



AERODROME METEOROLOGICAL OBSERVATION AND FORECAST STUDY GROUP(AMOFSG)

SEVENTH MEETING

Montréal, 9 to 12 September 2008

SUMMARY OF DISCUSSIONS

1. HISTORICAL

1.1 The seventh meeting of the Aerodrome Meteorological Observation and Forecast Study Group (AMOFSG), formerly known as the Aerodrome Meteorological Observing Systems Study Group (AMOSSG) was held at the International Civil Aviation Organization (ICAO) Headquarters in Montreal, Canada, 9 to 12 September 2008.

1.2 The meeting was opened by Dr Olli Turpeinen, Chief of the MET/AIM Section on behalf of the Director of the Air Navigation Bureau of ICAO who welcomed the group to Montréal and emphasized the important and complex nature of the tasks contained within the proposed agenda of the meeting.

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 AMOFSG, Neil Halsey, Technical Officer in the MET/AIM Section 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 observations
- 6) Aerodrome forecasts
- 7) Units of measurement

- 8) OPMET exchange and dissemination
- 9) ATS requirements for meteorological information
- 10) Future work programme
- 11) Any other business
- 12) Closure of the meeting

1.5 A list of study notes and information papers issued for the meeting is given in **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 OBSERVATIONS**

3.1 **General requirements for meteorological observations at aerodromes**

3.1.1 The group recalled from the AMOSSG/6 Meeting that some discussions had taken place concerning the use of a liquid water equivalent parameter in aerodrome observations as well as in determining the precipitation rate. It had been noted by the group that the definitions of the precipitation rate in terms of liquid water equivalent would fall under the role of the World Meteorological Organization (WMO) under the *Working Arrangements between the International Civil Aviation Organization and the World Meteorological Organization* (Doc 7475). It was noted that WMO had already established thresholds for precipitation rates (i.e. light, moderate and heavy) in WMO regulatory material expressed in terms of mm per hour. However, the group was made aware of operational research that had developed alternative thresholds relating to precipitation rate that related more directly to airframe icing rather than the more generic values offered by WMO. The group noted that WMO would most likely not support a proposal to change their current guidance on the precipitation rate scheme for intensity considering the wider user community. However, one member of the group considered it appropriate for WMO to consider the divergence in the scheme as presented in the AMOSSG/6 Meeting summary of discussions.

3.1.2 Furthermore, it had been agreed at the AMOSSG/6 Meeting that liquid water content should be included as a requirement in Annex 3 — *Meteorological Service for International Air Navigation* as a part of aerodrome warnings. However, the group agreed that such requirements would be more appropriate to local routine and special reports. It was noted that if such a need were deemed to be a national requirement in those States wishing to make use of liquid water content measurements then use could be made of a remarks section of METAR/SPECI which was not disseminated internationally and was therefore not part of Annex 3. The following action was agreed by the group:

Action agreed 7/1 Enabling the reporting of liquid equivalent water equivalent in local routine and special reports

That, a proposal to enable the reporting of liquid water equivalent in local routine and special reports, included in **Appendix C** be forwarded by the Secretary as part of draft Amendment 75 to Annex 3.

3.2 Requirements for remote-sensing equipment at aerodromes

3.2.1 The group considered the need for Annex 3 provisions or guidance material on the use of remote sensing equipment in the vicinity of aerodromes. In particular, an outline of potential requirements for information derived from lightning detection systems based in the vicinity of an aerodrome was provided. Any such consideration should take into account the ability of States to provide such information as well as the nature and format of the data that would be required if any draft amendment proposals to Annex 3 were to be included as a part of Amendment 75 in 2010 and it was agreed that there were no proposals mature enough for consideration at that stage.

3.3 Requirements for present and recent weather phenomena in meteorological reports

3.3.1 The group noted that the European Air Navigation Planning Group (EANPG) at its 49th Meeting held in Paris, 27 to 29 November 2007 in its Conclusion 49/45 had invited ICAO to consider the reporting of conditions where non-super cooled rain freezes on impact with the ground. In consideration of this conclusion it could be suggested that the definition of freezing precipitation could be adjusted to incorporate such circumstances. However, this was likely to be a controversial topic which could take many years to resolve if an amendment to the formal definition were to be made bearing in mind the role of WMO (and its Commissions) under the working arrangements with ICAO. The group considered the creation of a new present weather element to encompass such circumstances, however, the group felt that such a proposal was not mature and would need further consideration with a view to developing a solution in time for Amendment 76 to Annex 3 in 2013.

3.4 Reporting of tornadoes and waterspouts

3.4.1 An inconsistency was noted in that Appendix 1, MODEL A of Annex 3 relates to the reporting of +FC which is not indicated in Table A3-2. The group was informed that two States utilize +FC to indicate the presence of a tornado or waterspout as opposed to a funnel cloud. The group felt that given the significant operational difference between the two it would be useful to stipulate this distinction in Annex 3. The group did concur that the same should not apply to the reporting of dust devils as currently indicated in Appendix 1, MODEL A to Annex 3. The following action was agreed:

Action agreed 7/2 Reporting or tornadoes and waterspouts

That, a proposal to distinguish between funnel clouds and tornadoes and waterspouts by the use of +FC in METAR, SPECI and local reports, included in **Appendix C** be forwarded by the Secretary as part of draft Amendment 75 to Annex 3 and the deletion of reference to dust whirls in Appendix 1 for the attention of WMO.

3.5 Reporting of recent weather

3.5.1 Some discussion took place regarding the need for reporting recent weather in METAR/SPECI with some members of the group indicating that there is no perceived need for recent weather reporting in their State. However, some members of the group argued that this would only be the case where SPECI were issued which would cater for the situations whereby a recent shower would be made known to users through the SPECI but not in the following METAR. As the group could not reach a consensus on this issue no changes to the provisions of Annex 3 were agreed pending further consideration at the next meeting.

3.6 Use of fully automatic observing systems for local reports

3.6.1 The group recalled that following the introduction of the use of fully automatic observing systems during operational hours for the issuance of METAR/SPECI (as a part of Amendment 74 to Annex 3) it had been considered to be appropriate by the AMOSSG/6 Meeting to create draft provisions to allow similar use for the issuance of local routine and special reports. The group considered that no additional provisions would be necessary in the case of local routine and special reports in view of any perceived shortcomings of fully automatic observing systems over and above the requirements already catered for in METAR/SPECI. The group is invited to agree the following action:

Action agreed 7/3 Amendment to Annex 3 regarding the use of fully automatic observing systems for the issuance of local routine and special reports

That, the proposal to amend Annex 3 regarding the use of fully automatic observing systems for the issuance of local routine and special reports contained in the appendix to SN/18 be included as a part of draft Amendment 75 by the Secretary together with any additions considered necessary by the group.

3.7 The reporting of minimum visibility

3.7.1 The group recalled that it had been agreed at the AMOSSG/6 Meeting that an amendment proposal to Annex 3 should be developed to require the reporting of minimum visibility whenever the prevailing visibility was below 5 000 m to meet the requirements at aerodromes with mixed IFR and VFR operations. The group was reminded that it had also been noted at the AMOSSG/6 Meeting that this

proposal would de facto lead to a more systematic reporting of the minimum visibility which may be contrary to the wishes of some users since there would be a risk that the minimum visibility would be used as the criteria for landing minima. On reflection the group agreed that this proposal should not be pursued.

3.7.2 Some discussion took place regarding a proposal of referring to the aerodrome reference point (ARP) in determining the direction of minimum visibility. Concern was expressed in the error in translating the observed direction of minimum visibility at the point of human observer into that at the ARP. The group also noted that ARPs at some aerodromes are not located at the centre of the aerodrome. The group agreed that this proposal should not be pursued.

3.8 Ranges and resolution for visibility

3.8.1 The group noted some ambiguity in the ranges and resolution for the reporting and forecasting of visibility as given in Tables A3-4, A3-5 and A5-3 where the values at the extreme of each range were repeated in the next range throughout. The group agreed that this should be rectified and agreed the following action:

**Action agreed 7/4 Amendment to Annex 3 regarding the
ranges and resolution of visibility in
observations and forecasts**

That, the proposal to amend Annex 3 regarding the ranges and resolution of visibility in observations and forecasts contained in **Appendix C** be included as a part of draft Amendment 75 by the Secretary together with any additions considered necessary by the group.

3.9 Slant visual range

3.9.1 A report was provided noting a gap between (a) the air traffic management (ATM) requirement for visibility representative of the direction of approach and landing as stipulated in para 6.6.4 (c) of *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444) and (b) the reporting of visibility representative of conditions along the runway the touchdown zone as stipulated in para 4.6.2.2 in Annex 3. The group was made aware that certain ATM personnel is assessing and using slant visual range (SVR) to address the gap. The group noted that the task on SVR was dropped from the work programme by the Air Navigation Commission (ANC) following a lack of progress by States over the past decade or more and no mature proposals are considered likely in the foreseeable future. However, the group felt that it would be useful if any consideration could be given to the scientific issues involved in observing slant visual range and wished to encourage States, and particularly WMO to investigate methodologies.

3.9.2 Before a mature proposal in determining SVR is available, there is a proposal of a short-term solution of reporting prevailing visibility in supplementary information in LRR/LSR for inclusion in ATIS. However, at the CNS/MET SG/12 Meeting of APANPIRG, it was advised that in the current provisions of Annex 3, prevailing visibility should be reported in the METAR/SPECI and the proposed inclusion in the local routine and special report would not be appropriate. Nevertheless, the meeting was advised that, if States wish to pursue this short-term solution, they may do so by way of a

local arrangement with the ATS authority concerned without the need to revise the LRR/LSR template in Table A3-1 of Annex 3.

3.10 Reporting increments for the height of cloud base

3.10.1 The group recalled that the AMOSSG/6 Meeting had agreed that an amendment proposal to Annex 3 should be developed to reduce the reporting increments for the height of cloud base in local and special reports when it was below 100 m (300 ft) to assist operations when low visibility procedures (LVP) were being applied. The group agreed that operations were being penalized using the current reporting increments when LVP were applied when compared to practices in some States where a finer reporting resolution is used for local reports. Therefore the group considered it appropriate to enable the use of a finer resolution under such circumstances subject to local agreement with the authorities concerned. The group agreed the following action:

Action agreed 7/5 Amendment to Annex 3 regarding the reporting increments for height of cloud base when it is below 100 m (300 ft)

That, the proposal to amend Annex 3 regarding the reporting increments of height of cloud base when it is below 100 m (300 ft) contained in the **Appendix C** be included as a part of draft Amendment 75 by the Secretary, together with any additions considered necessary by the group.

3.11 Ceilometer siting

3.11.1 A report was provided noting some difficulties in complying with the requirements of Annex 3 regarding the siting of ceilometers for use in local reports and specifically where reference is made to the middle marker and the relevant decision heights. The group agreed that the issue of providing suitable siting for an array of ceilometers to assess the representation of decision height should be addressed by WMO with a view to generating some technical guidance in the future to assist States. The following actions were agreed:

Action agreed 7/6 Representation of decision height using an array of ceilometers

That, **Herbert** arrange for a study to be carried out by WMO into whether an array of appropriately sited ceilometers could be used to be representative of the decision height and to report back to the group as necessary.

Action agreed 7/7 Guidance on the siting of ceilometers

That, **Kees** provide draft guidance material on the siting of ceilometers for consideration by the group at the next meeting.

3.12 Semi-automatic observing systems

3.12.1 The group was aware that it had been assigned a task to study the classification of automatic observations backed up by a human observer by the Air Navigation Commission (ANC) during the final review process of Amendment 74 to Annex 3. The group agreed that since Annex 3 requires that automatic equipment was used for wind observations, as a minimum, there were only two types of observation i.e. fully automatic and semi-automatic since a fully manual observation would not meet the requirements of Annex 3. It could therefore be suggested that there was no need to provide any guidance for such practices that have been routinely carried out for many years on a global basis. The group is therefore agreed the following action:

Action agreed 7/8 Deletion of task 8

That, task 8 of the AMOFSG regarding studying the classification of automatic observations backed up by a human observer is not considered necessary and that the task should be deleted.

3.13 Study into the upgrading of Recommended Practices to Standards

3.13.1 The group recalled that an ad hoc group had been established at the AMOSSG/6 Meeting in order to review the Recommended Practices in Annex 3 relating to aerodrome observations and forecasts with a view to identifying any that would be suitable for consideration to be upgraded to Standards.

3.13.2 The group noted that provisions relating to quality management had not been included in the proposal as more general requirements to upgrade quality management procedures had already been identified in connection with the development of safety management systems carried out by ICAO. This amendment was to be processed separately.

3.13.3 The group also considered that increasing emphasis was being placed on the specific and verifiable nature of ICAO Standards. As a result, the group discussed the proposals made by the ad hoc group in light of the language used in each provision to ensure that compliance with any new Standard could be appropriately demonstrated. A small number of the proposals made were not supported by the group in this regard.

3.13.4 The group noted that whilst the majority of provisions proposed for upgrading related to aerodrome observations there were some that related to trend forecasts and TAF. It was considered prudent to include the whole proposal under this agenda item for convenience.

3.13.5 The group agreed that further use of the study would be beneficial although a total re-examination of Annex 3 would not be necessary. The information already extracted by the ad hoc group could be studied with those provisions selected being checked to see if some would be appropriate for upgrading to Standards perhaps after rewording and splitting.

3.13.6 The group agreed the following actions:

Action agreed 7/9 Amendment to Annex 3 regarding the upgrading of Recommended Practices to Standards

That, the proposal to amend Annex 3 regarding the upgrading of Recommended Practices to Standards contained in **Appendix C** be included as a part of draft Amendment 75 by the Secretary, together with any additions considered necessary by the group.

Action agreed 7/10 Ad hoc group to consider output from the work carried out to select provisions to upgrade to Standards

That, an ad hoc group consisting of **Bill (Rapporteur), Colin, Tom, Bryan, Steve, Herbert, Hervé** and **CM** study the output from the ad hoc group created at the AMOSSG/6 Meeting with a view to refining the provisions selected to examine whether any would be suitable for upgrading to Standards if rewording or splitting were carried out.

3.14 Reporting of the direction of minimum visibility when it cannot be determined

3.14.1 The group noted proposals regarding this task which had been introduced by the ANC during the final review process of Amendment 74 to Annex 3. The group noted that it was equally likely that the direction of the minimum visibility could not be observed by a human observer as would be the case for an automatic system thus rendering the abbreviation “NDV” obsolete if the requirement to report this direction were to be given when possible. In view of this proposal the group agree the following action:

Action agreed 7/11 Amendment to Annex 3 regarding the reporting of the direction of minimum visibility

That, the proposal to amend Annex 3 regarding the reporting of the direction of minimum visibility in **Appendix C** be included as a part of draft Amendment 75 by the Secretary, together with any additions considered necessary by the group.

3.15 Reporting of freezing fog in extremely low temperatures

3.15.1 The group was reminded that freezing fog technically contains supercooled liquid as a part of its definition and that this raised issues when extremely low temperatures are experienced. Furthermore, this meant that operationally different decisions would most likely be made under the circumstances whereby no supercooled liquid was present. The group agreed that further discussion on this issue would be useful at the next meeting of the group with a view to issuing guidance to those States affected.

3.16 Accuracy requirements for reporting present weather

3.16.1 The group recalled that some discussion had taken place at the AMOSSG/6 Meeting regarding the need for developing desirable levels of accuracy for the reporting of present weather. No progress had been possible since the AMOSSG/6 Meeting although the group felt that a proper review of user needs could be undertaken at the next meeting following the expected publication of new guidance from WMO.

3.17 Definition of area of observation

3.17.1 Further discussion took place regarding the definition of “at the aerodrome” linked to the definition of vicinity which has been a topic of much debate over recent meetings of the group. The group agreed that further consideration of this topic could be conducted at the next meeting.

3.18 Manual on the use of automatic observing systems at aerodromes

3.18.1 The group noted that all of the modifications provided by members of the group to the *Manual on Automatic Meteorological Observing Systems at Aerodromes* (Doc 9837) had been incorporated along with other minor amendments following the adoption of Amendment 74 to Annex 3. The group did not deem it necessary to provide any further updates to this document aside from making it compatible with Annex 3 following Amendment 75 in 2010. However, it was agreed that a further review should be made at the next meeting of the group.

3.19 Criterion for reporting gusts in SPECI

3.19.1 A report was provided noting certain conditions under which a significant increase in gusts merited a SPECI but existing SPECI criterion for gusts precluded so because gust was not reported in the previous METAR. The group concurred with the need to report gusts under such conditions and agreed the following action:

Action agreed 7/12. Amendment to Annex 3 regarding the SPECI criterion for gust reporting

That, the proposal to amend Annex 3 regarding the SPECI criterion for gust reporting contained in **Appendix C** is included as a part of draft Amendment 75 by the Secretary.

4. AGENDA ITEM 6: AERODROME FORECASTS

4.1 Guidance on the desirable level of accuracy of forecasts

4.1.1 The group noted that a need had been established to consider aligning the desirable accuracy of forecasts at aerodromes, contained in Attachment B to Annex 3 with the TAF amendment criteria to render any verification process more straightforward for those States wishing to do so. This need had been established by the ANC during the final review of Amendment 74 to Annex 3. The group agreed that, since the criteria given in Attachment B to Annex 3 cannot simply be scaled to fit the TAF amendment criteria, an ad hoc group should be established to consider the thresholds given and the desirable levels of accuracy for each threshold. The ad hoc group could be expected to provide a report for the next meeting of the group and should include user input with a view to incorporating any suggested changes as a part of draft Amendment 76 to Annex 3. Therefore, the group agreed to the following:

Action agreed 7/13 Ad hoc group to consider the alignment of Attachment B to Annex 3 with the TAF amendment criteria

That, an ad hoc group consisting of **Bryan (Rapporteur), Steve, Hervé, Colin, Bill** and **CM** be created to consider the alignment of Attachment B to Annex 3 with the TAF amendment criteria and the updating of the Attachment criteria for precipitation forecasts and provide a report for the next meeting of the AMOFSG.

Note. — Based on this proposal, a draft amendment to Annex 3 will be developed.

4.1.2 Furthermore, the group recalled that, as a response to a longstanding task of the group, it had been agreed at the AMOSSG/6 Meeting that some consideration should be given to the updating of the desirable level of accuracy for precipitation forecasts in Attachment B. The group agreed that further consideration should be given by the above group specifically concerning precipitation forecasts. It was also noted that it would be desirable that this work take into consideration the attainable accuracy of meteorological observations to meet any revised forecasting criteria.

4.2 **Optimization of the period of validity and update cycle of TAF**

4.2.1 The group noted that the European Air Navigation Planning Group (EANPG) at its 49th Meeting held in Paris, 27 to 29 November 2007 had formulated its Conclusion 49/44 in which it had invited ICAO to consider optimizing the period of validity and update cycle of TAF. It was noted that following Amendment 74 to Annex 3 in which it had been stipulated, at the request of users, that only one TAF should be valid at any one time at a given aerodrome any further changes to the Annex 3 provisions should be considered carefully. The group therefore agreed that an ad hoc group should be formed to consider any necessary proposals and report back to the next meeting of the group.

4.2.2 The group also noted that the ANC, as a part of the final review of Amendment 74 to Annex 3, had sought to clarify the provisions relating to the issuance of a TAF automatically cancelling previously issued TAF in order to avoid any ambiguity. An amendment proposal to Annex 3 addressing such concerns was provided for consideration by the group but it was felt that further consideration by the ad hoc group would be appropriate to avoid confusion in regions where there is limited lead time between the issuance and commencement of the forecast validity period.

4.2.3 Further issues were discussed concerning the problems encountered in some States where a number of aerodromes routinely close overnight and in particular for those aerodromes that are expected to be provided with 24 hour TAF which led to lengthy periods of redundancy in the forecast. The group agreed that these issues would also form a part of the deliberations of the ad hoc team.

Action agreed 7/14 Ad hoc group to consider the optimization of the TAF validity period and update cycle

That, an ad hoc group consisting of **Colin (Rapporteur), Steve, Bill, Michel** and **Bryan** be created to consider the optimization of the TAF validity period and update cycle and provide a report for the next meeting of the AMOFSG.

4.3 **The need for using “VV///” in TAF for vertical visibility**

4.3.1 The group noted that the ANC had referred the consideration of the need for the use of “VV///” in TAF during the final review of Amendment 74 to Annex 3. It was suggested that such a use would be redundant as far as TAF and trend forecasts were concerned. The group identified circumstances whereby it was appropriate to use “VV///” in TAF and considered that it was used operationally in several States. As a result the group considered it appropriate to retain its use in Table A5-1.

4.4 **Criteria related to TAFs**

4.4.1 The group noted the inconsistency with WMO relating to the reporting of “other weather phenomena” as defined in App 5, parp 1.2.3, and also its applicability when it related to a significant change in visibility. To remove this inconsistency and to make the upgraded provision more clear, the group agreed to remove the reference to changes in visibility and to permit its applicability as agreed by the national meteorological authority in TAF and TREND.

4.4.2 The group also discussed the proposal to upgrade to a Standard the maximum number of change groups permitted. The group felt, in consideration of the requirement for longer TAFs, that such a limit may hinder States ability to provide full details of conditions required in TAF in certain weather conditions. As a result, the group agreed to keep the existing Recommended Practices.

4.5 **Progress in the forecasting of RVR**

4.5.1 The group was aware that it had been a longstanding task of the AMOSSG to study any developments made in the forecasting for RVR with a view to determining whether any Annex provisions or guidance material were sufficiently mature for adoption or publication, respectively. The group agreed that no further action was justified at that time but that the task should remain in the work programme pending further updates at the next meeting of the group.

4.6 **WMO Expert Team on New Terminal Forecasts**

4.6.1 The group was briefed on the progress made by the WMO Expert Team on New Terminal forecasts. The group was pleased to note that significant progress had been made by the team in identifying the generic shortcomings in the provision of meteorological forecast information but also noted that difficulties had been encountered in obtaining information concerning user needs, particularly in the area of ATM. The group agreed that in order to obtain a consolidated view from the ATM community a formal link would be necessary between the expert team and an appropriate ICAO body dealing with ATM requirements. To this end the group agreed the following action:

Action agreed 7/15 Letter from WMO to ICAO requesting a formal dialogue between the Expert Team on the New Terminal Forecast and an appropriate body dealing with ATM requirements

That, **Herbert** arrange for a letter to be sent from WMO to ICAO seeking formal dialogue between the ET (NTF) and an ICAO body dealing with ATM requirements.

4.6.2 Furthermore, the group agreed that since ATM requirements would only form a subset of the expected future requirements it would be beneficial to establish an ad hoc working group to coordinate user input and guide the work of the WMO expert team from the requirements perspective. To this end the following action was agreed:

Action agreed 7/16 Ad hoc group to coordinate the work of the WMO ET (NTF) from the requirements perspective

That, an ad hoc group consisting of **Herbert (Rapporteur)**, **Steve** and **Dennis** be established with terms of reference given in **Appendix D** in order to coordinate the work of the WMO ET (NTF) from the requirements perspective.

Note. — Advisors would be expected to participate in the work of the group as deemed necessary by the members of the group

4.7 Inconsistencies in the inclusion of significant weather and the use of towering cumulous (TCU) in TAF

4.7.1 The group was made aware of a potential ambiguity in the Annex 3 provisions regarding the inclusion of significant weather in TAF. Specifically, the inclusion of light precipitation is permitted by the use of “-” in Table A5-1 which could only be accommodated by way of “other weather phenomena if they are expected to cause a significant change in visibility”. This would also apply to the inclusion of BR and HZ in the list of permitted phenomena. The group noted that the ambiguity lies in the use of the word “change” which could imply that these phenomena should only be used in change groups within the forecast. The group considered that it would be prudent to enable any weather phenomena to be given in the forecast irrespective of its effect on visibility provided that such additional phenomena were agreed with the local operators and that similar provision should be made for additional phenomena in trend forecasts. Furthermore, it was noted that the provisions for the forecasting of cloud did not reflect the inclusion of towering cumulus, in addition to cumulonimbus, in line with the provisions already in place for aerodrome observations. The group agreed that this oversight should be rectified as a part of the upcoming amendment to Annex 3. Accordingly, the group agreed to the following action:

Action agreed 7/17 Enabling any additional weather phenomena in TAF and trend forecasts by agreement with the operators concerned and including towering cumulus alongside cumulonimbus as a forecast requirement in TAF

That, a proposal to enable additional weather phenomena in TAF and trend forecasts by agreement with the operators concerned and the inclusion of towering cumulus as well as cumulonimbus as a forecast requirement in TAF, included in **Appendix C** be forwarded by the Secretary as part of draft Amendment 75 to Annex 3.

4.8 **Trend forecasts in SPECI from automatic systems**

4.8.1 The group noted that some problems had arisen in preparing trend forecasts for SPECI where fully automatic observing systems were providing aerodrome observations. Particular problems had occurred due to the tendency for automatic systems to produce more frequent SPECI and that in fluctuating meteorological situations (e.g. showers) trend forecasts would require frequent amendment and it was perceived that little useful information was being provided to users under such circumstances. Therefore, the group agreed the following action:

Action agreed 7/18 Trend forecasts in SPECI from automatic systems

That, information on problems encountered in issuing trend forecasts in SPECI where automatic systems provide more frequent SPECI and potential solutions be provided to **Kees** by 30 June 2009 and **Kees** to provide a collated study note for consideration at the next meeting of the group.

4.9 **Forecast temperatures**

4.9.1 The attention of the group was drawn to the potential ambiguity in temperature forecasts in TAF with the advent of 30 hour forecasts in that two daily maxima/minima could be expected in a single forecast. However, it was noted that multiple maxima/minima could occur over forecast periods of less than 24 hours and the group agreed that the current wording of the provisions did allow for more than one maxima/minima to be produced under those circumstances. It was also noted that the NTF may provide a better long-term solution to the provision of temperature forecasts in the aerodrome environment.

4.10 **Ad hoc group considering the upgrading of Recommended Practices to Standards**

4.10.1 The results of the work of the ad hoc group looking into the potential for upgrading Recommended Practices to Standards are provided under Agenda Item 5 covering both observations and forecasts for the sake of convenience.

5. **AGENDA ITEM 7: UNITS OF MEASUREMENT**

5.1 The group noted that the ASIA/PAC Air Navigation Planning and Implementation Regional Group (APANPIRG) at its eighteenth meeting held in Bangkok, Thailand, 3 to 7 September 2007 had formulated Conclusion 18/51 in which it had sought to replace kilometres per hour by metres per second as the SI unit of measurement of wind speed in ICAO annexes. The conclusion had subsequently been noted by the ANC which had tasked the Secretariat, with the assistance of the AMOFSG, to develop the corresponding amendment to Annex 5 — *Units of Measurement to be Used in Air and Ground Operations*.

5.2 The group noted that there were no States known to the Secretariat making use of kilometres per hour as the unit of measurement for wind speed whereas some States (including two major States) filed differences to the Annex 3 provisions relating to the units of measurement for wind speed as they used metres per second. Furthermore, metres per second was the standard SI unit recommended by the WMO for the reporting and forecasting of wind speed.

5.3 **Appendix C** contains a draft amendment proposal to Annex 5 which specifies the units of measurement to be used in all ICAO provisions which was agreed by the group. The group noted that many ICAO annexes contained multiple references to the reporting, forecasting and operational procedures involving wind speed. In order to avoid unnecessary repetition, it was proposed to describe the amendments to Annex 3, Annex 6 — *Operation of Aircraft*, Annex 11, Annex 16 — *Environmental Protection* as well as the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444) and the *Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS, Doc 8168) by way of an overriding editorial note rather than specifying each individual occurrence. Furthermore, the group noted that the draft proposal stipulated, as had been advised by the ANC, a conversion factor of 1 metre per second being equivalent to 2 knots which was a closer relationship than the approximate relationship (1 knot = 2 km/h) that had been adopted in most ICAO annexes between kilometres per hour and knots. It was noted that there would be no change to the wind speeds specified in knots in any current provisions in all ICAO annexes and that the values in m/s would be inferred from those expressed in knots, i.e. it is only the unit conversions that would be restated and no operational values in knots would be changed.

5.4 The group was made aware that the International Federation of Air Line Pilots' Associations (IFALPA) felt that it was not desirable to have more than one acceptable unit of measurement for the reporting and forecasting of wind speed but that the proposed change to permit the use of m/s was preferable to the potential for the future use of km/h.

Action agreed 7/19 Amendment to Annex 5 regarding units of measurement for wind speed

That, the proposal to amend Annex 5 regarding the units of measurement for wind speed given in **Appendix E** be processed by the Secretary along with consequential amendments to Annexes 3, 6, 11 and 16 and PANS-ATM and PANS-OPS as well as any other annex found to contain reference to wind speed units.

5.5 It was noted that the draft amendment proposal to Annex 5 contained in **Appendix E** would be sent to States and International Organizations for consideration with consequential amendments to Annexes 3, 6, 11, 16, PANS-ATM and PANS-OPS using editorial notes only.

6. **AGENDA ITEM 8: OPMET EXCHANGE AND DISSEMINATION**

6.1 A comprehensive update on progress made in this area, contained in **Appendix F**, was provided in the form of an information paper which had been presented to the WMO Commission for Basic Systems Expert Team on Data Representation and Codes and the Coordination Team on Migration to Table-Driven Code Forms 1 to 5 September 2008.

6.2 The group noted that pending the outcome of the work described in **Appendix F** no consideration of these issues was possible.

6.3 The group was given a presentation concerning the European Organisation for the Safety of Air Navigation (EUROCONTROL) information management activities with specific regard to the meteorological components of those activities. It was noted that strenuous efforts were being made to harmonize that work with that being carried out under the US NextGen programme and was closely tied to the European SESAR programme.

7. **AGENDA ITEM 9: ATS REQUIREMENTS FOR METEOROLOGICAL INFORMATION**

7.1 The group recalled that the AMOSSG/6 Meeting had agreed to actions in the area relating to the provision of meteorological information to ATS as summarized below:

- a) the need for the inclusion of multiple visibility measurements in automatic terminal information service (ATIS);
- b) criteria for the issuance of local special reports and the use of information given by continuous display by ATS;
- c) the need for additional crosswind and tailwind information to assist in runway selection;
- d) the general meteorological requirements for ATM;
- e) the effects of gusts in the calculation of crosswind and tailwind components, and
- f) update rate for wind information in ATS units.

7.2 **Multiple visibility measurements in ATIS**

7.2.1 It had been noted at the AMOSSG/6 Meeting that the possibility of providing more than one wind report had existed in the provisions concerning ATIS in Annex 11 — *Air Traffic Services* but that no similar provisions had existed for the reporting of multiple visibility measurements. The group agreed that visibility (and RVR) should be dealt with in a similar manner to wind and that the draft amendment proposal to Annex 11 contained in **Appendix C** should be processed accordingly. It was noted that similar provisions could be provided in Annex 11 concerning the height of cloud base but the

group agreed that multiple ceilometer measurements would not be appropriate in the ATIS broadcast considering the potential increase in the length of the broadcast.

Action agreed 7/20 Amendment to Annex 11 regarding multiple visibility measurements in ATIS

That, the proposal to amend Annex 11 regarding visibility measurement in ATIS contained in **Appendix G** be forwarded by the Secretary.

7.3 Criteria for local special reports and the use of meteorological information displays by ATS

7.3.1 The group noted that following consultation with the ATM Section of ICAO the current provisions regarding the issuance of local special reports were supported, i.e. that such reports are not considered necessary for those elements that were provided by means of displays in the ATS units, (i.e. wind as a minimum). In other words Annex 3, Appendix 3, 3.2.2 a) was supported without the need for amendment or clarification. The use of the display information by ATS is considered in the next section of this report.

7.4 ATM requirements including the effects of gusts in the calculation of crosswind and tailwind components

7.4.1 The group noted that the Air Traffic Management Requirements and Performance Panel (ATMRPP) was tasked with examining the needs of the ATM community for the future and that an outline concept for those needs had been developed by that group. As a high-level concept it was clearly stated that meteorological requirements would play an important role and that the group would move forward and start to identify the more basic requirements for both en-route and terminal area capacity and safety issues. Clearly, this panel would need advice in the area of meteorology and input from the meteorological community would be an important component. It had been agreed that in addition to the members of that group being able to seek such input from within their own States there would be specific input through the Secretariat. The ATMRPP expected to begin looking at the general requirements from 2009 onwards.

7.4.2 In view of the above the group agreed that the development of detailed requirements would not be ideal at that stage when a comprehensive plan was in place to study the requirements in depth. Furthermore, the group agreed that important input could be expected from the WMO CAeM Expert Team on New Terminal Forecasts which was likely to be able to identify tools to assist in this regard in similar timescales to the work of the ATMRPP. The group also noted that the majority of the elements likely to fulfil the needs of the ATM community would fall under the category of forecast requirements as discussed under Agenda Item 6 above.

7.4.3 Recalling a near-miss case of an aircraft being hit by extremely strong crosswind gusts while attempting to make landing in early 2008, a report was provided raising the need for crosswind information in SPECI, TAF and TREND forecast. The group recalled that a new provision in Amendment 74 was made to address the effects of gusts on landing aircraft arising from turbulence associated with airport buildings when the application of noise abatement procedures renders the use of the runway concerned under crosswind/tailwind conditions. At the AMOSSG/6 Meeting it had been

agreed that the requirements for additional information on crosswind and tailwind would be investigated in relation to runway selection by ATS units. The group noted that there are currently no requirements in either Annex 11 or Doc 4444 for the provision of any information regarding crosswind and tailwind information which would imply that the creation of provisions specifying detailed information such as the effects of gusts on these components may be premature. However, it was noted that some limited provisions existed in Doc 8168 which expected that gusts would be taken into consideration when calculating crosswind components. The group agreed that the creation of provisions or guidance on the effects of gusts on crosswind and tailwind components was not appropriate until an operational need for such information is identified by the ATS community as a global requirement but that a clear determination of the usefulness of additional information from users would be essential before any development of further requirements could be envisaged. It was suggested that any product in this regard could be expected to be in the form of a warning which may require consideration by the Meteorological Warnings Study Group (METWSG) if felt appropriate by the group at the next meeting. Therefore, the group agreed the following action:

Action agreed 7/21 Assessment of user requirements for additional information on crosswind and tailwind components including the effects of gusts

That, **Tom** provides a study note for the next meeting of the group expressing the need for additional information on crosswind and tailwind with specific regard to the effects of gusts.

Note.— The effects of gusts to be studied may include the natural variation of the wind, or disruption of the wind by buildings in the vicinity of the airport.

7.5 Update rate of wind displays in ATS units

7.6 The group recalled that the need for guidance on the use of data supplied by continuous displays in the ATS units had been identified at the AMOSSG/6 Meeting. The group considered proposals relating to the averaging period of the various elements that are required to be provided by display in the ATS units thus negating the need to provide local special reports. It was noted by the group that there was no guidance on the updating of ATIS in the case that the elements were provided using displays and that common practice did vary between the States represented by members of the group. The group agreed that it would be beneficial to collate information concerning the common practices for consideration at the next meeting and agreed the following action to that end:

Action agreed 7/22 Updating of information provided by display in ATS units and practices used to update ATIS in this regard

That, **members** provide details of common practice for the update of displays in ATS units and ATIS to **Michel** by 30 June 2009 and **Michel** provides a study note collating the information at the next meeting of the group.

8. AGENDA ITEM 10: FUTURE WORK PROGRAMME

8.1 Noted the future work programme in Appendix H containing the deliverables to be progressed by the Secretariat with the assistance of the AMOFSG (The group noted that Deliverables 2, 6, 11, 16 and 18 were proposed for deletion).

9. AGENDA ITEM 11: ANY OTHER BUSINESS

9.1 A brief note was provided for the information of the group concerning problems encountered involving low level temperature inversions by IFALPA. It was explained to the group that this issue had previously been considered by the Meteorological Warnings Study Group (METWSG) and that following the advice of that group the ANC had instructed the Secretariat not to pursue the issue. However, the group was made aware that IFALPA intended to raise the issue once again to allow the ANC to reconsider its decision in this regard.

9.2 The group agreed that considering the extensive workload contained in the actions agreed from the meeting that a further meeting would be necessary. The group was pleased to note an offer to host the meeting in Melbourne, Australia from 15 February 2010 and that a decision regarding whether a four or five day meeting was appropriate could be made by correspondence towards the end of 2009 depending on the expected number of issues for consideration. In view of the increased distance for travel necessary for many members of the group it was agreed that the offer to host the meeting in Australia would only be accepted if no objections were provided to the Secretary by 26 September 2008 to allow the members of the group time to consult with their respective authorities. It was, however, accepted that significant benefits could be derived from hosting the meeting in the southern hemisphere given that only one member of the group was currently representative of the southern half of the globe.

9.3 The meeting was closed by Olli Turpeinen and the group thanked Bryan Boase for his extensive efforts in chairing the meeting which had involved numerous complex issues and an extensive workload for the group.

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	Tasks relating to aerodrome observations	5
SN 3	Secretary	Tasks relating to aerodrome forecasts	6
SN 4	Secretary	Units of measurement for wind speed	7
SN 5	Secretary	OPMET exchange and dissemination	8
SN 6	Secretary	ATS requirements for meteorological information	9
SN 8	C.M. Cheng	Presentation of visibility data in local routine/special reports	5
SN 9	Bill Maynard	Reporting of tornadoes	5
SN 10	Steve Albersheim and Bill Maynard	Requirement for liquid water equivalent reporting during operations under icing conditions	5
SN 11	Bill Maynard	Reporting of recent weather	5
SN 12	Bill Maynard	Reporting of freezing fog	5
SN 13	Kees Blom	Cloud base measurement for precision approach runways	5
SN 14	Herbert Puempel	Future terminal forecast development	6
SN 15	Colin Hord	Cancellation of TAFS prior to closure of aerodrome	6
SN 16	Colin Hord	Production of 24-hr TAFS at all United Kingdom aerodromes	6
SN 17	Kees Blom	Lightning detection in support of airport authority decision making	5
SN 18	Secretary	Draft amendment proposal to Annex 3	5, 6, 9
SN 19	Kees Blom	Including significant weather and TCU in TAF	6
SN 20	Michel Leroy	Indication of direction of minimum visibility when it cannot be identified	5
SN 21	Michel Leroy	Rounded steps for the height of cloud base in case of low visibility procedure	5
SN 22	Michel Leroy	Updating period of local reports, especially in automated mode	5
SN 23	Bill Maynard	Altimeter setting reports and quality assurance	5
SN 24	Kees Blom	Trend forecast	6
SN 25	Bryan Boase	Aerodrome forecast (TAF) format - temperature group	6
SN 26	Bryan Boase	Graphical area for which the TAF and METAR are	5. 6

defined

Information Papers

Doc No.	Presented by	Title	Agenda Item
IP 1	Secretary	Working arrangements for the meeting	-
IP 2	Colin Hord	Provision of TAFs based upon AUTO METARs	6
IP 3	Tom Fahey	The need to use liquid equivalent precipitation rates for snowfall rate & freezing drizzle rate	5
IP 4	Tom Fahey	Snowfall rate thresholds for light, moderate and heavy	5
IP 5	Bill Maynard	Report from the rapporteur of the Annex 3 recommendations task group	5, 6
IP 6	Bill Maynard	A comparison of RVR and visibility reports	6
IP 7	Colin Hord	Additional guidance for aerodrome MET inspections	5
IP 8	C.M. Cheng	Criterion for reporting gusts in SPECI	5
IP 9	C.M. Cheng	Provision of information on crosswind in SPECI, TAF and TREND forecast	5
IP 10	Sue O'Rourke and Bryan Boase	Automated thunderstorm alert service	5, 6
IP 11	C.M. Cheng	ATC requirement for visibility reporting	5
IP 12	Michael Leroy	Discussion about the observation of cloud layers and the location of ceilometer(s)	5
IP 13	Dennis Hart	EUROCONTROL information management activities	5, 6

List of Documentation in Order of Agenda Item

Agenda Item	Doc No.
4	SN 1
5	SN 2, SN 8, SN 9, SN 10, SN 11, SN 12, SN 13, SN 17, SN 18, SN 20, SN 21, SN 22, SN 23, SN 26, IP, 3, IP 4, IP 5, IP 7, IP 8, IP 9, IP 10, IP 11, IP 12, IP 13
6	SN 3, SN 14, SN 14, SN 16, SN 18, SN 19, SN 24, SN 25, SN 26, IP 2, IP 5, IP 6 IP 10, IP 13
7	SN 4
8	SN 5
9	SN 6, SN 18

APPENDIX C

NOTES ON THE PRESENTATION OF THE PROPOSED AMENDMENT TO ANNEX 3

The text of the proposed amendment is arranged to show deleted text with a line through it and new text highlighted with grey shading as shown below:

1. ~~text to be deleted is shown with a line through it~~ text to be deleted
2. new text to be inserted is highlighted with grey shading new text to be inserted
3. ~~text to be deleted is shown with a line through it~~ followed by the new text which is highlighted with grey shading new text to replace existing text

**PROPOSED AMENDMENT TO
INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES**

**METEOROLOGICAL SERVICE
FOR INTERNATIONAL AIR NAVIGATION**

**ANNEX 3
TO THE CONVENTION OF INTERNATIONAL CIVIL AVIATION**

SIXTEENTH EDITION — JULY 2007

PART I. CORE SARPs

...

**CHAPTER 4. METEOROLOGICAL OBSERVATIONS
AND REPORTS**

4.1 Aeronautical meteorological stations and observations

...

4.1.4 **Recommendation.**— Each Contracting State ~~should~~ **shall** arrange for its aeronautical meteorological stations to be inspected at sufficiently frequent intervals to ensure that a high standard of observation is maintained, that instruments and all their indicators are functioning correctly, and that the exposure of the instruments has not changed significantly.

Note — Guidance on the inspection of aeronautical meteorological stations including the frequency of inspections is given in the Manual on Automatic Meteorological Observing Systems at Aerodromes (Doc 9837).

...

**4.7 Reporting meteorological information
from automatic observing systems**

4.7.1 **Recommendation.**— *Local routine and special reports and METAR and SPECI from automatic observing systems should be used by States in a position to do so during non-operational hours of the aerodrome, and during operational hours of the aerodrome as determined by the meteorological authority in consultation with users based on the availability and efficient use of personnel.*

Note.— Guidance on the use of automatic meteorological observing systems is given in the Manual on Automatic Meteorological Observing Systems at Aerodromes (Doc 9837) .

4.7.2 Local routine and special reports and METAR and SPECI from automatic observing systems shall be identified with the word “AUTO”.

...

CHAPTER 6. FORECASTS

...

6.2 Aerodrome forecasts

6.2.1 An aerodrome forecast shall be prepared by the meteorological office designated by the meteorological authority concerned. The aerodromes for which aerodrome forecasts are to be prepared and their period of validity shall be determined by regional air navigation agreement.

...

APPENDIX 3. TECHNICAL SPECIFICATIONS RELATED TO METEOROLOGICAL OBSERVATIONS AND REPORTS

(See Chapter 4 of this Annex.)

...

2. GENERAL CRITERIA RELATED TO METEOROLOGICAL REPORTS

...

2.2 Use of CAVOK

When the following conditions occur simultaneously at the time of observation:

- a) visibility, 10 km or more, and the lowest visibility is not reported;

Note 1.— In local routine and special reports, visibility refers to the value(s) to be reported in accordance with 4.2.4.2 and 4.2.4.3; in METAR and SPECI, visibility refers to the value(s) to be reported in accordance with 4.2.4.4; and

Note 2. — The lowest visibility is reported in accordance with Appendix 3, 4.2.4.4 a).

...

2.3 Criteria for issuance of local special reports and SPECI

...

2.3.2 SPECI shall be issued whenever changes in accordance with the following criteria occur:

- a) when the mean surface wind direction has changed by 60° or more from that given in the latest report, the mean speed before and/or after the change being 20 km/h (10 kt) or more;
- b) when the mean surface wind speed has changed by 20 km/h (10 kt) or more from that given in the latest report;
- c) when the variation from the mean surface wind speed (gusts) has increased by 20 km/h (10 kt) or more from that at the time of the latest report, the mean speed before and/or after the change being 30 km/h (15 kt) or more;
- d) when the onset, cessation or change in intensity of any of the following weather phenomena or combinations thereof occurs:
 - freezing precipitation
 - moderate or heavy precipitation (including showers thereof)
 - thunderstorm (with precipitation);
- e) when the onset or cessation of any of the following weather phenomena or combinations thereof occurs:
 - freezing fog
 - thunderstorm (without precipitation);
- f) when the amount of a cloud layer below 450 m (1 500 ft) changes:
 - 1) from SCT or less to BKN or OVC; or
 - 2) from BKN or OVC to SCT or less.

2.3.2—3 **Recommendation.**— *SPECI should be issued whenever changes in accordance with the following criteria occur:*

- ~~a) when the mean surface wind direction has changed by 60° or more from that given in the latest report, the mean speed before and/or after the change being 20 km/h (10 kt) or more;~~
- ~~b) when the mean surface wind speed has changed by 20 km/h (10 kt) or more from that given in the latest report;~~
- ~~c) when the variation from the mean surface wind speed (gusts) has increased by 20 km/h (10 kt) or more from that given in the latest report, the mean speed before and/or after the change being 30 km/h (15 kt) or more;~~
- ~~da) when the wind changes through values of operational significance. The threshold values should be established by the meteorological authority in consultation with the appropriate ATS authority and operators concerned, taking into account changes in the wind which would:~~

- 1) *require a change in runway(s) in use; and*
 - 2) *indicate that the runway tailwind and crosswind components have changed through values representing the main operating limits for typical aircraft operating at the aerodrome;*
- e)** *when the visibility is improving and changes to or passes through one or more of the following values, or when the visibility is deteriorating and passes through one or more of the following values:*

- 1) *800, 1 500 or 3 000 m; and*
- 2) *5 000 m, in cases where significant numbers of flights are operated in accordance with the visual flight rules;*

Note 1.— In local special reports, visibility refers to the value(s) to be reported in accordance with 4.2.4.2 and 4.2.4.3; in SPECI, visibility refers to the value(s) to be reported in accordance with 4.2.4.4.

Note 2 — Visibility refers to “prevailing visibility” except in the case where only the lowest visibility is reported in accordance with Appendix 3, 4.2.4.4 b).

- f)** *when the runway visual range is improving and changes to or passes through one or more of the following values, or when the runway visual range is deteriorating and passes through one or more of the following values: 150, 350, 600 or 800 m;*

- g)** *when the onset, cessation or change in intensity of any of the following weather phenomena or combinations thereof occurs:*

- ~~—freezing precipitation~~
- ~~—moderate or heavy precipitation (including showers thereof)~~
- ~~—thunderstorm (with precipitation)~~
- duststorm
- sandstorm;

- h)** *when the onset or cessation of any of the following weather phenomena or combinations thereof occurs:*

- ice crystals
- ~~—freezing fog~~
- low drifting dust, sand or snow
- blowing dust, sand or snow
- ~~—thunderstorm (without precipitation)~~
- squall
- funnel cloud (tornado or waterspout);

- i)** *when the height of base of the lowest cloud layer of BKN or OVC extent is lifting and changes to or passes through one or more of the following values, or when the height of base of the lowest cloud layer of BKN or OVC extent is lowering and passes through one or more of the following values:*

- 1) *30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft); and*
- 2) *450 m (1 500 ft), in cases where significant numbers of flights are operated in accordance with the visual flight rules;*

~~j) when the amount of a cloud layer below 450 m (1 500 ft) changes:~~

~~— 1) from SCT or less to BKN or OVC; or~~

~~— 2) from BKN or OVC to SCT or less;~~

~~kg) when the sky is obscured and the vertical visibility is improving and changes to or passes through one or more of the following values, or when the vertical visibility is deteriorating and passes through one or more of the following values: 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft); and~~

~~h) any other criteria based on local aerodrome operating minima, as agreed between the meteorological authority and the operators.~~

Note.— Other criteria based on local aerodrome operating minima are to be considered in parallel with similar criteria for the inclusion of change groups and for the amendment of TAF developed in response to Appendix 5, 1.3.1 k).

2.3.3—4 When a deterioration of one weather element is accompanied by an improvement in another element, a single SPECI shall be issued; it shall then be treated as a deterioration report.

3. DISSEMINATION OF METEOROLOGICAL REPORTS

3.1 METAR and SPECI

...

3.1.3 **Recommendation.**— SPECI representing a deterioration in conditions ~~should~~ **shall** be disseminated immediately after the observation. ~~A SPECI representing an improvement in conditions should be disseminated only after the improvement has been maintained for 10 minutes; it should be amended before dissemination, if necessary, to indicate the conditions prevailing at the end of that 10-minute period.~~ A SPECI representing a deterioration of one weather element and an improvement in another element ~~should~~ **shall** be disseminated immediately after the observation.

3.1.4 **Recommendation.**— *A SPECI representing an improvement in conditions should be disseminated only after the improvement has been maintained for 10 minutes; it should be amended before dissemination, if necessary, to indicate the conditions prevailing at the end of that 10-minute period.*

...

4. OBSERVING AND REPORTING OF METEOROLOGICAL ELEMENTS

...

4.1 Surface wind

4.1.1 Siting

4.1.1.1 **Recommendation.**— Surface wind should be observed at a height of ~~approximately 10 m (30 ft)~~ $10 \pm 1 \text{ m}$ ($30 \pm 3 \text{ ft}$) above the ~~runway(s)~~ ground.

...

4.2 Visibility

...

4.2.4 Reporting

...

4.2.4.4 **Recommendation.**— In METAR and SPECI, visibility should be reported as prevailing visibility, as defined in Chapter 1. When the visibility is not the same in different directions and

- a) when the lowest visibility is different from the prevailing visibility, and 1) less than 1 500 m or 2) less than 50 per cent of the prevailing visibility and less than 5 000 m; the lowest visibility observed should also be reported and, when possible, its general direction in relation to the aerodrome indicated by reference to one of the eight points of the compass. If the lowest visibility is observed in more than one direction, then the most operationally significant direction should be reported; and
- b) when the visibility is fluctuating rapidly, and the prevailing visibility cannot be determined, only the lowest visibility should be reported, with no indication of direction.

~~— 4.2.4.5 **Recommendation.**— In automated METAR and SPECI, when visibility sensors are sited in such a manner that no directional variations can be given, the visibility value reported should be followed by the abbreviation “NDV”.~~

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4.4 Present weather

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4.4.2 Reporting

...

4.4.2.4 **Recommendation.**— In automated ~~local routine and special reports and~~ METAR and SPECI, in addition to the precipitation types listed under 4.4.2.3 a), the abbreviation UP should be used for unidentified precipitation when the type of precipitation cannot be identified by the automatic observing system.

4.4.2.5 In local routine and special reports and in METAR and SPECI, the following characteristics of present weather phenomena, as necessary, shall be reported, using their respective abbreviations and relevant criteria, as appropriate:

Thunderstorm

TS

- Used to report a thunderstorm with precipitation in accordance with the templates shown in Tables A3-1 and A3-2. When thunder is heard or lightning is detected at the aerodrome during the 10-minute period preceding the time of observation but no precipitation is observed at the aerodrome, the abbreviation “TS” should be used without qualification.

Freezing

FZ

- Supercooled water droplets or precipitation, used with types of present weather phenomena in accordance with the templates shown in Tables A3-1 and A3-2.

4.4.2.5—6 **Recommendation.**— *In local routine and special reports and in METAR and SPECI, the following characteristics of present weather phenomena, as necessary, should be reported, using their respective abbreviations and relevant criteria, as appropriate:*

Thunderstorm

TS

- *Used to report a thunderstorm with precipitation in accordance with the templates shown in Tables A3-1 and A3-2. When thunder is heard or lightning is detected at the aerodrome during the 10-minute period preceding the time of observation but no precipitation is observed at the aerodrome, the abbreviation “TS” should be used without qualification.*

Shower

SH

- *Used to report showers in accordance with the templates shown in Tables A3-1 and A3-2. Showers observed in the vicinity of the aerodrome (see 4.4.2.6) should be reported as “VCSH” without qualification regarding type or intensity of precipitation.*

Freezing

FZ

- *Supercooled water droplets or precipitation, used with types of present weather phenomena in accordance with the templates shown in Tables A3-1 and A3-2.*

Blowing

BL

- *Used in accordance with the templates shown in Tables A3-1 and A3-2 with types of present weather phenomena raised by the wind to a height of 2 m (6 ft) or more above the ground.*

...

Editorial Note.— Renumber 4.4.2.6 as 4.4.2.7

4.4.2.7—**8 Recommendation.**— In local routine and special reports and in METAR and SPECI:

- a) one or more, up to a maximum of three, of the present weather abbreviations given in 4.4.2.3 and 4.4.2.5 ~~should~~ **shall** be used, as necessary, together with an indication, where appropriate, of the characteristics and intensity or proximity to the aerodrome, so as to convey a complete description of the present weather of significance to flight operations;
- b) the indication of intensity or proximity, as appropriate, ~~should~~ **shall** be reported first followed respectively by the characteristics and the type of weather phenomena; and
- c) where two different types of weather are observed, they ~~should~~ **shall** be reported in two separate groups, where the intensity or proximity indicator refers to the weather phenomenon which follows the indicator. However, different types of precipitation occurring at the time of observation ~~should~~ **shall** be reported as one single group with the dominant type of precipitation reported first and preceded by only one intensity qualifier which refers to the intensity of the total precipitation.

4.5 Clouds

...

4.5.3 Reference level

Recommendation.—The height of cloud base ~~should normally~~ **shall** be reported above aerodrome elevation. When a precision approach runway is in use which has a threshold elevation 15 m (50 ft) or more below the aerodrome elevation, local arrangements ~~should~~ **shall** be made in order that the height of cloud bases reported to arriving aircraft ~~should~~ **shall** refer to the threshold elevation. In the case of reports from offshore structures, the height of cloud base ~~should~~ **shall** be given above mean sea level.

4.5.4 Reporting

4.5.4.1 In local routine and special reports ~~and in METAR and SPECI~~, the height of cloud base shall be reported in steps of 15 m (50 ft) up to and including 90 m (300 ft) and 30 m (100 ft) ~~up to between~~ 90 m (300 ft) and 3 000 m (10 000 ft). Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale.

4.5.4.2 In METAR and SPECI the height of cloud base shall be reported in steps of 30 m (100 ft) up to 3 000 m (10 000 ft). Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale.

Editorial Note.— Renumber existing 4.5.4.2 and 4.5.4.3 as 4.5.4.3 and 4.5.4.4

...

4.5.4.45 **Recommendation.**— *In automated local routine and special reports and METAR and SPECI:*

- a) *when the cloud type cannot be observed by the automatic observing system, the cloud type in each cloud group should be replaced by “///”;*
- b) *when no clouds are detected by the automatic observing system, it should be indicated by using the abbreviation “NCD”; and*
- c) *when cumulonimbus clouds or towering cumulus clouds are detected by the automatic observing system and the cloud amount and the height of cloud base cannot be observed, the cloud amount and the height of cloud base should be replaced by “/////”.*

...

4.8 Supplementary information

4.8.1 Reporting

...

4.8.1.3 **Recommendation.**— *In automated local routine and special reports and METAR and SPECI, in addition to the recent weather phenomena listed under 4.8.1.1, recent unknown precipitation should be reported in accordance with the template shown in Table A3-2 when the type of precipitation cannot be identified by the automatic observing system.*

4.8.1.4 **Recommendation.**— *In local routine and special reports, the liquid water equivalent rate of precipitation should be included in accordance with local arrangements with the operators concerned.*

Editorial Note.— *Renumber existing 4.8.1.4 and 4.8.1.5 as 4.8.1.5 and 4.8.1.6*

...

Table A3-1. Template for the local routine (MET REPORT) and local special (SPECIAL) reports

...

<i>Element as specified in Chapter 4</i>	<i>Detailed content</i>	<i>Template(s)</i>			<i>Examples</i>
Identification of the type of report (M)	Type of report	MET REPORT <i>or</i> SPECIAL			MET REPORT SPECIAL
Location indicator (M)	ICAO location indicator (M)	Nnnn			YUDO ¹
Time of the observation (M)	Day and actual time of the observation in UTC	nnnnnZ			221630Z
Identification of an automated report (C)	Automated report identifier (C)	AUTO			AUTO
...
Present weather (C) ^{9, 10}	Intensity of present weather (C) ⁹	FBL <i>or</i> MOD <i>or</i> HVY —			
	Characteristics and type of present weather (C) ^{9, 11}	DZ <i>or</i> RA <i>or</i> SN <i>or</i> SG <i>or</i> PL <i>or</i> DS <i>or</i> SS <i>or</i> FZDZ <i>or</i> FZRA <i>or</i> FZUP ¹² <i>or</i> FC ¹³ <i>or</i> SHGR <i>or</i> SHGS <i>or</i> SHRA <i>or</i> SHSN <i>or</i> SHUP ¹² <i>or</i> TSGR <i>or</i> TSGS <i>or</i> TSRA <i>or</i> TSSN <i>or</i> TSUP ¹² <i>or</i> UP ¹²	IC <i>or</i> FG <i>or</i> BR <i>or</i> SA <i>or</i> DU <i>or</i> HZ <i>or</i> FU <i>or</i> VA <i>or</i> SQ <i>or</i> PO <i>or</i> FC <i>or</i> TS <i>or</i> BCFG <i>or</i> BLDU <i>or</i> BLSA <i>or</i> BLSN <i>or</i> DRDU <i>or</i> DRSA <i>or</i> DRSN <i>or</i> FZFG <i>or</i> MIFG <i>or</i> PRFG		MOD RA HZ HVY TSRA FG HVY DZ VA FBL SN MIFG HVY TSRASN FBL SNRA FBL DZ FG HVY SHSN BLSN HVY TSUP
Cloud (M) ⁴²¹⁴	Name of the element (M)	CLD			
	Runway (O) ²	RWY nn[L] <i>or</i> RWY nn[C] <i>or</i> RWY nn[R]			CLD NSC
	Cloud amount (M) <i>or</i> vertical visibility (O) ⁹	FEW <i>or</i> SCT <i>or</i> BKN <i>or</i> OVC <i>or</i> ////// ¹²	OBSC	NSC <i>or</i> NCD ¹²	CLD SCT 300M OVC 600M (CLD SCT 1000FT OVC 2000FT) CLD OBSC VER VIS 150M (CLD OBSC VER VIS 500FT)
	Cloud type (C) ⁹	CB <i>or</i> TCU <i>or</i> /// ¹²	—		CLD BKN TCU 270M (CLD BKN TCU 900FT)

Element as specified in Chapter 4	Detailed content	Template(s)				Examples	
	Height of cloud base or the value of vertical visibility (C) ⁹	nn[n][n]M (or nnn[n]FT)	[VER VIS nn[n]M (or VER VIS nnn[n]FT)]			CLD RWY 08R BKN 60M RWY 26 BKN 90M (CLD RWY 08R BKN 200FT RWY 26 BKN 300FT)	
...				Supplementary information (C) ⁹	Significant meteorological phenomena (C) ⁹	CB or TS or MOD TURB or SEV TURB or WS or GR or SEV SQL or MOD ICE or SEV ICE or FZDZ or FZRA or SEV MTW or SS or DS or BLSN or FC ^{14,15}	FC IN APCH WS IN APCH 60M-WIND: 360/50KMH WS RWY 12 REFZRA CB IN CLIMB-OUT RETSRA
	Location of the phenomenon (C) ⁹	IN APCH [nnnM-WIND nnn/nnKMH] or IN CLIMB-OUT [nnnM-WIND nnn/nnKMH] (IN APCH [nnnFT-WIND nnn/nnKT] or IN CLIMBOUT [nnnFT-WIND nnn/nnKT]) or RWY nn[n]					
	Recent weather (C) ^{9, 10}	REFZDZ or REFZRA or REDZ or RE[SH]RA or RERASN or RE[SH]SN or RESG or RESHGR or RESHGS or REBLSN or RESS or REDS or RETSRA or RETSSN or RETSGR or RETSGS or REFC or REPL or REUP ¹² or REFZUP ¹² or RETSUP ¹² or RESHUP ¹² or REVA or RETS					
	Liquid water equivalent rate of precipitation (C)	LWEnnn				LWE035	
Trend forecast (O) ^{14,16}	Name of the element (M)	TREND				TREND NOSIG TREND BECMG FEW 600M (TREND BECMG FEW 2000FT) TREND TEMPO FM0300 TL0430 MOD FZRA TREND BECMG FM1900 VIS 500M HVY SNRA TREND BECMG FM1100 MOD SN TEMPO FM1130 BLSN	
	Change indicator (M) ^{15,17}	NOSIG	BECMG or TEMPO				
	Weather phenomenon: characteristics and type (C) ^{9, 10, 12, 11}	DZ or RA or SN or SG or PL or DS or SS or FZDZ or FZRA or SHGR or SHGS or SHRA or SHSN or TSGR or TSGS or TSRA or TSSN	IC or FG or BR or SA or DU or HZ or FU or VA or SQ or PO or FC or TS or BCFG or BLDU or BLSA or BLSN or DRDU or DRSA or DRSN or FZFG or MIFG or PRFG				
...							

- 12. For automated reports only.
- 13. Heavy used to indicate tornado or waterspout, no qualifier to indicate funnel cloud not reaching the ground.
- 14. Up to four cloud layers in accordance with 4.5.4.2 e).
- 15. Abbreviated plain language may be used in accordance with 4.8.1.2.
- 16. To be included in accordance with Chapter 6, 6.3.2.
- 17. Number of change indicators to be kept to a minimum in accordance with Appendix 5, 2.2.1, normally not exceeding three groups.

Table A3-2. Template for METAR and SPECI

<i>Element as specified in Chapter 4</i>	<i>Detailed content</i>	<i>Template(s)</i>			<i>Examples</i>
Identification of the type of report (M)	Type of report (M)	METAR, METAR COR, SPECI or SPECI COR			METAR METAR COR SPECI
...					
Visibility (M)	Prevailing or minimum visibility (M) ⁵	Nnnn			C A V O K 0350 CAVOK 7000NDV 9999 0800 2000 1200NW 6000 2800E
	Unidirectional visibility (C) ⁶	NDV			
	Minimum visibility (C) ⁷ and direction of the minimum visibility (C) ⁷	nnnn[N] or nnnn[NE] or nnnn[E] or nnnn[SE] or nnnn[S] or nnnn[SW] or nnnn[W] or nnnn[NW] or N or NE or E or SE or S or SW or W or NW			
...					
Present weather (C) ^{2,11}	Intensity or proximity of present weather (C) ¹²	- or +	—	VC	RA HZ VCFG +TSRA FG VCSH +DZ VA VCTS -SN MIFG VCBLA +TSRASN -SNRA DZ FG +SHSN BLSN UP FZUP TSUP FZUP
	Characteristics and type of present weather (M) ¹³	DZ or RA or SN or SG or PL or DS or SS or FZDZ or FZRA or FZUP ⁶ or FC ¹⁴ or SHGR or SHGS or SHRA or SHSN or SHUP ⁶ or TSGR or TSGS or TSRA or TSSN or TSUP ⁶ or UP ⁶	IC or FG or BR or SA or DU or HZ or FU or VA or SQ or PO or FC or TS or BCFG or BLDU or BLSA or BLSN or DRDU or DRSA or DRSN or FZFG or MIFG or PRFG	FG or PO or FC or DS or SS or TS or SH or BLSN or BLSA or BLDU or VA	
...					

<i>Element as specified in Chapter 4</i>	<i>Detailed content</i>	<i>Template(s)</i>	<i>Examples</i>
Supplementary information (C)	Recent weather (C) ^{2, 11}	REFZDZ <i>or</i> REFZRA <i>or</i> REDZ <i>or</i> RE[SH]RA <i>or</i> RERASN <i>or</i> RE[SH]SN <i>or</i> RESG <i>or</i> RESHGR <i>or</i> RESHGS <i>or</i> REBLN <i>or</i> RESS <i>or</i> REDS <i>or</i> RETSRA <i>or</i> RETSSN <i>or</i> RETSGR <i>or</i> RETSGS <i>or</i> RETS <i>or</i> REFC <i>or</i> REVA <i>or</i> REPL <i>or</i> REUP ⁶ <i>or</i> REFZUP ⁶ <i>or</i> RETSUP ⁶ <i>or</i> RESHUP ⁶	REFZRA RETSRA
	Wind shear (C) ²	WS Rnn[L] <i>or</i> WS Rnn[C] <i>or</i> WS Rnn[R] <i>or</i> WS ALL RWY	WS R03 R03 WS ALL RWY

...

14. Heavy used to indicate tornado or waterspout, no qualifier to indicate funnel cloud not reaching the ground.

Editorial Note.— Renumber the subsequent footnotes accordingly.

Table A3-4. Ranges and resolutions for the numerical elements included in local reports

<i>Element as specified in Chapter 4</i>		<i>Range</i>	<i>Resolution</i>
...			
Wind speed:	KMH/MS KT	1 - 3999 * 1 - 199*	1 1
Visibility:	M M KM	0 - 800 799 800 - 5 000 999 5 - 10	50 100 1
...			
Vertical visibility:	M FT	0 - 600 0 - 2 000	30 100
Clouds: height of cloud base:	M M FT FT	0 - 90 0 90 - 3 000 0 - 300 0 300 - 10 000	15 30 50 100
...			
Liquid water equivalent rate	1/10 MM/H	0 - 999	1

* There is no aeronautical requirement to report surface wind speeds of ~~200-50~~ km/h/s (100 kt) or more; however, provision has been made for reporting wind speeds up to ~~399~~ km/h/s (199 kt) for non-aeronautical purposes, as necessary.

Table A3-5. Ranges and resolutions for the numerical elements included in METAR and SPECI

<i>Element as specified in Chapter 4</i>		<i>Range</i>	<i>Resolution</i>
...			
Wind speed:	KMH/MS KT	00 – 39999* 00 – 199*	1 1
Visibility:	M M M M	0000 – 0799 0800 – 4 999 5 000 – 8 999 9 000 – 9 999	50 100 1 000 999
...			
* There is no aeronautical requirement to report surface wind speeds of 200–50 km/h/s (100 kt) or more; however, provision has been made for reporting wind speeds up to 399 km/h/s (199 kt) for non-aeronautical purposes, as necessary.			

APPENDIX 5. TECHNICAL SPECIFICATIONS RELATED TO FORECASTS

(See Chapter 6 of this Annex.)

1. CRITERIA RELATED TO TAF

...

1.2 Inclusion of meteorological elements in TAF

Note.— Guidance on operationally desirable accuracy of forecasts is given in Attachment B.

1.2.1 Surface wind

Recommendation.—In forecasting surface wind, the expected prevailing direction ~~should~~ **shall** be given. When it is not possible to forecast a prevailing surface wind direction due to its expected variability, for example, during light wind conditions (less than 6 km/h (3 kt)) or thunderstorms, the forecast wind direction ~~should~~ **shall** be indicated as variable using “VRB”. When the wind is forecast to be less than 2 km/h (1 kt), the forecast wind speed ~~should~~ **shall** be indicated as calm. When the forecast maximum speed (gust) exceeds the forecast mean wind speed by 20 km/h (10 kt) or more, the forecast maximum wind speed ~~should~~ **shall** be indicated. When a wind speed of 200 km/h (100 kt) or more is forecast, it ~~should~~ **shall** be indicated to be more than 199 km/h (99 kt).

...

1.2.3 Weather phenomena

Recommendation.—One or more, up to a maximum of three, of the following weather phenomena or combinations thereof, together with their characteristics and, where appropriate, intensity, ~~should~~ **shall** be forecast if they are expected to occur at the aerodrome:

- freezing precipitation
- freezing fog
- moderate or heavy precipitation (including showers thereof)
- low drifting dust, sand or snow
- blowing dust, sand or snow
- duststorm
- sandstorm
- thunderstorm (with or without precipitation)
- squall
- funnel cloud (tornado or waterspout)
- other weather phenomena given in Appendix 3, 4.4.2.3, ~~only if they are expected to cause a significant change in visibility~~ **as agreed by the meteorological authority with the ATS authority and operators concerned.**

The expected end of occurrence of those phenomena ~~should~~ **shall** be indicated by the abbreviation “NSW”.

1.2.4 Cloud

Recommendation.— *Cloud amount should be forecast using the abbreviations “FEW”, “SCT”, “BKN” or “OVC” as necessary. When it is expected that the sky will remain or become obscured and clouds cannot be forecast and information on vertical visibility is available at the aerodrome, the vertical visibility should be forecast in the form “VV” followed by the forecast value of the vertical visibility. When several layers or masses of cloud are forecast, their amount and height of base should be included in the following order:*

- a) *the lowest layer or mass regardless of amount, to be forecast as FEW, SCT, BKN or OVC as appropriate;*
- b) *the next layer or mass covering more than 2/8, to be forecast as SCT, BKN or OVC as appropriate;*
- c) *the next higher layer or mass covering more than 4/8, to be forecast as BKN or OVC as appropriate; and*
- d) *cumulonimbus clouds and/or towering cumulus clouds, whenever forecast and not already included under a) to c).*

Cloud information should be limited to cloud of operational significance; when no cloud of operational significance is forecast, and “CAVOK” is not appropriate, the abbreviation “NSC” should be used.

...

1.3 Use of change groups

Note. — *Guidance on the use of change and time indicators in TAF is given in Table A5-2.*

1.3.1 The criteria used for the inclusion of change groups in TAF or for the amendment of TAF shall be based on any of the following weather phenomena or combinations thereof being forecast to begin or end or change in intensity:

- freezing precipitation
- moderate or heavy precipitation (including showers thereof)
- thunderstorm (with precipitation)
- duststorm
- sandstorm;

~~1.3.1~~ **1.3.2 Recommendation.**— *The criteria used for the inclusion of change groups in TAF or for the amendment of TAF should be based on the following:*

- a) *when the mean surface wind direction is forecast to change by 60° or more, the mean speed before and/or after the change being 20 km/h (10 kt) or more;*

...

~~f) when any of the following weather phenomena or combinations thereof are forecast to begin or end or change in intensity:~~

- ~~freezing precipitation~~
- ~~moderate or heavy precipitation (including showers thereof)~~
- ~~thunderstorm (with precipitation)~~
- ~~duststorm~~
- ~~sandstorm;~~

Editorial Note.— *Renumber subsequent sub-paragraphs accordingly.*

...

~~1.3.2~~ **1.3.3 Recommendation.**— *When a change in any of the elements given in Chapter 6, 6.2.3 is required to be indicated in accordance with the criteria given in 1.3.1, the change indicators “BECMG” or “TEMPO” should be used followed by the time period during which the change is expected to occur. The time period should be indicated as the beginning and end of the period in whole hours UTC. Only those elements for which a significant change is expected should be included following a change indicator. However, in the case of significant changes in respect of cloud, all cloud groups, including layers or masses not expected to change, should be indicated.*

Editorial Note.— *Renumber subsequent paragraphs accordingly.*

...

2. CRITERIA RELATED TO TREND FORECASTS

...

2.2 Inclusion of meteorological elements in trend forecasts

...

2.2.4 Weather phenomena

2.2.4.1 The trend forecast shall indicate the expected onset, cessation or change in intensity of one or more of the following weather phenomena or combinations thereof:

- freezing precipitation
- moderate or heavy precipitation (including showers thereof)
- thunderstorm (with precipitation)
- duststorm
- sandstorm
- other weather phenomena given in Appendix 3, 4.4.2.3, ~~only if they are expected to cause a significant change in visibility~~ as agreed by the meteorological authority with the ATS authority and operators concerned.

...

Table A5-3. Ranges and resolutions for the numerical elements included in TAF

<i>Element as specified in Chapter 6</i>		<i>Range</i>	<i>Resolution</i>
Wind direction:	° true	000 – 360	10
Wind speed:	KMH/MS	00 – 39999*	1
	KT	00 – 199*	1
Visibility:	M	0000 – 0800/799	50
	M	0800 – 5000/4 999	100
	M	5 000 – 9 000/8 999	1 000
	M	9 000 – 9 999	999
...			
* There is no aeronautical requirement to report surface wind speeds of 200-50 km/h/s (100 kt) or more; however, provision has been made for reporting wind speeds up to 399 km/h/s (199 kt) for non-aeronautical purposes, as necessary.			

...



APPENDIX D

AMOFSG AD HOC WORKING GROUP

TERMS OF REFERENCE

1. Tasks

The WG is tasked to prepare a first draft of operational service needs and corresponding deliverables for the NTF by looking at the following questions:

- Weather parameters
What currently existing parameters need to be predicted? Are there new parameters (e.g. thunderstorm density?) that need to be considered?
- Spatial and temporal scales
What time scales and lead times are appropriate? How will the spatial variability within the wider terminal area as proposed by the WMO CAeM ET-NTF be addressed? Is there a need for reviewing this space scale over time?
- Applicable locations
The WG may suggest a “minimum traffic” criterion for locations requiring the additional products, data and service, possibly “staged” from a basic set to a fully-blown range of products. Topographic considerations (e.g. Hong Kong, China; Bhutan etc) may enter these definitions as additional drivers.
- Desirable accuracy and resolution
There will be a need to refine desired accuracies for QMS purposes.

2. Work Plan and modus operandi

The WG is tasked to develop a prototype plan (and schedule), with reference to the ICAO Annex 3 amendment cycle, for consideration during and after AMOFSG/8. The prototype plan (and schedule) should include efforts of evaluation, e.g. based on user's feedback on prototypes available on the NTF web-based platform (<http://www.ntf.weather.gov.hk>) and development of guidance material and training for users to facilitate and future implementation of the NTF products.

It is expected that the group will perform most of the work by correspondence but will meet at every subsequent AMOFSG meetings.

The WG can invite other industry experts to meetings (in person or virtual at their own expense)

The WG will provide status updates, as necessary, to the AMOFSG.

APPENDIX E

NOTES ON THE PRESENTATION OF THE PROPOSED AMENDMENT TO ANNEX 5

The text of the proposed amendment is arranged to show deleted text with a line through it and new text highlighted with grey shading as shown below:

1. ~~text to be deleted is shown with a line through it~~ text to be deleted
2. new text to be inserted is highlighted with grey shading new text to be inserted
3. ~~text to be deleted is shown with a line through it~~ followed by the new text which is highlighted with grey shading new text to replace existing text

**PROPOSED AMENDMENT TO
INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES**

UNITS OF MEASUREMENT TO BE USED IN AIR AND GROUND OPERATIONS

**ANNEX 5
TO THE CONVENTION OF INTERNATIONAL CIVIL AVIATION**

FOURTH EDITION — JULY 1979

CHAPTER 3. STANDARD APPLICATION OF UNITS OF MEASUREMENT

...

3.3 Application of specific units

...

Table 3-4. Standard application of specific units of measurement

<i>Ref. No.</i>	<i>Quantity</i>	<i>Primary unit (symbol)</i>	<i>Non-SI alternative unit (symbol)</i>
-----------------	-----------------	----------------------------------	---

...

4. Mechanics

...

4.16	wind speed ^{e)}	km/h/m/s	kt
------	--------------------------	----------	----

...

e) A conversion of 1 kt = 0.5 m/s is used in ICAO Annexes for the representation of wind speed.

e)-f) The decibel (dB) is a ratio which may be used as a unit for expressing sound pressure level and sound power level. When used, the reference level must be specified.

APPENDIX F

WORLD METEOROLOGICAL ORGANIZATION

CT-MTDCF/ET-DR & C
Doc. 8.5(X),

JOINT MEETING OF EXPERT TEAM ON DATA
REPRESENTATION AND CODES and
COORDINATION TEAM ON MIGRATION TO
TABLE-DRIVEN CODE FORMS

(22.VII.2008)

GENEVA, 1 TO 5 SEPTEMBER 2008

ENGLISH ONLY

Review of the migration plan in view of ICAO requirements

(Submitted by the International Civil Aviation Organization)

Summary and purpose of document

This paper addresses migration to table-driven code forms (TDCF) as far as the aeronautical meteorological codes (METAR/SPECI and TAF) are concerned.

Action proposed

To note the information provided in this paper and in particular the fact that the Extensible mark-up language (XML) is likely to be used for the exchange of OPMET information in the future.

1. INTRODUCTION

1.1 The development of the migration plan for aeronautical meteorological (MET) codes was prompted by the conjoint ICAO/WMO MET Divisional Meeting (2002) which called for WMO to develop, in co-ordination with ICAO, a detailed migration plan for the use of table-driven codes, including the development of the necessary BUFR code tables to encode and decode OPMET information (i.e. METAR/SPECI and TAF). The work was subsequently undertaken by the CBS Expert Team (ET) on Data Representation and Codes which developed the necessary BUFR code tables together with the associated migration plan. The migration plan, envisaging the completion of migration to the BUFR code

form for OPMET information by 2015, was noted by the 13th Session of the WMO Commission for Basic Systems (CBS).

2. DEVELOPMENTS

2.1 In parallel to the above developments, concerns were repeatedly expressed by ICAO planning and implementation regional group (PIRG) meetings. They were primarily related to two issues:

- a) incapability of the ICAO aeronautical fixed service (AFS) to carry digital data; and
- b) non-familiarity of BUFR code form amongst the aeronautical personnel and the difficulties foreseen in decoding/encoding BUFR-coded messages.

It was also suggested by the regional groups that other table-driven codes, such as Extensible mark-up language (XML), which were considered to be more suitable for aeronautical users, should be considered.

2.2 The concerns expressed by PIRGs were brought to the attention of WMO by ICAO; subsequently, the Extraordinary Session of the CBS (2006) agreed that an ET team should be established to assess advantages and disadvantages of different data representation systems for use in real-time operational exchanges between national MET services and in transmission of information to users. Furthermore, a conjoint Commission for Aeronautical Meteorology (CAeM)/CBS Expert Team on OPMET data representation (CAeM-CBS/ET-ODR), involving ICAO, was to be established to discuss concerns raised by aviation experts regarding the migration of alpha-numeric OPMET codes to TDCF. In view of these developments, the ICAO Air Navigation Commission (ANC) agreed in 2007 that work within ICAO related to migration to the use of BUFR code form for METAR/SPECI and TAF should be suspended until such a time that the results of the work of the WMO ETs are known.

2.3 Work within WMO was initiated in this area by convening the Expert Team on Assessment of Data Representation Systems (ET-ADRS) in April 2008. The ET-ADRS is developing draft policy related to data representation systems, which is to be completed by October 2008 and would subsequently be tabled for endorsement by the 14th Session of the CBS (March, 2009). The ET-ADRS noted that the XML was the *de facto* Standard for Eurocontrol and Federal Aviation Administration (FAA) since similar codes are used by Eurocontrol (AIXM and WXXM –weather model based on XML/GML, geography mark-up language) and FAA (and other US government agencies) (using XML representation through the Joint Meteorology and Oceanography (METOC) Broker Language (JMBL)). Furthermore, the tendency towards the use of XML within the aeronautical community is reinforced by the fact that XML is expected to be used for aeronautical information within the framework of the aeronautical information management (AIM), to be implemented over the next few years. There are clearly advantages of using the same code both for the OPMET and aeronautical information. One of the major challenges will be to ensure interoperability through the harmonization of data elements.

2.4 With regard to the ET-ODR, it is expected soon to initiate its work. One of its main tasks will be to organize a pilot project in view of demonstrating the feasibility of using OPMET information coded in a table-driven code form (i.e. XML), based on the experiences by Eurocontrol and the United States FAA.

2.5 Initially, it was expected that the work undertaken by two ETs would be completed by the end of 2008; however, it has become clear that in view of the postponement of the 14th Session of the CBS, the results will have to be awaited until the second half of 2009.

3. FUTURE PERSPECTIVES

3.1 In view of the above developments, it is highly likely that a recommendation for the use of XML for OPMET information (METAR/SPECI and TAF) will be made by the ET-ODR. It may be expected that subsequently WMO will be tasked, in accordance with the *Working Arrangements between the International Civil Aviation Organization and the World Meteorological Organization* (Doc 7475), to develop the necessary code tables in order to ensure the interoperability by developing a minimum set of standards.

APPENDIX G

NOTES ON THE PRESENTATION OF THE PROPOSED AMENDMENT TO ANNEX 11

The text of the proposed amendment is arranged to show deleted text with a line through it and new text highlighted with grey shading as shown below:

1. ~~text to be deleted is shown with a line through it~~ text to be deleted
2. new text to be inserted is highlighted with grey shading new text to be inserted
3. ~~text to be deleted is shown with a line through it~~ followed by the new text which is highlighted with grey shading new text to replace existing text

PROPOSED AMENDMENT TO
INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES
AIR TRAFFIC SERVICES
ANNEX 11
TO THE CONVENTION OF INTERNATIONAL CIVIL AVIATION
THIRTEENTH EDITION — JULY 2001

CHAPTER 4. FLIGHT INFORMATION SERVICE

...

**4.3 Operational flight information
service broadcasts**

...

4.3.7 ATIS for arriving and
departing aircraft

ATIS messages containing both arrival and departure information shall contain the following elements of information in the order listed:

...

- *m) visibility and, when applicable, RVR and, if visibility/RVR sensors related specifically to the sections of runway(s) in use are available and the information is required by operators, the indication of the runway and the section of the runway to which the information refers;

...

4.3.8 ATIS for arriving aircraft

ATIS messages containing arrival information only shall contain the following elements of information in the order listed:

...

- *m) visibility and, when applicable, RVR and, if visibility/RVR sensors related specifically to the sections of runway(s) in use are available and the information is required by operators, the indication of the runway and the section of the runway to which the information refers;

...

4.3.9 ATIS for departing aircraft

ATIS messages containing departure information only shall contain the following elements of information in the order listed:

...

- *1) visibility and, when applicable, RVR and, if visibility/RVR sensors related specifically to the sections of runway(s) in use are available and the information is required by operators, the indication of the runway and the section of the runway to which the information refers;

Observing and forecasting at the aerodrome and in terminal area (AMOFSG 1)



Observing and forecasting at the aerodrome and in terminal area (AMOFSG 1) > Deliverables

APPENDIX H WORK PROGRAMME

Deliverables

Key deliverables of the project				View: MET/AIM SG/OPSG view	
New	Actions	Settings	Short-Name	Description	Source of task
N/A			00-development and implementation of new observing and forecasting practices	support task ensuring that the work being undertaken with the assistance of the Aerodrome Meteorological Observation and Forecast Study Group be progressed (including the draft Amendment 75 to Annex 3 and other ICAO provisions)	N/A
AMOFSG-01			01-revision of MET observations in light of the development of AMOS	revision of the requirements for meteorological observations at aerodromes in light of the capability of automated weather observing systems to meet these requirements	EANPG 40/26; 151-6
AMOFSG-02			02-requirements for remote-sensing equipment in the terminal area	inclusion of the requirements for remote sensing equipment to monitor weather in the terminal area	130-11 (TWP Review)
AMOFSG-03			03-revision of the requirements for weather phenomena in MET reports	revision of the requirements for present and recent weather phenomena in meteorological reports, including the consideration to report conditions where non-super cooled rain may freeze when reaching the ground	MET/02: 2/3; EANPG 49/45
AMOFSG-04			04-expansion of the use of MET information from automatic observing systems	expansion of the use of meteorological information from fully automatic observing systems to encompass operational hours	MET/02: 2/3
AMOFSG-05			05-inclusion of gusts in the calculation of crosswind and tailwind	inclusion of the effect of gusts in the calculation of crosswind and tailwind components	EANPG 44/17; 163-5
AMOFSG-06				revision of the requirement for the inclusion of minimum	EANPG 47/33;

H-2

AMOFSG-07	06-inclusion of minimum VIS whenever less than 5000 m 07-refining the reporting increments of height of cloud base in local reports	visibility whenever less than 5000 metres	172-11
AMOFSG-08	08-classification of automatic observations backed-up by an observer	revision of the requirements for refining the reporting increments of height of cloud base in local routine and special reports	EANPG 47/34; 172-11
AMOFSG-09	09-upgrade of SPECI criteria to Standards	classification of automatic observations backed-up by a human observer	173-6
AMOFSG-10	10-indication of MIN visibility non-identifiable with 8 compass points	upgrade of the provision related to SPECI criteria to a Standard	173-6
AMOFSG-11	11-accuracy of the observation of present weather in Attachment A	revision of the requirements for the indication of direction of minimum visibility when it cannot be identified using eight compass points	173-6
AMOFSG-12	12-update of wind information displayed for ATC	review of the requirements for the accuracy for the observation of present weather phenomena for inclusion in Attachment A	173-6
AMOFSG-13	13-inclusion of multiple visibility values in ATIS	optimized update rate of wind information displayed for ATC	EANPG 48/43; 175-3
AMOFSG-14	14-update to Doc 9837	review of the requirements for the inclusion of multiple visibility values in ATIS	EANPG 48/44; 175-3
AMOFSG-15	15-alignment of Attachment B to TAF amendment criteria	update to the <i>Manual on Automatic Meteorological Observing Systems at Aerodromes</i> (Doc 9837)	MET/02: 2/2
AMOFSG-16	16-updated accuracy for precipitation forecasts in Attachment B	review of the requirements for aligning guidance in Attachment B related to operationally desirable accuracy of forecasts to the TAF amendment criteria (including precipitation)	173-6; 136-18 (for precipitation)
AMOFSG-17	17-clarification concerning the cancellation of TAF (by a new TAF)	updated accuracy required for precipitation forecasts in Attachment B	136-18
AMOFSG-18	18-discontinuation of the	review of the requirements for clarifying when a newly issued TAF cancel TAF previously issued for the same place and for the same period of validity, or part thereof	173-6
		discontinuation of the use of "VV////" in TAF	173-6

H-3

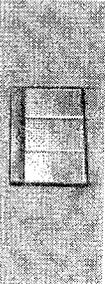
AMOFSG-19	use of "VV///" in TAF 19-progress report on the forecasting of RVR	progress report on the forecasting of RVR	COM/MET/82; 141-2; EANPG 48/41
AMOFSG-20	20-optimization of the validity and update of the TAF	optimization of the period of validity and update cycle of the TAF	EANPG 49/44
AMOFSG-21	21-replacement of "km/h" with "m/s" as the SI unit for wind speed	replacement of "km/h" with "m/s" as the SI unit of measurement of wind speed in ICAO annexes	APANPIRG 18/51; 178-4

Implementation of table-driven OPMET messages (AMOFSG 2)



Implementation of
table-driven OPMET
messages (AMOFSG 2)
> Deliverables

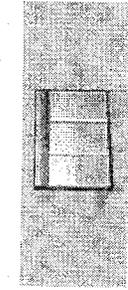
Deliverables



H-4

Key deliverables of the project			
New	Actions	Settings	View: MET/AIM SG/OPSG view
task number		Short-Name	Source of task
AMOFSG-22		01 -use of the BUFR code form to transmit OPMET information	MET/02: 2/5; EANPG 45/12; 166-5; EANPG 46/18; 169-1; EANPG 47/27; 172-11
		Description	
		use of the BUFR code form to transmit OPMET information including guidance on how: a) the information is to be presented to aeronautical users to ensure that the mapping is complete and unambiguous; b) to achieve a uniform global transition to the implementation of BUFR-coded OPMET messages to minimize its possible negative safety, operational and economic impacts on the aviation community	

MET information to support ATM (AMOFSG 3)



MET information to support ATM (AMOFSG 3) > Deliverables

H-5

Deliverables

Key deliverables of the project			
New ▾	Actions ▾	Settings ▾	View: MET/AIM SG/OPSG view
task number	Short-Name	Description	Source of task
N/A	00-development and implementation of MET support to ATM	support task ensuring that the element related to the MET information in the ATIS included in draft amendment to Annex 11 be processed	N/A
AMOFSG-23	01-MET products to be provided to ATS to support the global ATM	requirements for additional meteorological products to be provided to the ATS units to support the global ATM, inter alia, in regard to the (severe) weather phenomena that could cause significant changes in the ATC procedures	EANPG 47/36; 172-11; APANPIRG 17/43 b); 174-2
AMOFSG-24	02-provision of surface wind direction in ATIS in degrees magnetic	Inclusion of provision requiring that surface wind direction in ATIS is to be provided in degrees magnetic	EANPG 47/35; 172-11

- END -