group to be incorporated ahead of the next meeting of the group.

3.3.2 The group also agreed that the provisions for local special reports should be revised as the criteria for their issuance was not required when automatic feeds of the information was provided in the ATS unit (Annex 3, Appendix 3, 3.2.2 a) refers) and that other users on the aerodrome may have a need of special local reports for those parameters concerned. Furthermore, the use of automatic observing systems would enable the literal use of SPECI criteria and would mean issuing local special reports in cases where the two-minute mean wind speed or one-minute visibility values passed through prescribed thresholds. The group was made aware that in such cases, local special reports could be triggered at frequent intervals, often every two or three minutes, and that as a result the group agreed that the criteria should be revised to be more precise. Additional problems were noted in that no provisions existed in Annex 11 for including those parameters in ATIS messages that are provided to ATS units by a continuous data feed. To this end the group tasked the **Secretary** with developing a draft amendment to Annex 3 and Annex 11 for consideration by the group at the next meeting.

3.3.3 The group agreed that no developments in technology had occurred since the last meeting, or were foreseen, that would have an impact on the current provisions in Annex 3 for the reporting of METAR and SPECI using automatic systems.

3.4 **Requirements for the use of remote sensing techniques**

3.4.1 The group recalled that some discussion had taken place at the AMOSSG/4 and AMOSSG/5 Meetings concerning the potential use of remote sensing techniques to complement automatic observing systems. A further report was provided concerning the introduction of an operational system to use remote sensing (radar and lightning detection) to identify the presence of CB at, or close to the aerodrome automatically and that, after the system was introduced, the users had expressed satisfaction with the indication of the CB/TCU information in AUTO METARs. The group noted that there was no definition concerning the assessment of the distance from the aerodrome that should be considered for the reporting of cloud and that it could be shown that human observers report CB at a distance of as much as 100 km on occasions. However, it was agreed by the group that no standard distance could be identified as the requirement would vary depending on the approach that are designated for each aerodrome but that distances of around 30 km or 40 km had been tentatively selected as the best approximations to provide consistency with human observations.

3.4.2 The group noted a request for guidance material on the supply and use of radar and satellite imagery by pilots and ATC personnel. It was noted that such guidance could be provided in Doc 8896 to assist in the supply of such information but that coordination would be necessary with ATM Section in order to establish a need for such guidance. To this end the group agreed that the **Secretary** should seek the advice of ICAO experts on the need for such guidance.

3.5 **Agreed action by the group**

The group agreed to:

a) task **Michel** with providing further information concerning situations where the direction of the minimum visibility cannot be determined when the minimum visibility was required to be reported as well as the prevailing visibility at the next meeting of the group;

b) create an ad hoc group to propose any Recommended Practices in Chapters 2 , 4 and 6 and Appendices 3 and 5 that could be upgraded to Standards with a task description and membership given in **Appendix C**;

c) task the **Secretary** to develop an appropriate amendment to Annex 3 concerning the reporting of minimum visibility whenever the prevailing visibility was below 5 000 m in time for the next meeting for further consideration by the group;

d) task the **Secretary** with developing a draft amendment to Annex 3 concerning the reporting increments for the height of cloud base when below 100 m (300 ft) in local reports for consideration by the group at the next meeting;

e) task the **WMO representative on the group** with validating the relationship between precipitation type/intensity and liquid water content;

f) task the **Secretary** to produce a draft amendment proposal to Annex 3 to introduce liquid water content together with precipitation type in the case where icing conditions were in evidence for consideration by the group at the next meeting;

g) task the **Secretary** to produce a draft amendment proposal to Annex 11 for the ATIS provisions concerning the inclusion of multiple visibility measurements;

h) task the **Secretary** with producing guidance material concerning the reporting by human observers of CB embedded in other clouds for consideration by the group at the next meeting as well as developing a draft amendment to Annex 3 enabling the use of solidi in this case for human observers, as required;

i) task the **Secretary** with establishing a coordination process with ATM Section within ICAO to consider the requirement for additional crosswind and tailwind information to assist in runway selection and to report back to the group at the next meeting;

j) task the **Secretary** with developing a draft amendment to Annex 3 concerning the enabling of the provision of local reports using fully automatic observing systems and circulate it to the group for comment by the end of June 2007 to enable a more mature amendment proposal to be developed in time for the next meeting;

k) task the **Secretary** with developing a draft amendment to Annex 3 concerning the specification of criteria for the issuance of special local reports and Annex 11 concerning the use of parameters provided to ATS by continuous data feeds for ATIS messages by the next meeting for consideration by the group; and

l) task the **Secretary,** in coordination with **Michel** with developing a draft amendment to Annex 3 concerning the provisions for meteorological information to ATC in time for the next meeting.

4. AGENDA ITEM 6: AERODROME FORECAST REQUIREMENTS

4.1 Amendment 74 to Annex 3

4.1.1 The group recalled that it had assisted the Secretariat in developing elements for draft Amendment 74 to Annex 3 which was expected to be applicable in November 2007, subject to the final review of the Air Navigation Commission and subsequent adoption by the Council. The proposed changes related to aerodrome forecast requirements concerned:

a) the update of the operationally desirable accuracy of forecasts as given in Attachment B to Annex 3;

b) the validity period of TAF, inter alia, to enable TAF of validity period up to 30 hours; and

c) other miscellaneous, mainly editorial amendments.

4.1.2 The group noted that the draft amendments made for changes in paragraphs 6.2.6 and 6.2.7; and Appendix 5, 1.2.4, 1.3 i), Tables A5-1, A5-2 and Example A5-1 were being proposed for a delayed applicability date of 5 November 2008. Once again this was subject to the final review of the Commission and subsequent adoption by the Council and was in response to comments made by States to the State letter AN 10/1-06/02 to allow more time to implement the provisions concerning changes to the

aeronautical meteorological codes. This date coincided with the applicability date used by WMO in 2008 for amendments to the codes as it is WMO that was responsible for changes to those codes under the *Working Arrangements between the International Civil Aviation Organization and the World Meteorological Organization* (Doc 7475).

4.1.3 The group recalled the extensive work that had been carried out at the AMOSSG/4 and AMOSSG/5 Meetings in developing the proposals contributing towards draft Amendment 74 to Annex 3 as described above. To this end a number of the tasks of the group were expected to be completed following the adoption of Amendment 74 to Annex 3.

4.1.4 It was also noted by the group that the following three new tasks had been suggested to be progressed with the assistance of the group:

a) to study the cases where the issuance of a TAF cancels the previous TAF in existence to avoid confusion, particularly when a TAF amendment is issued in the intervening period between the issuance of a new TAF and that TAF becoming valid;

b) to consider the appropriateness of providing VV/// as an option for forecasting vertical visibility in TAF; and

c) consider aligning the presentation of the desirable accuracy of forecasts given in Attachment B to Annex 3 with the TAF change group criteria.

These tasks stemmed from the comments received by States on the proposals contained in Amendment 74 to Annex 3 and were still that were subject to the approval of the Air Navigation Commission.

4.1.5 The group agreed that, if approved by the Air Navigation Commission, the tasks listed above would be considered at the next meeting of the group including any consideration of amendment proposals to Annex 3 or the need for additional guidance material.

4.2 The desirable level of accuracy of forecasts

4.2.1 The group recalled that consideration had been given to the establishment of a requirement for defining the desirable accuracy of forecasts of the intensity of precipitation at the AMOSSG/5 Meeting. The group agreed that this task should be considered at the next meeting of the group with a view to incorporating the potential new task given in 4.1.4 above and that **Kimberley** and **Jeff** should be tasked with establishing whether there is a user requirement for establishing a desirable level of accuracy for the forecasting of precipitation intensity.

4.3 Future requirements for aerodrome forecasts

4.3.1 The group noted that the WMO CAeM Management Group had made a proposal for consideration by the forthcoming 13th Session of the CAeM that an expert team on the future of aerodrome forecasts and TAF in particular be established. The group supported the proposal in principle; however, it emphasized that the work of such an expert team should principally relate to the development of methodology on how to meet the aeronautical requirements stated by ICAO, in accordance with the *Working Arrangements between the International Civil Aviation Organization and the World Meteorological Organization* (Doc 7475). Therefore, any proposals from the new expert team which could be considered a candidate for a future requirement should be made known to the AMOSSG for further assessment (as to whether it constitutes a genuine aeronautical requirement). Furthermore, the

group wished to encourage any WMO expert team to not limit their deliberations to forecasts intended for flight planning (i.e. TAF) but to consider the needs of ATM and other aerodrome users as developing technologies could be considered by the AMOSSG in the light of the needs of all aeronautical users.

4.4 RVR forecasting

4.4.1 The group was aware that it had been a longstanding task of the group to monitor the development of techniques for the forecasting of runway visual range (RVR). Two reports were noted by the group on progress made towards the forecasting of RVR. It was agreed by the group that it was of critical importance that the assessment of RVR in a consistent manner was required before such forecasts could be considered and that the upgrading of some of the provisions for assessing RVR to Standards should be considered by the ad hoc group discussed in 3.2.2 above. Furthermore, the group agreed that it would be necessary to improve the forecasting of visibility before reliable forecasts of RVR could be derived from these forecasts.

4.4.2 The group agreed that further progress was being made by States in the forecasting of visibility, thus, RVR and that consideration of such progress should be made at the next meeting of the group.

4.5 Agreed action by the group

The group agreed to task **Kimberley** and **Jeff** with providing user input concerning whether a desirable level of accuracy for forecasting precipitation intensity should be established at the next meeting of the group.

5. AGENDA ITEM 7: REVIEW OF THE MANUAL ON AUTOMATIC METEOROLOGICAL OBSERVING SYSTEMS AT AERODROMES

5.1 The group was pleased to note that the *Manual on Automatic Meteorological Observing Systems at Aerodromes* (Doc 9837) had been completed by the ICAO editorial Section and that it was due for release in November 2006.

5.2 It was agreed that a general review of the manual should be undertaken by the group which would take place alongside work carried out by the **Secretary** in ensuring that the provisions included in Amendment 74 to Annex 3 were reflected in the manual. It was agreed that any proposals for updates to the manual should be sent to the **Secretary** by the end of April 2007 and that the resulting draft update should be circulated to the group for comment in view of publication as a draft version on the ICAO website ahead of the implementation date of Amendment 74 in November 2007. The group was reminded that any comments provided should be specific and in the form of precise instructions concerning the suggested changes to the text.

5.3 It was noted that in providing comments, the group would take the comments received from WMO and circulated to the group in March 2006 into consideration.

5.4 The group noted a report concerning difficulties experienced in the frequent pollution of wind measurements by passing aircraft despite best efforts being made to site anemometers appropriately. It was agreed by the group that perfect siting of anemometers was not possible at all aerodromes and further agreed that guidance on the appropriate use of algorithms to detect and, if necessary remove,

spurious measurements, caused by passing aircraft, should be included in the manual. However, it was stressed that the guidance should also emphasize that every effort should be made to site anemometers so as to avoid such occurrences and that the use of such algorithms should be a last resort. The group agreed to task **Cho-Ming** in coordination with **Dennis** with producing draft guidance material for consideration by the group in line with the timescales given in 5.2 above.

5.5 A further report was noted indicating an alternative algorithm to detect marked discontinuities in wind measurements and the group agreed that this algorithm, given in **Appendix D** should be included in the manual as an additional example.

5.6 The group recalled that **Pekka** had been tasked with providing information on instrument specifications for consideration as material to include in the manual. Following the presentation of draft material it was agreed that such material, once developed fully, would be circulated to the group for comment and that it should be included in the chapter related to quality issues with the technical specifications included as an appendix. The group suggested that this material should contain approximately ten pages of material and that it should be circulated to the group for comment by the end of November 2006.

5.7 **Agreed action by the group**

The group agreed to:

a) send amendment proposals to the manual to the **Secretary** by the end of April 2007 taking the comments received from WMO into account;

b) task **Cho-Ming** in coordination with **Dennis** with providing draft material on algorithms for the removal of spurious wind measurements caused by passing aircraft to the **Secretary** by the end of April 2007; and

c) task **Pekka** with providing instrument specifications for inclusion in the manual and to circulate to the group for comment by the end of November 2006.

6. AGENDA ITEM 8: MIGRATION TO BUFR CODED OPMET MESSAGES

6.1 The group recalled that following Recommendation 2/5 of the MET Divisional Meeting (2002) WMO had produced a migration plan concerning the use of table-driven codes for the dissemination of METAR/SPECI and TAF. Furthermore, the group recalled that a more detailed global plan for the progression of the migration for aeronautical meteorological codes had been agreed at the AMOSSG/5 Meeting. Draft Amendment 74 to Annex 3, subject to the final review by the Air Navigation Commission and the adoption by the Council was expected to enable the first stage of this process by allowing the exchange of OPMET information using table-driven codes between States under bilateral agreements and in addition to the exchange in the traditional alphanumeric codes. The group agreed that the **Secretary** should be tasked with developing an amendment to Annex 3 for consideration by the group at the next meeting that would enable the next stage of the migration and would apply to the exchange between the regional OPMET databanks and the uplink sites for satellite distribution system for information relating to air navigation (SADIS) and international satellite communications system (ISCS) as outlined in the appendix. The group further agreed that the migration plan should be updated as given in **Appendix E**.

6.2 The group recalled that the AMOSSG/5 Meeting had tasked the **Secretary** with seeking reassurances from the WMO Expert Team on Data Representation and Codes that an unambiguous mapping could be obtained between the BUFR code and the traditional alphanumeric codes for METAR-SPECI and TAF as well as for SIGMET. The group noted that this issue had been raised at the Joint Meeting of the Expert Team on Data Representation and Codes and the Coordination Team on the Migration to Table-Driven Codes held in Montreal, Canada, 8 to 12 May 2006. The WMO meeting had agreed that to avoid any potential problems regarding the conversion of units aeronautical codes could use the units of measurement as given in Annex 3 directly in the BUFR code thus eliminating any difficulties in converting from standard SI units to those used in Annex 3. It had also been pointed out that no ambiguity could exist as the data precision requirements are given in Annex 3 and were also given in the BUFR code tables provided for the exchange of METAR/SPECI so that all necessary information for the unambiguous conversion had also been readily available.

6.3 The group noted that the European Air Navigation Planning Group (EANPG) at its forty-seventh Meeting held in Paris, France, 29 November to 1 December 2005 had formulated a conclusion inviting ICAO to consider a review of the transition from alphanumeric codes to BUFR-coded OPMET messages in particular with respect to the possibility of reducing the negative impact on the aviation community and to bring the BUFR code issue and in particular safety issues to the consideration of the relevant WMO bodies. It was noted that the concerns expressed by the EANPG were largely with regard to the substantial work required in the telecommunications area.

6.4 The group agreed that it would not be helpful to raise issues questioning the concept of migration to table-driven codes to the technical bodies established by WMO as those bodies were tasked with only considering the technical aspects of the migration. However, it was noted that such concerns could be raised by WMO Members at the forthcoming Commission for Basic Systems Meeting to be held in Seoul, Republic of Korea, in November 2006 as under the *Working Arrangements between the International Civil Aviation Organization and the World Meteorological Organization* (Doc 7475), it is the role of WMO to specify the codes to be used for the exchange of aeronautical meteorological information.

6.5 **Agree action by the group**

The group tasked the **Secretary** with developing an appropriate amendment to Annex 3 to introduce a Recommended Practice for the use of BUFR for the exchange of METAR/SPECI and TAF between the international OPMET databanks for consideration by the group at the next meeting.

7. AGENDA ITEM 9: FUTURE WORK PROGRAMME

7.1 The group noted that the future work programme of the group was likely to change during the week following the meeting and that it would not be prudent to revise the programme until the outcome of the Air Navigation Commission's final review of Amendment 74 proposals was known. The group therefore agreed thatthe work programme should be updated by the **Secretary** two weeks after the meeting and circulate to the group for comment.

7.2 **Agreed action by the group**

The group agreed to task the **Secretary** to update the work programme of the group two weeks after the meeting and circulate to the group for comment.

8. AGENDA ITEM 10: ANY OTHER BUSINESS

8.1 The group and the **Secretary,** on behalf of ICAO, wished to express its appreciation to the United Kingdom, and the Met Office in particular, for providing excellent facilities for the meeting.

8.2 It was agreed that owing to the extensive list of tasks to be considered by the group that it would be necessary to hold a further meeting and that the next meeting should tentatively be held at the ICAO headquarters in Montreal, Canada in June 2008.

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APPENDIX A

LIST OF PARTICIPANTS

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APPENDIX B

LIST OF DOCUMENTATION

Study Notes

Doc No.	Presented by	Title	Agenda Item
SN 1	Secretary	Provisional agenda	4
SN 2	Secretary	Overview of progress with respect to aerodrome observation requirements	5
SN 3	Secretary	Overview of progress with respect to aerodrome forecast requirements	6
SN 4	Secretary	Overview of progress with respect to the review of the manual on automatic meteorological observing systems at aerodromes	7
SN 5	Secretary	Overview of progress with respect to the migration to BUFR coded OPMET messages	8
SN 6	Secretary	Updating the future work programme of the group	9
SN 7	B. Maynard	Emerging requirement for a new aerodrome forecast product	6
SN 8	Secretary	Final review of Amendment 74 to Annex 3 by the Air Navigation Commission	10
SN 9	B. Maynard	Standards development processes	5.1
SN 10	B. Maynard	Meteorological information in support of de-icing and anti-icing operations	5.1
SN 11	B. Maynard	Prerequisites for RVR forecasting	6
SN 12	M. Leroy	Operational flight information service broadcast of meteorological parameters, in particular visibility	5.1
SN 13	M. Leroy	Introduction by Météo-France of automatic notification of convective phenomena in auto METAR	5.3
SN 14	C.M. Cheng	Automatic detection of marked discontinuity in wind data	7
SN 15	C.M. Cheng	Removal of artificial gusts in surface wind measurements at aerodromes	5.1
SN 16	A. Wells	The reporting of obscured CBS in METARS and local reports	5.1
SN 17	M. Leroy	ICAO Annex 3 SARPs related to convective events: Possibilities for improvement	5.3
SN 18	P. Utela	Reporting practices in METARs and local reports with AWOS	5.1
SN 19	D. Hart	The development of provisions or guidance for wind components	5.1

Information Papers

Doc No.	Presented by	Title	Agenda Item
IP 1	Secretary	General information	3
IP 2	B. Maynard	Risk estimation of a weather related scenario	6
IP 3	Secretary	RVR forecasting	6

List of Documentation in Order of Agenda Item

Agenda Item	Doc No.
3	IP 1
4	SN 1
5	SN 2, SN 9, SN 10, SN 12, SN 13, SN 15, SN 16, SN 17, SN 18, SN 19
6	SN 3, SN 7, SN 11, IP 2, IP 3
7	SN 4, SN 14
8	SN 5
9	SN 6
10	SN 8

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APPENDIX C

AD HOC GROUP TO CONSIDER THE RAISING OF RECOMMENDED PRACTICES IN ANNEX 3 TO STANDARDS

1. The group consisting of Bill (rapporteur), Bryan, Cho-Ming, Colin, Dennis, Jeff, Kimberley, Michel, Steve and representatives from ASECNA (subject to confirmation) and WMO (subject to confirmation) will examine the Recommended Practices in Chapters 2, 4 and 6 of Annex 3 as well as Appendices 3 and 5 with a view to suggesting those which could be upgraded to Standards. The **Secretary** will provide advice and assistance as deemed necessary by the group.

2. The group is expected to work by correspondence to:

a) agree to an appropriate methodology to carry out such an assessment by the end of June 2007; and

b) provide a list of suggested provisions to the **Secretary** by the end of December 2007.

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APPENDIX D

NEW ALGORITHM

a) To take into account a change in direction of 30°, the instantaneous directions should not be used directly, since rapid changes reach and often top 30°, without any overall change in wind direction;

b) an MD must be maintained for at least 2 minutes, so the mean wind must be used over 2 minutes (speed and direction);

c) calculate ff2 and DD2, the mean speed and direction values over the last 2 minutes;

d) calculate ff8 and DD8, the mean speed and direction values over 8 minutes, calculated 2 minutes before (meaning that it does not take into account the last 2 minutes). To limit calculations, it is also possible to use the mean values over 10 minutes, calculated 2 minutes before. The result will not differ much and the mean values over 10 minutes are usually calculated regularly;

e) compare DD2 with DD8/DD10. If both mean directions differ by more than 30° and the mean wind before or after (ff2 or ff8/ff10) is above 10 kt, there is an MD (at 2 minutes ago). However, if 2-minute wind direction variation ≥ 60°, then discard MD and go to step c);

f) compare ff2 with ff8/ff10. If the absolute difference is above 10 kt, there is an MD (at 2 minutes ago). However, if 2-minute wind direction variation ≥ 60°, then discard MD and go to step c); and

g) if an MD is detected, note the moment it occurs, in order to calculate the successive mean values. When the MD is detected, the last values calculated over 2 minutes must be used for the mean values. The following minute, the parameters will be calculated over a period of 3 minutes, then 4, until the normal 10-minute period is caught up with.

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APPENDIX E

OUTLINE FOR THE MIGRATION TO THE USE OF BUFR CODED OPMET MESSAGES

1. AMENDMENT 74 TO ANNEX 3 (2007) (COMPLETED)

1.1 Provisions to allow the use of BUFR coded METAR/SPECI and SIGMET in addition to alphanumeric dissemination between States under bilateral agreement.

2. AMENDMENT 75 TO ANNEX 3 (2010)

2.1 Provisions for the exchange of OPMET data in BUFR between the International OPMET databanks in Brasilia, Brussels, Dakar (yet to be implemented), Pretoria (yet to be implemented), Toulouse, Vienna and Washington and the Regional OPMET databanks in Bangkok, Brisbane, Nadi, Singapore and Tokyo as well as the satellite distribution system for information relating to air navigation (SADIS) and international satellite communications system (ISCS) uplink sites. These provisions should be as recommended practices.

3. AMENDMENT 76 TO ANNEX 3 (2013)

3.1 Provisions in 2.1 above to become standards.

3.2 Provisions for all States to issue OPMET data in BUFR to the appropriate OPMET databank. These provisions would be as recommended practices.

4. AMENDMENT 77 TO ANNEX 3 (2016)

4.1 Provisions in 3.2 above to become standards.

Note.— Consideration should be given to the use of the public Internet.

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