AERODROME METEOROLOGICAL OBSERVING SYSTEMS STUDY GROUP (AMOSSG)

FIFTH MEETING

Montreal, 11 to 14 April 2005

SUMMARY OF DISCUSSIONS

1. HISTORICAL

1.1 The fifth meeting of the Aerodrome Meteorological Observing Systems Study Group (AMOSSG) was held at the International Civil Aviation Organization (ICAO) Headquarters in Montreal, Canada, 11 to 14 April 2005.

1.2 The meeting was opened, on behalf of the Director of the Air Navigation Bureau (ANB) of ICAO, by Olli Turpeinen, Chief of the Meteorology (MET) Section. The group was reminded of the extensive workload that had been placed upon them with particular reference to the consideration of the use of fully automatic observing systems during operational hours, the consideration of TAF validity periods and the forthcoming migration to the use of table driven codes as well as a review of the *Manual on Automatic Meteorological Observing Systems at Aerodromes* (Doc 9837). The meeting was also informed of the amendment cycle for Annex 3 — *Meteorological Service for International Air Navigation* in which proposals made at the meeting would form a part of draft Amendment 74 which, if accepted, would become applicable in November 2007. However, due to the need to harmonize the applicability date with that of consequential changes to the WMO Publication No. 306 — *Manual on Codes*, it is likely that amendments related to aeronautical meteorological codes would be applicable either 2008, or more likely, 2009 once the amendments had been approved by the appropriate ICAO and WMO bodies.

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

1.4 The meeting considered the following agenda items:

1) Opening of the meeting

2) Election of Chairman

3) Adoption of working arrangements

4) Adoption of the agenda

5) Aerodrome observation requirements

6) Aerodrome forecast requirements

7) Guidance material

8) Migration to BUFR coded OPMET messages

9) Future work programme

10) Any other business

11) Closure of the meeting

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

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

2.1 These items are covered under Section 1: Historical.

3. AGENDA ITEM 5: AERODROME OBSERVATION REQUIREMENTS

3.1 Reporting requirements and criteria

***Attainable accuracy of measurement* (ANC task 9206 a) 3)**

3.1.1 The group recalled that the Air Navigation Commission had instructed the Secretariat to invite the World Meteorological Organization (WMO) to provide an update to the attainable accuracy of measurements that were contained in Annex 3 — *Meteorological Service for International Air Navigation*, Appendix B (following Amendment 73 to Annex 3 this is now Appendix A). During the discussion at the AMOSSG/4 Meeting it had been noted that significant progress had been made by WMO in this respect and that a set of proposed levels of accuracy had been developed subject to final approval by the relevant constituent WMO body.

3.1.2 A report was presented to the group from WMO in this regard with a view to including an agreed set of values for the obtainable accuracy in Appendix A to Annex 3. However, it was noted that related issues (described in 3.1.13) had overtaken events leading to the replacement of the column in Attachment A concerning the attainable accuracy of observation by a reference to WMO Publication No. 8 — *Guide to Meteorological Instruments and Methods of Observation* providing information on the updated uncertainty of measurement.

***Definition of "vicinity"* (ANC task 9206 a) 5)**

3.1.3 The group recalled that the MET Divisional Meeting (2002) in its Recommendation 2/3 e) had referred the definition of the term "vicinity" back to the group for further consideration. The MET Divisional Meeting (2002) had considered that the use of the aerodrome reference point in the proposed definition could cause confusion at some aerodromes where this point had not been necessarily positioned

centrally. This could have given rise to parts of the aerodrome being considered as within the definition of vicinity, particularly at larger aerodromes.

3.1.4 The AMOSSG/4 Meeting, in further considering this definition had made a comparison between the original proposed definition and a more sophisticated definition that had taken into account the size and shape of the aerodrome perimeter. It had been agreed by the group that the benefits of increased clarity provided by the more complex definition were outweighed by the likely difficulties that would be experienced by pilots in interpretation where the definition would vary from one aerodrome to another. One modification to the draft definition was suggested by the group to use "approximately 8 km" instead of "8 km" in order to cater for those large aerodromes where parts of the aerodrome were more than that distance from the aerodrome reference point.

3.1.5 The meeting agreed that the use of the term "approximately" should be taken to allow flexibility in the interpretation of what constituted the aerodrome boundaries in regard to meteorological observations and particularly for those aerodromes with complex terrain in its immediate surroundings. In this regard, an appropriate amendment to Annex 3 is included in **Appendix C** as a part of draft Amendment 74.

Display and the reporting of the height of cloud base **(ANC task 9206 a) 8, 12)**

3.1.6 The AMOSSG/4 Meeting had agreed that there had been a need to develop provisions in Annex 3 relating to the display of the height of cloud base in ATS units. This had been in response to a request from the European Air Navigation Planning Group (EANPG) that had originally identified such a need and had formulated Conclusion 44/16 in noting that instrumented systems were required at aerodromes with Category II and III runways but that there had been no requirement for displays which had been inconsistent with the requirements for surface wind and runway visual range (RVR) displays.

3.1.7 It was noted that in response to comments received from States during the final review of Amendment 73 to Annex 3, the appropriate provisions had already been developed and included in that amendment which became applicable in November 2004, and no further action was required in this regard.

3.1.8 An additional suggestion had been made, during the final review by the Air Navigation Commission of Amendment 73 to Annex 3, concerning the consideration of whether there was a need to specify that the height of cloud base should be rounded down to the nearest reported value in METAR/SPECI and local routine and special reports, similar to visibility and RVR.

3.1.9 The group agreed that an appropriate amendment should be made to Annex 3 concerning the rounding down of observations of the height of cloud base which is included in **Appendix C** as a part of draft Amendment 74.

Reporting of gusts in local report **(ANC task 9206 a) 9, 11)**

3.1.10 The group recalled that at the AMOSSG/4 Meeting it had been noted that issues concerning the reporting of gusts had been raised at the EANPG/44 meeting and at the sixth meeting of the Operations Panel (OPSP/6) which had met concurrently with the AMOSSG/4 Meeting. It had been agreed that the issues raised would be brought to the attention of the group for consideration of any proposals made by the OPSP/6 Meeting.

3.1.11 In considering noise abatement procedures, the OPSP/6 Meeting had developed an amendment to the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444) in formulating the following recommendation:

Recommendation 4/5 — Amendment to the Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM) (Doc 4444)

That the proposed amendments to PANS-ATM, as shown in Appendix E to the report on this agenda item, be referred to the ICAO Secretariat for coordination of the necessary amendments to Annex 3 concerning the wind measurement criteria in Attachment B, Column 1; criteria for reporting of wind variation including gusts; and the provision of surface wind information for each runway via ATIS, to effect simultaneous amendment to Annex 3, PANS-ATM and PANS-OPS, Volume 1.

3.1.12 The Appendix E referred to in the above Recommendation is reproduced at **Appendix D** to this summary of discussions. The group noted the specific items 1), 3), and 6) and that the inclusion of these items in the PANS-ATM necessitated consequential amendments to Annex 3. These three specific items are dealt with in turn below. It was also noted that the reference to Annex 3, Attachment B was made before the applicability date of Amendment 73 and that the attachment in question had been relabelled as Attachment A.

3.1.13 The group noted that the consequence of developing a requirement for wind observations meeting the desirable accuracy as currently given in Attachment A to Annex 3 would be to upgrade the desirable accuracy to a Recommended Practice in Appendix 3 to Annex 3. It was agreed by the group that it would be appropriate to delete the column referring to the attainable accuracy of measurement owing to the difficulties in maintaining the information in the format provided which is the responsibility of WMO under the agreed working arrangements between WMO and ICAO, particularly as the presentation methods differed between the two organizations.

3.1.14 The group noted that the requirement for elements to be included in the automatic terminal information service (ATIS) broadcast were given in Annex 11 — *Air Traffic Services* which allowed for the transmission of separate wind observations for each runway in use. Furthermore, Annex 3, Appendix 3, 4.1.4.3 b) already enabled the provision of additional observations in local reports for each runway in use. Annex 3 could have been amended so as to require the systematic provision of separate wind observations relating to each runway in use. However, the group agreed that due to the configuration of most aerodromes and the costs involved, it would not be sensible to mandate that anemometers should be installed for each usable runway. Therefore, it was agreed that no amendments to Annex 3 are required in order to ensure that separate wind information should be supplied for all runways in use.

3.1.15 Upon further consideration, the group noted that the proposed changes were in order to facilitate the use of raised limits for crosswind and tailwind operating values for aerodromes facing capacity problems when operating noise abatement procedures. The implications of this were that such procedures would only be required for a limited number of aerodromes and that such requirements would only be necessary under these specific circumstances. This would remove the need for all States to incur unnecessary costs to allow procedures that they would never have a need to invoke. Therefore, it was agreed that the **Secretary** would develop draft provisions in Annex 3 that specified that:

a) wind observations should be made in accordance with the required accuracy of Attachment A to Annex 3; and

b) gusts should be reported when they exceed the mean speed by 10 km/h (5 kt) or more in local reports only when the specified noise abatement procedures were being applied.

This would remove the need to upgrade Attachment A to a Recommended Practice. It was agreed by the group that an appropriate amendment proposal would be circulated to the group within two weeks of the meeting following consultation with the OPS/AIR Section of ICAO. This proposal would then form a part of draft Amendment 74 to Annex 3.

3.1.16 Some concerns were expressed regarding the note attached to item 1) given in **Appendix D** and, in particular the use of the term "techniques". These concerns related to the likelihood that many States would find the apparent practice of adjusting wind measurements by means of an algorithm unacceptable. It was understood that the proposed amendment to the PANS-ATM was not a responsibility of the group but it was agreed that the **Secretary** should seek the views of the Air Navigation Commission regarding a change to the wording in the note to read "the additional assessment of wind along the runway should be considered".

***Criteria for reporting CAVOK* (ANC task 9206 a) 10)**

3.1.17 The group noted that as a part of the final review of Amendment 73 to Annex 3, the Air Navigation Commission had invited the group to consider the inclusion of towering cumulus (TCU) in the criteria for reporting CAVOK in METAR/SPECI and local reports. The group agreed that TCU are of operational significance and should therefore always be indicated. Therefore, the criteria for CAVOK was agreed by the group to be amended to include the requirement for there to be no TCU present.

3.1.18 It was agreed by the group that a similar inconsistency should be corrected for the reporting of NSC (no significant cloud) in that TCU was not included in the requirements of Annex 3.

3.1.19 It was also brought to the attention of the group that the only difference between the use of SKC and NSC was the possibility that cloud, not of operational significance, was present. As there was no requirement to report cloud that was not of operational significance, it was agreed by the group that there was no requirement to report SKC.

3.1.20 The group also noted that in the specific case of the cloud type not being observed solidi should be used in accordance with Annex 3, Appendix 3, 4.9.1.4 a) it was agreed that in view of the increasing use of remote sensing to detect the likelihood of CB and/or TCU, there should be provision for the cloud type being reported without an associated height of cloud base using six solidi to represent the missing information. The group considered this to be appropriate as the general situation was likely to involve a lack of cloud height information in this case.

3.1.21 In this regard, an appropriate amendment to Annex 3 is included in **Appendix C** as a part of draft Amendment 74.

***Requirements for issuing SPECI* (ANC task 9206 a) 13)**

3.1.22 The Air Navigation Commission had noted that the practice described in the *Air Navigation Plan — European Region*, *Air Navigation Plan — European Region*, Volume I — *Basic ANP* (Doc 7754) that waived the requirement to disseminate SPECI when half-hourly METAR were disseminated was not in

accordance with the provisions of Annex 3. It had been agreed by the Commission that this discrepancy should be resolved either by developing provisions in Annex 3 to incorporate or to cancel the European practice.

3.1.23 The group agreed that the current European practice had been in operation for many years without any significant operational, or safety, problems being generated. Furthermore, it was emphasized that the removal of the requirement for SPECI would not affect the requirement for the issuance of local special reports to be used by aircraft landing and taking off for operational decision making. Therefore, the group agreed that, for the above reasons the most appropriate solution would be to incorporate the current European practice into Annex 3.

3.1.24 In this regard, an appropriate amendment to Annex 3 is included in **Appendix C** as a part of draft Amendment 74.

***Runway designators in OPMET messages* (ANC task 9206 a) 14)**

3.1.25 The EANPG/46 Meeting (1 to 3 December 2003), had noted that the notation used for the runway designator used in METAR/SPECI to describe the state of the runway was not in line with that used in Annex 14 — *Aerodromes*. Furthermore, the notation used in the state of runway group made it impossible to identify the runway in question at aerodromes which had parallel runways. In order to address this difficulty, the EANPG had formulated the following conclusion:

Conclusion 45/15 — Runway designator in OPMET messages

That ICAO consider a review of the runway designator in all operational meteorological (OPMET) messages in order to align with the provisions in Annex 14.

3.1.26 In noting the EANPG conclusion, the Air Navigation Commission had referred this issue to the AMOSSG for consideration during its 166th session. The group developed the amendment to Annex 3 given in **Appendix C** in this respect as a part of draft Amendment 74.

Expansion of the use of the descriptor "FZ"

3.1.27 The group recalled that the AMOSSG/4 Meeting had noted that some difficulties had been experienced with the reporting of partial fog and shallow fog when the temperature had been below zero degrees Celsius as the descriptor "FZ" was only permitted for use with "FG" implying that fog had affected the entire aerodrome. Similarly, it had been questioned whether the descriptor "FZ" could be used with mist.

3.1.28 It was agreed by the group that there was no operational need for the expansion of the use of the "FZ" descriptor in this way and that there was no need to develop any proposed amendment to Annex 3 in this regard.

Guidance on the reporting of visibility

3.1.29 The group recalled that some confusion had been expressed at the AMOSSG/4 Meeting concerning the assessment of visibility for the purposes of reporting fog. It had been confirmed at that meeting that the aeronautical visibility should be used in order to assess whether fog or mist should be reported. The meeting noted that appropriate amendments had been made to the *Manual of Aeronautical*

Meteorological Practice (Doc 8896) and *Manual of Runway Visual Range Observing and Reporting Practices* (Doc 9328).

3.1.30 Several issues were brought to the attention of the group regarding problems encountered in reporting the prevailing visibility. Some confusion had been expressed concerning the definition of prevailing visibility and the group agreed that the insertion of the word "greatest" would remove any potential ambiguity so that the definition would read "the greatest visibility value ..... which is reached or exceeded within at least half the horizon circle or within at least half of the surface of the aerodrome.....". Furthermore, it was noted that problems had been encountered in reporting the minimum visibility when one or both of the prevailing visibility and the minimum visibility were above 10 km. It was agreed that a note should be provided in Annex 3 to only require the reporting of the lowest visibility when it is less than half of the prevailing visibility and below 5 000 m. It was also agreed by the group that CAVOK should only be reported if both the prevailing visibility was 10 km or more and the lowest visibility was not reported.

3.1.31 In this regard, an appropriate amendment to Annex 3 is included in **Appendix C** as a part of draft Amendment 74.

Reporting increments for runway visual range (RVR)

3.1.32 The AMOSSG/4 Meeting had noted that there had been some inconsistency between the reporting increments for RVR given in Annex 3 and those given in the WMO Publication No. 306, *Manual on Codes*. The meeting noted that the Secretary had presented an amendment proposal to the WMO documentation at a meeting of the WMO CBS, Expert Team on Data Representation and Codes held in Kuala Lumpur, Malaysia from 21 to 26 June 2004. The proposed changes had been endorsed by that group and approved by the 13th Session of the WMO Commission for Basic Systems (March 2005). It was expected that the WMO documentation will be aligned in due course following final approval by the WMO Executive Council in June 2005.

3.1.33 It was noted by the group that some confusion had existed regarding the reporting ranges required for RVR following the introduction in Amendment 72 to Annex 3 of the new upper limit of reporting RVR at 2 000 m. It was realized that RVR would be reported if either the visibility or the RVR is less than 1 500 m (Annex 3, 4.6.3.3 refers) and that the upper limit of 2 000 m would be invoked in cases whereby the visibility was the trigger for the reporting of RVR. An example would be where the reported visibility was 1 200 m and the RVR was 1 700 m in which case there would be a requirement to report the RVR. It was agreed that the **Secretary** would contact the MET Regional Officer at the Regional Office in Dakar in order to seek assistance in providing further explanation, where necessary, in the western part of Africa where problems had been encountered and provide appropriate examples in the templates in Annex 3 for local reports and METAR/SPECI.

The use of solidi in METAR/SPECI and local reports

3.1.34 The group noted a suggestion to clarify the use of solidi in METAR/SPECI and local reports when information was not available owing to the failure of one or more components of an automatic system. It was pointed out and agreed by the group that it would not be appropriate to include such options in Annex 3 as the requirements stipulate that appropriate measures should be taken to fulfil the observations in all cases. However, it was noted that under the *Working Arrangements between the International Civil Aviation Organization and the World Meteorological Organization* (Doc 7475) it was the responsibility of WMO to advise on how to fulfil the requirements of Annex 3 and that the WMO Publication No. 306, *Manual on Codes* did contain guidance on how to use solidi in such cases. It was noted that some clarification to the guidance would be beneficial and agreed that members of the group would ensure that the appropriate

information would be passed to their respective colleagues who were members of the WMO Expert Team on Data Representation and Codes in order to clarify the situation.

Miscellaneous editorial amendments to Annex 3

3.1.35 The group noted that a review of the differences filed against Annex 3 following the applicability of Amendment 73 had taken place within the Secretariat and that a number of editorial corrections and inconsistencies in Annex 3 had come to light:

a) the range of cloud heights to be reported was extended (up to 3 000 m (10 000 ft)) to cover the reporting of cumulonimbus and towering cumulus clouds with high cloud bases, this additionally affected the range of height of cloud base in TAF;

b) the specific reference to pressure readings in the information supplied to the approach control office was deleted as it is superfluous and already was included in METAR/SPECI (Annex 3, Appendix 9, 1.2 a) refers);

c) the notes pertaining to unidentified precipitation (UP) were extended to cover freezing unidentified precipitation (FZUP) and recent unidentified precipitation (REUP), recent freezing unidentified precipitation (REFZUP) was also introduced in METAR/SPECI;

d) an editorial correction was made to one example of wind reporting in the METAR/SPECI template (one digit missing);

e) RVR was added to the example of a local special report since the visibility was below 1 500 m (Annex 3, Appendix 3, Example A3-2 a) refers);

f) the reference to "above" the aerodrome reference point was deleted in relation to the reporting of pressure (QFE) as, by definition, a threshold cannot be above the aerodrome reference point (Annex 3, Appendix 3, 4.7.2 refers);

g) the reference to showers of ice pellets was removed (Annex 3, Appendix 3, 4.4.2.4 refers) together with all references to thunderstorm with ice pellets as ice pellets are defined by WMO as stratiform, not convective precipitation, in accordance with the *International Cloud Atlas, Volume I — Manual on the Observation of Clouds and other Meteors* (WMO - No. 407); and

h) further editorial issue was noted by the group involving potential ambiguity in the reporting of variations of the wind speed (Annex 3, Appendix 3, 4.1.4.2 b) refers) and the terminology used to determine the ranges of wind direction variation.

3.1.36 The group noted that there was a need to introduce the possibility of using the descriptors SH and TS with unidentified precipitation (UP) together with the equivalent codes to be included in the recent weather.

3.1.37 The group noted a request to include an option to provide separate visibility and wind forecasts for different runways in the trend attached to the local report. However, the group agreed that this would not be appropriate as it would imply a higher level of forecasting ability than is required and would not, in general, be feasible and such additional forecast information would, in most cases, be of limited value.

3.1.38 In this regard, an appropriate amendment to Annex 3 is included in **Appendix C** as a part of draft Amendment 74.

3.2 Capability of automatic observing equipment to meet aeronautical requirements and the use of automated equipment during operational hours

***Capability of automatic observing equipment to meet aeronautical requirements* (ANC task 9206 a) 1, 4)**

3.2.1 The group recalled that an assessment had been carried out at the AMOSSG/4 Meeting regarding the ability of automatic observing systems to meet the aeronautical requirements given in Annex 3.

3.2.2 It had been agreed that temperature, dew point temperature, wind, atmospheric pressure, visibility and RVR could all be observed, or assessed, by fully automatic observing equipment in order to meet the requirements of Annex 3. Furthermore, it had been agreed that the cloud amount and height of cloud base could also be observed similarly and that any difficulties experienced had been sufficiently minor to be ignored when considered alongside the difficulties experienced by human observers at night. The group had also noted that WMO had been made aware of further work, to be completed when practicable, concerning the harmonization of algorithms for the calculation of the height of cloud base and cloud amount, which would be of great value in the future.

3.2.3 It had been agreed by the group that the detection of CB and/or TCU had not been possible by the use of direct measurement at an aerodrome and that it was unlikely that significant changes would be made to this status in the foreseeable future. However, it had also been noted that the use of remote sensing techniques was likely to provide alternative methods for the indirect observation of CB and TCU which would require further consideration by the group concerning the most appropriate means of reporting in the future.

3.2.4 The group had agreed that it was not currently possible to observe all of the present and recent weather phenomena using fully automatic systems.

3.2.5 In its review of any progress made in the intervening period the group agreed that the overall status had not changed from that given above.

***Use of fully automated observing systems during operational hours* (ANC task 9206 a) 6)**

3.2.6 The group recalled that the MET Divisional Meeting (2002) in it Recommendation 2/3 d) had invited ICAO, in consultation with WMO to re-evaluate the requirements for present weather and recent weather taking into account the capacity of automatic systems. Furthermore, in its Recommendation 2/3 c) the meeting had invited ICAO, in consultation with WMO to study the expansion of the use of automatic systems to include operational hours including the new concept of the "required level of meteorological services".

3.2.7 An ad hoc group had been established at the AMOSSG/4 Meeting to undertake the two tasks given above with a view to reporting at the end of 2004 which would have enabled the **Secretary** to develop any changes to Annex 3 as required. However, the work of the ad hoc group had not been completed by the

end of 2004 but a report was provided by the rapporteur of the ad hoc group at the meeting concerning how an automatic system could provide a METAR for flight planning purposes.

3.2.8 It was recognized by the group that the only significant shortfall of fully automatic systems in fulfilling the requirements of Annex 3 was in the reporting of certain present and recent weather elements. The need to specify a minimum requirement for reporting could be accommodated by upgrading to a Standard a subset of safety critical present weather elements to ensure that any use of fully automatic observing systems gave priority to those elements with the highest importance. The group agreed that this minimum set should consist of the identification of precipitation and freezing precipitation (including intensity), fog, freezing fog and thunderstorms (including thunderstorms in the vicinity). The group agreed that the concept of the required level of service would be difficult to specify on a global basis as such requirements would be likely to vary significantly between States. Therefore, the group agreed that the use of fully automatic systems should be allowed during operational hours as determined by the MET authority to provide METAR/SPECI in consultation with users, i.e. the aerodromes for which it would be acceptable to use fully automatic observing systems during operational hours should be selected by the MET authority based on consultation with the users concerned. It was also noted by the group that the consideration of using fully automatic observing systems to provide local reports would need further consideration which could be given at the AMOSSG/6 Meeting.

3.2.9 The group further agreed that the opportunity should be taken to upgrade the reporting of the height of cloud base to a standard as well as the requirement to use the word "AUTO" when fully automatic systems are used to report METAR/SPECI.

3.2.10 The group noted some concerns that the introduction of fully automatic observing systems might not be a suitable alternative to human observers in some regions. It was accepted that whilst the proposed changes to Annex 3 would enable States to make use of such systems it was not expected that their use would become a requirement and that States would maintain the option of using human observers for the foreseeable future.

3.2.11 In this regard, an appropriate amendment to Annex 3 is included in **Appendix C** as a part of draft Amendment 74.

3.3 Use of remote sensing techniques (ANC task 9206 a) 2)

3.3.1 The group recalled that several presentations had been made at the AMOSSG/4 Meeting concerning the use of remote sensing techniques in order to assist in the generation of automatic aerodrome observations. It had been suggested that information stemming from remote sensors could fall into three categories:

a) information used to assist in the production of standard meteorological reports;

b) information used to assist aerodrome operations but not as direct input to aerodrome meteorological reports; and

c) information that could be sent directly to an aircraft in flight.

3.3.2 The group had agreed that the potential to use remote sensing as a direct input into meteorological reports was of primary interest to the group although the possibility of new requirements stemming from information not previously available should be considered by future meetings of the group.

It had also been noted that any potential products developed for uplink to aircraft in flight should be considered by the Meteorological Information Data Link Study Group (METLINKSG).

3.3.3 No further developments in this area were reported by the group although it was indicated that work on the automatic detection, by radar and other technologies, of deep convection, and hence the likely existence of CB or TCU was in progress in France for which a report would be given by **Michel** at the AMOSSG/6 Meeting.

3.4 **Agreed action by the group**

a) **Michel** to provide a report on the development of remote sensing products to detect the likely existence of CB and/or TCU in the vicinity of an aerodrome;

b) **Secretary** to develop an amendment to Annex 3 concerning the use of noise abatement procedures in coordination with the OPS/AIR Section of ICAO; and

c) **Secretary** to contact the MET Regional Officer at the ICAO Regional Office in Dakar to seek assistance in the explanation of the RVR reporting requirements for States in the western part of Africa.

4. AGENDA ITEM 6: AERODROME FORECAST REQUIREMENTS

4.1 Alignment of TAF amendment criteria with the criteria used for the issuance of SPECI (ANC task 9206 a) 7)

4.1.1 The group recalled that the MET Divisional Meeting in its Recommendation 2/3 b) had invited ICAO, in consultation with the World Meteorological Organization (WMO) and user organizations, to consider the need for harmonizing the criteria for issuance of SPECI and those for including change groups in TAF.

4.1.2 The AMOSSG/4 Meeting had agreed that there was an operational need to harmonize these two sets of criteria but had recognized that it was the SPECI criteria that represented the operational requirements. Therefore, the **Secretary** had been requested to prepare an amendment proposal to the TAF change group criteria in order to provide the harmonization as required. The required changes consisted of more detailed criteria for wind speed and visibility. Furthermore, the group agreed that a requirement should be included in the SPECI criteria for the development or dissipation of cumulonimbus clouds which was a requirement for a change group in TAF. It was also agreed that no change should be made to the criteria in TAF relating to visibility as the values given coincided to this in SPECI for visibility for the higher values and RVR for the lower values.

4.1.3 In this regard, an appropriate amendment to Annex 3 is included in **Appendix C** as a part of draft Amendment 74.

4.2 Update of Attachment B to Annex 3 (ANC task 0403 a) 1, 4)

4.2.1 The group recalled that at the AMOSSG/4 Meeting a review had been carried out concerning the operationally desirable accuracy of forecasts contained in Attachment E to Annex 3, which following the adoption of Amendment 73 in November 2004 had become Attachment B.

4.2.2 The review of the attachment had taken place in two parts; within the AMOSSG concerning those forecast criteria associated with aerodromes, and within the World Area Forecast System Operations Group (WAFSOPSG) dealing with en-route forecasts. A further request, stemming from WMO, had sought to ensure that the format of the attachment allowed for the forecast verification scheme that was being developed by WMO at that time. The group recalled that clarification had been sought into the precise nature of the concerns expressed by WMO and had requested **Saad** to provide some guidance on how the format of the attachment could be changed to accommodate such a verification scheme. In response to action a) of agenda item 7 of the summary of discussions of the AMOSSG/4 Meeting, a response from WMO had been received by the Secretary on 19 October 2004 stating that no changes were required to the format of the attachment.

4.2.3 In this regard, an appropriate amendment to Annex 3 is included in **Appendix C** as a part of draft Amendment 74. The proposal simply combines the changes agreed by the AMOSSG/4 Meeting and by the WAFSOPSG/1 Meeting.

4.2.4 The group was further invited by the Air Navigation Commission to consider whether there was a need to establish a requirement for the accuracy of precipitation forecasts. It was noted that the requirements specified the occurrence or non-occurrence of precipitation whereas there was no requirement concerning the intensity of precipitation. This was a longstanding task given to the Secretariat by the Commission in 1994 which had arisen during the consultation process concerning Amendment 70 to Annex 3.

4.2.5 The group agreed that the user organizations should be consulted regarding the possible requirement to define a desirable accuracy of forecasts of the intensity of precipitation and agreed that **Henry** and **Kimberly** should be asked to provide a report at the AMOSSG/6 Meeting.

4.3 Desirability of greater accuracy in the first three hours of TAF and the limitation of the use of the PROB qualification (ANC task 0403 a) 2)

4.3.1 The group recalled that following action taken by the Air Navigation Commission on a proposal to study the operational feasibility and desirability of requiring a greater accuracy in TAF during the first three hours of its validity period, the group had agreed during the AMOSSG/4 Meeting that further clarification was required. It had been noted that one option was to remove the use of the "PROB" statement during this validity period and that it had been unclear whether operational difficulties had been experienced either by overuse of PROB or the interpretation of PROB statements in differing ways by the operators.

4.3.2 It was noted by the group that no such problems had been encountered and that the user community were happy with the current provisions concerning the use of PROB. Therefore, the group agreed that no further action was necessary.

4.4 TAF validity period (new task)

4.4.1 The group recalled the discussions at the AMOSSG/4 Meeting concerning difficulties being experienced by operators with the use of TAF for increasingly long flights. A proposed solution had been that 24-hour forecasts should be issued with a lead time of 6 hours which would cater for the longest routes such as Manilla-Paris and Frankfurt-Santiago. However, some members of the group had expressed the view that a 30-hour forecast with no lead time would be a more appropriate solution. The group had agreed that the requirement for a 30-hour TAF would be the most appropriate long-term solution despite the need to amend the TAF code form to accommodate the duplication of validity times within the period of the forecast.

4.4.2 The group noted that the EANPG/46 Meeting (30 November to 2 December 2004), had proposed an interim solution of providing 24-hour TAF with a 6 hour lead time in the EUR Region as the issuance times for TAF were subject to regional agreements. However, the IATA position that only a single TAF was required for each aerodrome had been noted by the meeting which would require a further solution to eliminate the need for the same aerodrome having both a short and long TAF. The meeting had therefore agreed on the following conclusion:

Conclusion 46/25 — Annex 3 provisions for issuance of aerodrome forecasts for very long haul flights

That ICAO consider a review of the Annex 3 provisions on the issuance and validity time for aerodrome forecasts (TAF) in order to meet new operational requirements for very long haul flights.

4.4.3 The group agreed on the proposed changes to Annex 3 shown in **Appendix C** stating a requirement for the introduction of 30-hour TAF to be issued every 6 hours as a part of draft Amendment 74 to Annex 3. The proposed amendment includes the date in all appropriate time groups.

4.4.4 The group further agreed that there was no requirement for the issuance of more than one TAF at a particular aerodrome, i.e. an aerodrome should not have more than one valid TAF in operation at any one time. However, it was also noted that some problems had arisen for users with TAFs issued using a long lead time which effectively cancelled the previous TAF before the validity period of the new TAF had passed. Technically this left the aerodrome without a valid forecast until such time that the new TAF became valid. The group agreed that a TAF should not be not cancelled by the issuance of a new TAF until the validity period of the new TAF had been reached. The group also agreed that there should be standard issuance times at 0000, 0600, 1200 and 1800 UTC for TAF of 12 hours duration or longer and additional issuance times of 0300, 0900, 1500 and 2100 UTC for TAF less than 12 hours. Finally, the group agreed that the minimum forecast period of 9 hours should be removed to allow flexibility for States wishing to issue TAF for a short period eg. prior to the overnight closure of the aerodrome.

4.4.5 In this regard, an appropriate amendment to Annex 3 is included in **Appendix C** as a part of draft Amendment 74.

4.4.6 An additional problem concerning the interpretation of the continuous review of TAF was raised and the group noted that some States were considering the lack of one or more METAR as sufficient cause to cancel a TAF. This was causing problems for users who were incurring costs owing to the additional fuel requirements being imposed for the selection of diversions further afield. The group agreed that some clarification was required in allowing States to use alternative means to review TAFs when METAR were unavailable.

4.4.7 In this regard, an appropriate amendment to Annex 3 is included in **Appendix C** as a part of draft Amendment 74.

4.5 **Visibility forecasting (ANC task 0403 a) 3)**

4.5.1 During the review process of Amendment 73 to Annex 3, it had been noted by the Air Navigation Commission that there had been a need to consider whether there was a requirement to include the forecast of minimum visibility in TAF, in addition to prevailing visibility, when the visibility was forecast to vary in different directions. The group considered that such forecasts would be of little operational use and

that there would be great difficulty involved in forecasting variable visibility over a period of up to 30 hours. The group also felt that this was adequately covered by the use of TEMPO and PROB. Therefore, the group agreed that it would be inappropriate to make any amendments to Annex 3 in this regard.

4.6 **Runway visual range (RVR) forecasting (ANC task 0403 b))**

4.6.1 The group recalled that it was a longstanding task of the ICAO Secretariat to monitor the development of techniques for the forecasting of RVR which had been originally formulated by the COM/MET/82 Divisional Meeting.

4.6.2 This issue had been studied by the MET/AOP PT in the EUR Region more recently and members of the group confirmed that no significant progress had been made towards the introduction of provisions in Annex 3 at the time of the meeting.

4.7 **Miscellaneous editorial amendments to Annex 3**

4.7.1 Three suggested editorial changes to the Annex 3 provisions had been brought to the attention of the Secretariat during a review of the differences filed following the applicability date of Amendment 73 in November 2004:

a) the issuance of SPECI and amendments to TAF for the onset or cessation of thunderstorms only applied to those without precipitation, whereas those with precipitation should also be listed in the category where a change in intensity was considered;

b) the consideration of present weather phenomena to be reported in trend forecasts currently allowed a maximum of three elements to be reported for both elements involving precipitation and those without which could be misinterpreted to give a total of six elements. Therefore, clarification was required to specify that the total number of elements to be reported should not exceed three; and

c) landing forecasts were intended to be provided as determined by regional air navigation agreement whereas the provisions in Annex 3 implied that the format of these forecasts was stipulated in the regional agreement rather than an indication of the aerodromes for which the requirement existed.

4.7.2 In this regard, an appropriate amendment to Annex 3 is included in **Appendix C** as a part of draft Amendment 74.

4.8 **Agreed action by the group**

Henry and **Kimberly** to provide reports concerning the need for the intensity of precipitation to be included in Attachment B to Annex 3;

5. AGENDA ITEM 7: GUIDANCE MATERIAL

5.1 The group recalled that the MET Divisional Meeting (2002) in its Recommendation 2/2 had called for the issuance of a manual on the use of automatic observing systems at aerodromes. Following a review by the AMOSSG/4 Meeting, the manual had been submitted for the editorial and translation processes with the hope that it would be available to States by the applicability date of Amendment 73 to Annex 3 in November 2004.

5.2 The heavy workload of the editorial sections within ICAO had caused some delay in these processes and further significant delays had been created by the budgetary cuts imposed on the organization by the 35th Assembly. The result of these problems was that the manual had remained on the ICAO website in draft form so that it could be used by States with the proviso that editorial changes were still expected. It was not known when the final version would be published although any changes made were not expected to have any impact on the technical content of the manual. The group expressed its concern regarding the lack of progress in the publication of this important guidance material, particularly when the MET Divisional Meeting (2002) had emphasized the need for such material to assist States in the implementation of Amendment 73.

5.3 The group agreed that a review of the draft material should be carried out given the limited time provided for the review of the initial draft of the manual. Furthermore, it was agreed that detailed comments should be sent to the **Secretary** by 30 September 2005 for incorporation into a second edition of the manual which would be then circulated to the group for final comments. The aim was to submit the agreed second edition for publication by the end of 2005. It was emphasized that the section on present weather should receive special attention and that **Pekka** should provide a provisional set of specifications for the various sensors involved in aerodrome observing for review by the group and consideration as an additional appendix to the manual.

5.4 The text of the draft manual is available on the study group website at: http://www.icao.int/anb/sg/amossg .

5.5 Agreed action by the group

a) **all members to** review the draft *Manual on Automatic Meteorological Observing Systems at Aerodromes* (Doc 9837) with comments to be sent to the **Secretary** by 30 September 2005; and

b) **Pekka** to provide a set of specifications for automatic sensors by 30 September 2005 for review by the group.

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

6.1 Progress concerning the development of BUFR code tables

6.1.1 The group noted that the WMO Expert Team on Data Representation and Codes (ET (DR & C)), at its meeting in Kuala Lumpur, Malaysia, 21 to 26 June 2004, had agreed upon the formulation of BUFR code tables for METAR/SPECI, TAF and SIGMET. The development of the BUFR code tables was being coordinated with ICAO through the attendance of the Secretariat at the relevant WMO meetings.

6.2 Migration plan for the introduction of BUFR coded OPMET messages (ANC task 0101)

6.2.1 The group recalled that the MET Divisional Meeting (2002) in its Recommendation 2/5 had invited WMO to develop a migration plan concerning the use of table-driven codes forms for the dissemination of METAR/SPECI and TAF. The AMOSSG/4 Meeting had noted that a plan had been endorsed by the WMO Congress which had included a timetable specifying that table-driven codes could be used, by those States in a position to do so, in parallel with the alphanumeric codes from 2007 and that the fully operational use of table-driven codes was planned for 2015.

6.2.2 In order to cater for the use of table-driven codes, by States in a position to do so, from 2007 there was a need to amend Annex 3 accordingly. It was proposed that such use of the BUFR code for METAR, TAF and SIGMET should be in addition to the current requirement to use the traditional alphanumeric codes and would be carried out between States under appropriate bilateral agreements. In this regard, an appropriate amendment to Annex 3 is included in **Appendix C** as a part of draft Amendment 74.

6.2.3 The group noted that in order to address this issue, the EANPG/45 Meeting had formulated the following conclusion:

Conclusion 45/12 — Migration to BUFR coded OPMET messages

That, ICAO give guidance to achieve a uniform global approach to the implementation of binary universal form for the representation of meteorological data (BUFR) coded operational meteorological (OPMET) messages, including early advice of the likely time-frame for the development of the provisions necessary for air traffic services message handling service (ATSMHS) extended services to accommodate BUFR coded messages.

6.2.4 In order to accommodate the exchange of BUFR coded messages, it was necessary to implement a global communications infrastructure that is capable of handling digital data which was not possible with the current aeronautical fixed service (AFS). The planning for the global aeronautical telecommunication network (ATN) was carried out by the ICAO Aeronautical Communications Panel (ACP) who would take the responsibility of providing the guidance requested by the EANPG. The group approved the broad set of requirements for such guidance given in **Appendix E** that would be considered as a basic framework for use by the ACP. The set of requirements had been coordinated with the Communications, Navigation, and Surveillance (CNS) Section of the Air Navigation Bureau (ANB) of ICAO.

6.2.5 The group noted that in order to address this issue, the EANPG/46 Meeting had formulated the following conclusion:

Conclusion 46/18 — Conversion software for BUFR coded OPMET messages

That, ICAO, in coordination with the World Meteorological Organization (WMO), develop the necessary specifications to ensure that a consistent presentation format is provided for Traditional Alphanumeric Codes (TAC) and that the mapping between BUFR and TAC is complete and unambiguous.

6.2.6 The group agreed that in order to ensure that the mapping from the BUFR code tables produced by WMO to the alphanumeric codes was addressed, the matter should be raised by the **Secretary** at the next meeting of the WMO ET (DR & C).

6.3 **Agreed action by the group**

The **Secretary** to raise the issue of ensuring a well-defined mapping of the WMO BUFR code tables to the alphanumeric codes for METAR/SPECI, TAF and SIGMET at the next meeting of the WMO ET (DR & C).

7. AGENDA ITEM 9: FUTURE WORK PROGRAMME

7.1 The group reviewed its work programme which is reproduced in **Appendix F**.

8. AGENDA ITEM 10: ANY OTHER BUSINESS

8.1 The group was informed that in response to a conclusion arising from the EANPG/46 Meeting the group was expected to resolve a number of minor inconsistencies in the provisions of Annex 3 and Annex 11 — *Air Traffic Services* concerning the provision of meteorological information to ATS units. It was agreed that the **Secretary** would circulate a proposed amendment to Annex 3 and a consequential amendment to Annex 11 for consideration by the group as a part of draft Amendment 74 and draft Amendment 43 respectively in approximately two weeks.

8.2 The group considered that it was necessary to hold another meeting in approximately 18 months in order to progress the extensive workload contained in the future work programme of the group. It was agreed that the meeting would tentatively be held in Montreal during the second half of October 2006.

8.3 **Agreed action by the group**

The **Secretary** to circulate a proposed amendment to Annex 3 and Annex 11 for comments by the group in two weeks.

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APPENDIX A

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APPENDIX B

LIST OF DOCUMENTATION

Doc No.	Presented by	Title	Agenda Item
SN 01	Secretary	Provisional agenda	4
SN 02	Secretary	Overview of progress with respect to aerodrome observation requirements	5
SN 03	Secretary	Overview of progress with respect to aerodrome forecast requirements	6
SN 04	Secretary	Manual on automatic meteorological observing systems at aerodromes (Doc 9837)	7
SN 05	Secretary	Overview of progress with respect to the migration to BUFR coded OPMET messages	8
SN 06	Secretary	Updating the future work programme of the group	9
SN 07	S. Benarafa	WMO activities related to attainable accuracy for some meteorological observations	5.2
SN 08	S. Albersheim	Report of the ad hoc working group on automated observing systems to support operations	5.2
SN 09	A. Wells	Prevailing visibility	5
SN 10	C.M. Cheng	Trend forecast in local routine and special reports	5.1
SN 11	W. Woveris	Use of “PROB” in TAF forecast	6
SN 12	W. Woveris	Criteria for TAF cancellation	6
SN 13 & **Flimsy 01**	W. Woveris	User requirements for TAF	6
SN 14	W. Woveris	Criteria for TREND forecast requirement	6
SN 15	D. Hart	Reporting of recent weather phenomena	5.1
SN 16 **Revised**	D. Hart	TS identified as a present weather phenomena	5.1
SN 17	D. Hart	Characteristics of unidentified precipitation	5.1
SN 18	W. Maynard	Proposal for present and recent weather phenomena reporting criteria	5.1
SN 19	W. Maynard	Appropriate locations for fully automated weather systems	5.2
SN 20	D. Hart & M. Leroy	Considerations for automated reports	5.1

Doc No.	Presented by	Title	Agenda Item
SN 21	D. Hart	Level of meteorological services for international air navigation	5.2
SN 22	W. Maynard	Automated versus human assessment of visibility	5.2
SN 23	A.B. Okossi	The use of fully automatic observing systems during operational hours	5.2 5.3
SN 24	A.B. Okossi	The assessment and report of runway visual range	5.1
IP 01	Secretary	Working arrangements for the meeting	3
IP 02	A. Wells	The effects of extended validity TAFS on accuracy	6
IP 03	W. Maynard	Example of a domestic standard for automated weather stations	5.2

LIST OF DOCUMENTATION IN ORDER OF AGENDA ITEM

Agenda Item	Doc No.
3	IP 1
4	SN 1
5	SN 2, SN 7, SN 8, SN 9, SN 10, SN 15, SN 16, SN 17; SN 18, SN 19, SN 20, SN 21, SN 22, SN 23, SN 24, IP 3
6	SN 3, SN 11, SN 12, SN 13 & Flimsy No. 1, SN 14, IP 2
7	SN 4
8	SN 5
9	SN 6

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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**

FIFTEENTH EDITION — JULY 2004

PART I - Core SARPs

CHAPTER 1. DEFINITIONS

. . .

1.1 Definitions

When the following terms are used in the Standards and Recommended Practices for Meteorological Service for International Air Navigation, they have the following meanings:

. . .

Prevailing visibility. The greatest visibility value, observed in accordance with the definition of "visibility", which is reached or exceeded within at least half the horizon circle or within at least half of the surface of the aerodrome. These areas could comprise contiguous or non-contiguous sectors.

Note.— This value may be assessed by human observation and/or instrumented systems. When instruments are installed, they are used to obtain the best estimate of the prevailing visibility.

. . .

CHAPTER 4. METEOROLOGICAL OBSERVATIONS AND REPORTS

Note.—Technical specifications and detailed criteria related to this chapter are given in Appendix 3.

. . .

4.4 Special observations and reports

4.4.2 Reports of special observations shall be issued as:

a) local special reports, only for dissemination at the aerodrome of origin, (intended for arriving and departing aircraft); and

b) SPECI for dissemination beyond the aerodrome of origin (mainly intended for flight planning, VOLMET broadcasts and D-VOLMET) unless METAR are issued at half-hourly intervals.

Note.— Meteorological information used in ATIS (voice-ATIS and D-ATIS) is to be extracted from the local special report, in accordance with Annex 11, 4.3.6.1 g).

. . .

4.7 Reporting of meteorological information from automatic observing systems

4.7.1 **Recommendation.—** *METAR and SPECI from automatic observing systems should ~~only~~ 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. ~~These METAR and SPECI should be identified with the word "AUTO".~~*

4.7.2 METAR and SPECI from automatic observing systems shall be identified with the word "AUTO".

. . .

CHAPTER 6. FORECASTS

Note.— Technical specifications and detailed criteria related to this chapter are given in Appendix 5.

6.1 Interpretation and use of forecasts

. . .

6.1.2 The issue of a new forecast by a meteorological office, such as a routine aerodrome forecast, shall be understood to cancel automatically any forecast of the same type previously issued for the same place and for the same period of validity or part thereof as soon as the validity period of the new forecast has commenced.

6.2 Aerodrome forecasts

. . .

6.2.4 Meteorological offices preparing TAF shall keep the forecasts under continuous review through appropriate methods and, when necessary, shall issue amendments promptly. The length of the forecast messages and the number of changes indicated in the forecast shall be kept to a minimum.

Note.— Guidance on appropriate methods to keep TAF under continuous review is given in Chapter 3 of the Manual of Aeronautical Meteorological Practice (Doc 8896).

. . .

6.2.6 **Recommendation.**— *The period of validity of a routine TAF should be not ~~less than 9 hours nor~~ more than ~~24~~30 hours; th~~is~~e period of validity should be determined by regional air navigation agreement. Routine TAF valid for less than 12 hours should be issued every 3 hours ~~and~~ at 0000, 0300, 0600, 0900, 1200, 1500, 1800 and 2100 UTC. ~~those~~Routine TAF valid for 12 to ~~24~~30 hours should be issued every 6 hours at 0000, 0600, 1200 and 1800 UTC.*

6.2.7 Meteorological offices shall not issue more than one TAF covering the same period of validity.

6.3 Landing forecasts

6.3.1 A landing forecast shall be prepared by the meteorological office designated by the meteorological authority concerned as determined by regional air navigation agreement; such forecasts are intended to meet requirements of local users and of aircraft within about one hour's flying time from the aerodrome.

6.3.2 Landing forecasts shall be prepared in the form of a trend forecast~~, as determined by regional air navigation agreement~~.

. . .

PART II

APPENDICES AND ATTACHMENTS

APPENDIX 3. TECHNICAL SPECIFICATIONS RELATED TO METEOROLOGICAL OBSERVATIONS AND REPORTS
(*See Chapter 4 of this Annex***.)**

. . .

2. GENERAL CRITERIA RELATED TO METEOROLOGICAL REPORTS

2.1 Format of meteorological reports

. . .

2.1.3 **Recommendation**:— *METAR and SPECI should be disseminated, under bilateral agreements between States in a position to do so, in the WMO BUFR code form, in addition to the dissemination of the METAR and SPECI in accordance with 2.1.2.*

Note —. The BUFR code form is contained in WMO Publication No. 306, Manual on Codes*, Volume I.2, Part B — Binary Codes.*

2.2 Use of CAVOK

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

a) visibility, 10 km or more;

Note.— 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.

b) no cloud below 1 500 m (5 000 ft) or below the highest minimum sector altitude, whichever is greater, and no cumulonimbus or towering cumulus;

c) no weather of significance to aviation as given in 4.4.2.3 and 4.4.2.4;

information on visibility, runway visual range, present weather and cloud amount, cloud type and height of cloud base shall be replaced in all meteorological reports by the term "CAVOK".

2.3 Criteria for issuance of local special reports and SPECI

. . .

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

. . .

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 (~~with or~~ without precipitation)*
— *squall*
— *funnel cloud (tornado or waterspout);*

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

1) from ~~SKC~~NSC, FEW or SCT to BKN or OVC; or

2) from BKN or OVC to ~~SKC~~NSC, FEW or SCT; ~~and~~

k) when cumulonimbus clouds develop or dissipate;

~~k~~l) 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

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

Note.— Agreements for other criteria based on local aerodrome operating minima are to be considered in parallel with agreements for similar criteria for the use of change groups and the amendment of TAF given in Appendix 5, 1.3.1 i).

. . .

4. OBSERVING AND REPORTING OF METEOROLOGICAL ELEMENTS

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4.1 Surface wind

. . .

4.1.4 Reporting

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4.1.4.2 In local routine and special reports and in METAR and SPECI:

. . .

b) variations from the mean wind direction during the past 10 minutes shall be reported as follows, if the total variation is 60° or more:

1) when the total variation is ~~between~~ 60° or more and less than 180° and the wind speed is 6 km/h (3 kt) or more such directional variations shall be reported as the two extreme directions between which the surface wind has varied;

2) when the total variation is ~~between~~ 60° or more and less than 180° and the wind speed is less than 6 km/h (3 kt), the wind direction shall be reported as variable with no mean wind direction; or

3) when the total variation is 180° or more, the wind direction shall be reported as variable with no mean wind direction;

. . .

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 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.

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4.4 Present weather

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4.4.2 Reporting

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4.4.2.4 **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 rain "TSRA", snow "TSSN", ~~ice pellets "TSPL",~~ hail "TSGR" or small hail and/or snow pellets "TSGS" or combinations thereof, for example, "TSRASN". 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 of rain "SHRA", snow "SHSN", ~~ice pellets "SHPL",~~ hail "SHGR", small hail and/or snow pellets "SHGS", or combinations thereof, for example "SHRASN". Showers observed in the vicinity of the aerodrome (see 4.4.2.5) should be reported as "VCSH" without qualification regarding type or intensity of precipitation.*

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4.4.2.5 **Recommendation.**— *In local routine and special reports and in METAR and SPECI, the relevant intensity or, as appropriate, the proximity to the aerodrome of the reported present weather phenomena should be indicated as follows:*

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Vicinity *VC*

— *~~Not at the aerodrome but not further away than approximately 8 km from the aerodrome perimeter~~Between approximately 8 and 16 km of the aerodrome reference point and used only in METAR and SPECI with DS, SS, FG, FC, SH, PO, BLDU, BLSA, BLSN, TS and VA when not reported under 4.4.2.4.*

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4.5 Clouds

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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 30 m (100 ft) up to 3 000 m (10 000 ft) and in steps of 300 m (1 000 ft) above 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.~~1~~2 **Recommendation.**— *In local routine and special reports and in METAR and SPECI:*

a) cloud amount should be reported using the abbreviations "FEW" (1 to 2 oktas), "SCT" (3 to 4 oktas), "BKN" (5 to 7 oktas) or "OVC" (8 oktas);

b) cumulonimbus clouds and towering cumulus clouds should be indicated as "CB" and "TCU", respectively;

~~*c) the height of cloud base should be reported in steps of 30 m (100 ft) up to 3 000 m (10 000 ft) and in steps of 300 m (1 000 ft) above 3 000 m (10 000 ft);*~~

~~d~~c) the vertical visibility should be reported in steps of 30 m (100 ft) up to 600 m (2 000 ft);

~~*e) if there are no clouds and no restriction on vertical visibility and the abbreviation "CAVOK" is not appropriate, the abbreviation "SKC" should be used;*~~

~~f~~d) if there are no clouds of operational significance, no cumulonimbus, no towering cumulus and no restriction on vertical visibility and the abbreviation~~s~~ "CAVOK" ~~and "SKC" are~~is not appropriate, the abbreviation "NSC" should be used;

~~g~~e) when several layers or masses of cloud of operational significance are observed, their amount and height of cloud base should be reported in increasing order of the height of cloud base, and in accordance with the following criteria:

1) the lowest layer or mass, regardless of amount to be reported as FEW, SCT, BKN or OVC as appropriate;

2) the next layer or mass, covering more than 2/8 to be reported as SCT, BKN or OVC as appropriate;

3) the next higher layer or mass, covering more than 4/8 to be reported as BKN or OVC as appropriate; and

4) cumulonimbus and/or towering cumulus clouds, whenever observed and not reported in 1) to 3);

~~h~~f) when the cloud base is diffuse or ragged or fluctuating rapidly, the minimum height of cloud base, or cloud fragments, should be reported; and

g) when an individual layer (mass) of cloud is composed of cumulonimbus and towering cumulus clouds with a common cloud base, the type of cloud should be reported as cumulonimbus only.

Note.— Towering cumulus indicates cumulus congestus clouds of great vertical extent.

4.5.4.~~2~~3 In local routine and special reports:

a) the units of measurement used for the height of cloud base and vertical visibility shall be indicated; and

b) when there is more than one runway in use and the heights of cloud bases are observed by instruments for these runways, the available heights of cloud bases for each runway shall be reported and the runways to which the values refer shall be indicated.

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4.7 Atmospheric pressure

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4.7.2 Reference level

Recommendation.— *The reference level for the computation of QFE should be the aerodrome elevation. For non-precision approach runways, the thresholds of which are 2 m (7 ft) or more below ~~or above~~ the aerodrome elevation, and for precision approach runways, the QFE, if required, should refer to the relevant threshold elevation.*

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4.8 Supplementary information

4.8.1 Reporting

4.8.1.1 **Recommendation.—** *In local routine and special reports and in METAR and SPECI, the following recent weather phenomena, i.e. weather phenomena observed at the aerodrome during the period since the last issued routine report or last hour, whichever is the shorter, but not at the time of observation, should be reported, up to a maximum of three groups, in the supplementary information:*

— freezing precipitation	REFZDZ, REFZRA
— moderate or heavy precipitation (including showers thereof)	REDZ, RERA, RESN, RESG, REPL, RESHRA, RESHSN, RESHGR, RESHGS
— blowing snow	REBLSN
— duststorm, sandstorm	REDS, RESS
— thunderstorm	RETS, RETSRA, RETSSN, RETSGR, RETSGS
— funnel cloud (tornado or water spout)	REFC
— volcanic ash	REVA

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4.9 Meteorological information from automatic observing systems

4.9.1 Reporting

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4.9.1.3 **Recommendation.—** *In automated METAR and SPECI, present weather should be reported in accordance with provisions relevant to METAR and SPECI included in Section 4.4. However, 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.*

Note.— The abbreviations FZUP, REUP and REFZUP may be used for unidentified freezing precipitation, recent unidentified precipitation and recent unidentified freezing precipitation respectively when the type of precipitation cannot be identified by the automatic observing system.

4.9.1.4 **Recommendation.—** *In automated METAR and SPECI, clouds and vertical visibility should be reported in accordance with provisions relevant to METAR and SPECI included in Section 4.5. However:*

a) when the cloud type cannot be observed by the automatic observing system, the cloud type in each cloud group should be replaced by "///"; ~~and~~

b) when no clouds are detected by the automatic observing system and the system is not able to detect cumulonimbus clouds and towering cumulus clouds, it should be indicated by using the abbreviation "NCD"~~.~~;

c) when no clouds are detected by the automatic observing system and the system is able to detect the absence of cumulonimbus clouds and towering cumulus clouds, it should be indicated by using the abbreviation "NSC"; and

d) when cumulonimbus clouds and towering cumulus clouds are detected by the automatic observing system and the cloud amount or cloud height cannot be observed, the cloud amount and the cloud height should be replaced by "//////".

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

Key: M = inclusion mandatory, part of every message
C = inclusion conditional, dependent on meteorological conditions
O = inclusion optional

Note 1.— The ranges and resolutions for the numerical elements included in the local routine and special reports are shown in Table A3-4 of this appendix.

Note 2.— The explanations for the abbreviations used can be found in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes *(PANS-ABC, Doc 8400).*

Element as specified in Chapter 4	*Detailed content*	*Template(s)*			*Examples*
Identification of the type of report (M)	Type of report	MET REPORT or 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	nnnnnnZ			221630Z
Surface wind (M)	Name of the element (M)	WIND			WIND 240/15KMH (WIND 240/8KT)
	Runway (O)[2]	~~RWY nn[n]~~RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]			WIND RWY 18 TDZ 190/22KMH (WIND RWY 18 TDZ 190/11KT)
	Runway section (O)[3]	TDZ			
	Wind direction (M)	nnn/	VRB BTN nnn/ AND nnn/ *or* VRB	CALM	WIND VRB4KMH WIND CALM (WIND VRB2KT) WIND VRB BTN 350/ AND 050/4KMH (WIND VRB BTN 350/ AND 050/2KT)
	Wind speed (M)	[ABV] n[n][n]KMH (*or* [ABV] n[n]KT)			WIND 270/ABV 199KMH (WIND 270/ABV 99KT)
	Significant speed variations (C)[4]	MAX [ABV] nn [n] MNM n [n]			WIND 120/12KMH MAX35 MNM8 (WIND 120/6KT MAX18 MNM4)
	Significant directional variations (C)[5]	VRB BTN nnn/ AND nnn/	—		WIND 020/20KMH VRB BTN 350/ AND 070/ (WIND 020/10KT VRB BTN 350/ AND 070/)
	Runway section (O)[3]	MID			WIND RWY 14R MID 140/22KMH (WIND RWY 14R MID 140/11KT)
	Wind direction (O)[3]	nnn/	VRB BTN nnn/ AND nnn/ or VRB	CALM	
	Wind speed (O)[3]	[ABV] n[n][n]KMH (*or* [ABV] n[n]KT)			
	Significant speed variations (C)[4]	MAX [ABV] nn [n] MNM n [n]			
	Significant directional variations (C)[5]	VRB BTN nnn/ AND nnn/	—		
	Runway section (O)[3]	END			WIND RWY 27 TDZ 240/32KMH MAX54 MNM20 END 250/28KMH (WIND RWY 27 TDZ 240/16KT MAX27 MNM10 END 250/14KT)
	Wind direction (O)[3]	nnn/	VRB BTN nnn/ AND nnn/ *or* VRB	CALM	

	Wind speed (O)[3]	[ABV] n[n][n]KMH (*or* [ABV] n[n]KT)			
	Significant speed variations (C)[4]	MAX [ABV] nn [n] MNM n [n]			
	Significant directional variations (C)[5]	VRB BTN nnn/ AND nnn/	—		
Visibility (M)	Name of the element (M)	VIS		CAVOK	VIS 350M CAVOK VIS 7KM VIS 10KM
	Runway (O)[2]	~~RWY nn[n]~~RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]			*VIS RWY 09 TDZ 800M END 1200M*
	Runway section (O)[3]	TDZ			
	Visibility (M)	nn[n][n]M *or* n[n]KM			
	Runway section (O)[3]	MID			
	Visibility (O)[3]	nn[n][n]M *or* n[n]KM			
	Runway section (O)[3]	END			VIS RWY 18C TDZ 6KM RWY 27 TDZ 4000M
	Visibility (O)[3]	nn[n][n]M *or* n[n]KM			
RVR (C)[6]	Name of the element (M)	RVR			RVR RWY 32 400M RVR RWY 20 ~~5~~1600M
	Runway (C)[7]	~~RWY nn[n]~~RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]			
	Runway section (C)[8]	TDZ			
	RVR (M)	[ABV *or* BLW] nn[n][n]M			RVR RWY 10L BLW 50M RVR RWY 14 ABV 2000M RVR RWY 10 BLW 150M RVR RWY 12 ABV 1200M
	Runway section (C)[8]	MID			RVR RWY 12 TDZ 1100M MID ABV 1400M
	RVR (C)[8]	[ABV *or* BLW] nn[n][n]M			
	Runway section (C)[8]	END			RVR RWY 16 TDZ 600M MID 500M END 400M RVR RWY 26 500M RWY 20 800M
	RVR (C)[8]	[ABV *or* BLW] nn[n][n]M			
Present weather (C)[9, 10]	Intensity of present weather (C)[9]	FBL *or* MOD *or* *HVY*	—		
	Characteristics and type of present weather (C)[9,11]	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* ~~TSPL 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		MOD RA HZ HVY TSRA FG HVY DZ VA FBL SN MIFG HVY TSRASN FBL SNRA FBL DZ FG HVY SHSN BLSN
Cloud (M)[12]	Name of the element (M)	CLD			
	Runway (O)[2]	~~RWY nn[n]~~RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]			
	Cloud amount (M) or vertical visibility (O)[9]	FEW *or* SCT *or* BKN *or* OVC	OBSC	~~SKC or~~ NSC	CLD SCT 300M OVC 600M CLD NSC (CLD SCT 1000FT OVC 2000FT) CLD OBSC VER VIS 150M ~~CLD SKC~~ (CLD OBSC VER VIS 500FT)

	Cloud type (C)[9]	CB or TCU	—			CLD BKN TCU 270M (CLD BKN TCU 900FT)
	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 08 BKN 200FT RWY 26 BKN 300FT)
Air temperature (M)	Name of the element (M)	T				T17 TMS08
	Air temperature (M)	[MS]nn				
Dew-point temperature (M)	Name of the element (M)	DP				DP15 DPMS18
	Dew-point temperature (M)	[MS]nn				
Pressure values (M)	Name of the element (M)	QNH				QNH 0995HPA QNH 1009HPA
	QNH (M)	nnnnHPA				
	Name of the element (O)	QFE				QNH 1022HPA QFE 1001HPA QNH 0987HPA QFE RWY 18 0956HPA RWY 24 0955HPA
	QFE (O)	[~~RWY nn[n]~~RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]] nnnnHPA [~~RWY nn[n]~~RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]] nnnnHPA]				
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[13]				FC IN APCH WS IN APCH 60M-WIND: 360/50KMH WS RWY 12
	Location of the phenomenon (C)[9]	IN APCH [nnnMWIND nnn/nnKMH] *or* IN CLIMB-OUT [nnnM-WIND nnn/nnKMH] (IN APCH [nnnFT-WIND nnn/nnKT] or IN CLIMBOUT [nnnFTWIND nnn/nnKT]) *or* RWY nn[n]				
	Recent weather (C)[9, 10]	REFZDZ *or* REFZRA *or* REDZ *or* RE[SH]RA *or* RE[SH]SN *or* RESG *or* RESHGR *or* RESHGS *or* REBLSN *or* RESS *or* REDS *or* RETSRA *or* RETSSN *or* ~~RETSPL *or*~~ RETSGR *or* RETSGS *or* REFC *or* REPL *or* REVA *or* RETS				REFZRA CB IN CLIMB-OUT RETSRA
Trend forecast (O)[14]	Name of the element (M)	TREND				
	Change indicator (M)[15]	NOSIG	BECMG or TEMPO			TREND NOSIG TREND BECMG FEW 600M (TREND BECMG FEW 2000FT)
	Period of change (C)[9]		FMnnnn *and/or* TLnnnn *or* ATnnnn			
	Wind (C)[9]		nnn/ [ABV] n[n][n]KMH [MAX[ABV]nn[n]] (*or* nnn/ [ABV] n[n]KT [MAX[ABV]nn])			TREND TEMPO 250/70KMH MAX 100 (TREND TEMPO 250/35KT MAX 50)
	Visibility (C)[9]		VIS nn[n][n]M or VIS n[n]KM		CAVOK	TREND BECMG AT1800 VIS 10KM NSW TREND BECMG TL1700 VIS 800M FG TREND BECMG FM1030 TL1130 CAVOK
	Weather phenomenon: intensity (C)[9]		FBL *or* MOD *or* *HVY*	—	NSW	TREND TEMPO TL1200 VIS 600M BECMG AT1230 VIS 8KM NSW NSC
	Weather phenomenon: characteristics and type (C)[9, 10, 12]		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*	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*		TREND TEMPO FM0300 TL0430 MOD FZRA TREND BECMG FM1900 VIS 500M HVY SNRA TREND BECMG FM1100 MOD SN TEMPO FM1130 BLSN

			TSGR *or* TSGS *or* ~~TSPL *or*~~ TSRA *or* TSSN	BLSN *or* DRDU *or* DRSA or DRSN *or* FZFG *or* MIFG *or* PRFG			
	Name of the element (C)[9]		CLD				
	Cloud amount and vertical visibility (C)[9]		FEW *or* SCT *or* BKN *or* OVC	OBSC	~~SKC *or*~~ NSC		TREND BECMG AT1130 CLD OVC 300M (TREND BECMG AT1130 CLD OVC 1000FT)
	Cloud type (C)[9]		CB *or* TCU	—			TREND TEMPO TL1530 HVY SHRA CLD BKN CB 360M (TREND TEMPO TL1530 HVY SHRA CLD BKN CB 1200FT)
	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)]			

Notes.—

1. Fictitious location.
2. Optional values for one or more runways.
3. Optional values for one or more sections of the runway.
4. To be included in accordance with 4.1.4.2 c).
5. To be included in accordance with 4.1.4.2 b) 1)
6. To be included if visibility or RVR < 1 500 m.
7. To be included in accordance with 4.3.6.4 d).
8. To be included in accordance with 4.3.6.4 c).
9. To be included whenever applicable.
10. One or more, up to a maximum of three groups in accordance with 4.4.2.6, 4.8.1.1 and Appendix 5, 2.2.4.1.
11. Precipitation types listed under 4.4.2.3 a) may be combined in accordance with 4.4.2.6 and Appendix 5, 2.2.4.1. Only moderate or heavy precipitation to be indicated in trend forecasts in accordance with Appendix 5, 2.2.4.1.
12. Up to four cloud layers in accordance with 4.5.4.1 g).
13. Abbreviated plain language may be used in accordance with 4.8.1.2.
14. To be included in accordance with Chapter 6, 6.3.2.
15. 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

Key: M = inclusion mandatory, part of every message
C = inclusion conditional, dependent on meteorological conditions or method of observation
O = inclusion optional

Note 1.— The ranges and resolutions for the numerical elements included in METAR and SPECI are shown in Table A3-5 of this appendix.

Note 2.— The explanations for the abbreviations used can be found in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes *(PANS-ABC, Doc 8400).*

Element as specified in Chapter 4	*Detailed content*	*Template(s)*	*Examples*

Identification of the type of report (M)	Type of report (M)	METAR, METAR COR, SPECI *or* SPECI COR		METAR METAR COR SPECI
Location indicator (M)	ICAO location indicator (M)	nnnn		YUDO[1]
Time of the observation (M)	Day and actual time of the observation in UTC (M)	nnnnnnZ		221630Z
Identification of an automated or missing report (C)[2]	Automated or missing report identifier (C)	AUTO *or* NIL		AUTO NIL
END OF METAR IF THE REPORT IS MISSING.				
Surface wind (M)	Wind direction (M)	nnn	VRB	24015KMH VRB04KMH (24008KT) (VRB02KT) 19022KMH (19011KT) 00000KMH (00000KT) 140P199KMH (140P99KT)
	Wind speed (M)	[P]nn[n]		
	Significant speed variations (C)[3]	G[P]nn[n]		12012G35KMH (12006G18KT) 24032G54KMH (24016G27KT)
	Units of measurement (M)	KMH (*or* KT)		
	Significant directional variations (C)[4]	nnnVnnn	—	02020KMH 350V070 (02010KT 350V070)
Visibility (M)	Prevailing or minimum visibility (M)[5]	nnnn	C A V O K	0350 CAVOK 7000NDV 9999
	Unidirectional visibility (C)[6]	NDV		0800
	Minimum visibility (C)[7]	nnnn		2000 1200NW 6000 2800E
	Direction of the minimum visibility (C)[7]	N *or* NE *or* E *or* SE *or* S *or* SW *or* W *or* NW		
RVR (C)[8]	Name of the element (M)	R		R32/0400 R12R/1700 R10/M0050 R14L/P2000
	Runway (M)	~~nn[n]~~/nn[L]/*or* nn[C] *or* nn[R]/		
	RVR (M)	[P *or* M]nnnn		R16L/0650 R16C/0500 R16R/0450 R17L/0450
	RVR variations (C)[9]	V[P *or* M]nnnn		R20/0700V1200 R19/0350VP1200

	RVR past tendency (C)[10]		U, D *or* N			R12/1100U R26/0550N R20/0800D R09/0375V0600U R10/M0150V0500D
Present weather (C)[2,11]	Intensity or proximity of present weather (C)[12]		– *or* +	—	VC	
	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* SHGR *or* SHGS *or* SHRA *or* SHSN *or* SHUP *or* TSGR *or* TSGS *or* ~~TSPL *or*~~ *TSRA* *or* TSSN *or* TSUP *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*	*RA* *HZ* *VCFG* *+TSRA* *FG* *VCSH* *+DZ* *VA* *VCTS* *–SN* *MIFG* *VCBLSA* *+TSRASN* –SNRA DZ FG +SHSN BLSN UP FZUP TSUP FZUP
Cloud (M)[14]	Cloud amount and height of cloud base or vertical visibility (M)		FEWnnn *or* *SCTnnn* *or* *BKNnnn or* *OVCnnn*	*VVnnn or* VV///	~~SKC~~ ~~*or*~~ NSC or NCD[6]	~~FEW015 VV005 SKC~~ OVC030 VV/// NSC SCT010 OVC020 BKN025/// BKN009TCU NCD SCT008 BKN025CB
	Cloud type (C)[2]		CB *or* TCU *or* *III*[6]	—		
Air and dew-point temperature (M)	Air and dew-point temperatures (M)		[M]nn/[M]nn			17/10 02/M08 M01/M10
Pressure values (M)	Name of the element (M)		Q			Q0995 Q1009 Q1022 Q0987
	QNH (M)		nnnn			
Supplementary information (C)	Recent weather (C)[2, 11]		REFZDZ *or* REFZRA *or* REDZ *or* RE[SH]RA *or* RE[SH]SN *or* RESG *or* RESHGR *or* RESHGS *or* REBLSN *or* RESS *or* REDS *or* RETSRA *or* RETSSN *or* ~~RETSPL *or*~~ RETSGR *or* RETSGS *or* RETS *or* REFC *or* REVA *or* REPL*or* REUP[6] *or* REFZUP[6] *or* RETSUP[6] *or* RESHUP[6]			REFZRA RETSRA
	Wind shear (C)[2]		WS RWYnn[n] *or* WS ALL RWY			WS RWY03 WS ALL RWY
	Sea-surface temperature and state of the sea (C)[15]		W[M]nn/Sn			W15/S2
	State of the runway (C)[16]	Runway designator (M)	~~nn~~Rnn[L]/ *or* Rnn[C]/ *or* Rnn[R]/		R/SNOCLO	R99421594 R/SNOCLO R14L/CLRD//
		Runway deposits (M)	n *or* /		CLRD//	
		Extent of runway contamination (M)	n *or* /			
		Depth of deposit (M)	nn *or* //			
		Friction coefficient or braking action (M)	nn *or* //			

Trend forecast (O)[17]	Change indicator (M)[18]	NOSIG	BECMG *or* TEMPO				NOSIG BECMG FEW020
	Period of change (C)[2]		FMnnnn *and/or* TLnnnn or ATnnnn				
	Wind (C)[2]		nnn[P]nn[n][G [P]nn[n]]KMH (*or* *nnn[P]nn[G[P] nn]KT)*				TEMPO 25070G100KMH (TEMPO 25035G50KT)
	Prevailing visibility (C)[2]		*nnnn*			C A V O K	BECMG FM1030 TL1130 CAVOK BECMG TL1700 0800 FG BECMG AT1800 9000 NSW BECMG FM1900 0500 +SNRA BECMG FM1100 SN TEMPO FM1130 BLSN TEMPO FM0330 TL0430 FZRA
	Weather phenomenon: intensity (C)[12]		– *or* +	—	N S W		
	Weather phenomenon: characteristics and type (C)[2,11,13]		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* ~~TSPL *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			
	Cloud amount and height of cloud base or vertical visibility (C)[2]		FEWnnn *or* SCTnnn or BKNnnn *or* *OVCnnn*	VVnnn *or* *VV///*	~~S K C~~ ~~or~~ N S C		TEMPO TL1200 0600 BECMG AT1200 8000 NSW NSC BECMG AT1130 OVC010 TEMPO TL1530 +SHRA BKN012CB
	Cloud type (C)[2]		CB *or* TCU	—			

Notes.—

1. Fictitious location.
2. To be included whenever applicable.
3. To be included in accordance with 4.1.4.2 c).
4. To be included in accordance with 4.1.4.2 b) 1).
5. To be included in accordance with 4.2.4.4 b).
6. For automated reports only, in accordance with Section 4.9.
7. To be included in accordance with 4.2.4.4 a).
8. To be included if visibility or RVR < 1 500 m; for up to a maximum of four runways in accordance with 4.3.6.5 b).
9. To be included in accordance with 4.3.6.6 b).
10. To be included in accordance with 4.3.6.6 a).
11. One or more, up to a maximum of three, groups in accordance with 4.4.2.6, 4.8.1.1 and Appendix 5, 2.2.4.1.
12. To be included whenever applicable; no qualifier for *moderate* intensity in accordance with 4.4.2.5.
13. Precipitation types listed under 4.4.2.3 a) may be combined in accordance with 4.4.2.6 and Appendix 5, 2.2.4.1. Only moderate or heavy precipitation to be indicated in trend forecasts in accordance with Appendix 5, 2.2.4.1.

14. Up to four cloud layers in accordance with 4.5.4.1 g).
15. To be included in accordance with 4.8.1.4 a).
16. To be included in accordance with 4.8.1.4 b).
17. To be included in accordance with Chapter 6, 6.3.2.
18. Number of change indicators to be kept to a minimum in accordance with Appendix 5, 2.2.1; normally not exceeding three groups

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

Element as specified in Chapter 4		Range	Resolution
Runway:		01 – 36	1
Wind direction:	ºtrue	010 – 360	10
Wind speed:	KMH KT	1 – 399* 1 – 199*	1 1
Visibility:	M M KM	0 – 800 800 – 5 000 5 – 10	50 100 1
RVR:	M M M	0 – 400 400 – 800 800 – 2 000	25 50 100
Vertical visibility:	M FT	0 – 600 0 – 2 000	30 100
Clouds: height of cloud base:	M M FT FT	0 – 1 500 1500 – 3 000 0 – 5 000 5 000 – 10 000	30 300 100 1 000
Air temperature; Dew-point temperature:	ºC	–80 – +60	1
QNH; QFE:	hPa	0500 – 1 100	1

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

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

Element as specified in Chapter 4			Range	Resolution
Runway:		(no units)	01 – 36	1
Wind direction:		° true	000 – 360	10
Wind speed:		KMH KT	00 – 399* 00 – 199*	1 1
Visibility:		M M M M	0000 – 0800 0800 – 5 000 5 000 – 9 000 9 000 – 9 999	50 100 1 000 999
RVR:		M M M	0000 – 0400 0400 – 0800 0800 – 2 000	25 50 100
Vertical visibility:		30's M (100's FT)	000 – 020	1
Clouds: height of cloud base:		30's M (100's FT) 30's M (100's FT)	000 – 050 050 – 100	1 10
Air temperature; Dew-point temperature:		ºC	–80 – +60	1
QNH:		hPa	0850 – 1 100	1
Sea-surface temperature:		ºC	–10 – +40	1
State of the sea:		(no units)	0 – 9	1
State of the runway	Runway designator:	(no units)	01 – 36; ~~51 – 86;~~ 88; 99	1
	Runway deposits:	(no units)	0 – 9	1
	Extent of runway contamination:	(no units)	1; 2; 5; 9	—
	Depth of deposit:	(no units)	00 – 90; 92 – 99	1
	Friction coefficient/braking action:	(no units)	00 – 95; 99	1

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

Example A3-2. Special report

a) Local special report (same location and weather conditions as SPECI):

SPECIAL YUDO 151115Z WIND 050/25KT MAX37 MNM10 VIS 1200M RVR RWY 05 ABV 1800M HVY TSRA CLD BKN CB 500FT T25 DP22 QNH 1008 HPA TREND TEMPO TL1200 VIS 600M BECMG AT1200 VIS 8KM NSW NSC

b) SPECI for YUDO (Donlon/International)*:

SPECI YUDO 151115Z 05025G37KT 3000 1200NE+TSRA BKN005CB 25/22 Q1008 TEMPO TL1200 0600 BECMG AT1200 8000 NSW NSC

Meaning of both reports:

Special report for Donlon/International* issued on the 15th of the month at 1115 UTC; surface wind direction 050 degrees; wind speed 25 knots gusting between 10 and 37 knots (minimum wind speed not to be included in SPECI) visibility

1 200 metres (along the runway(s) in the local special report); prevailing visibility 3 000 metres (in SPECI) with minimum visibility 1 200 metres to north east (directional variations to be included in SPECI only); RVR above 1 800 metres on runway 05 (RVR not required in SPECI with prevailing visibility of 3 000 metres); thunderstorm with heavy rain; broken cumulonimbus cloud at 500 feet; air temperature 25 degrees Celsius; dew-point temperature 22 degrees Celsius; QNH 1 008 hectopascals; trend during next 2 hours, visibility (along the runway(s) in the local special report; prevailing visibility in SPECI) temporarily 600 metres from 1115 to 1200, becoming at 1200 UTC visibility (along the runway(s) in the local special report; prevailing visibility in SPECI) 8 kilometres, thunderstorm ceases and nil significant weather and nil significant cloud.

* Fictitious location

Note.— In this example, the non-SI alternative units "knot" and "foot" were used for wind speed and height of cloud base, respectively. However, in accordance with Annex 5, the corresponding primary units "kilometre per hour" and "metre" may be used instead.

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APPENDIX 5. TECHNICAL SPECIFICATIONS RELATED TO FORECASTS

(See Chapter 6 of this Annex.)

1. CRITERIA RELATED TO TAF

1.1 TAF format

1.1.1 TAF shall be issued in accordance with the template shown in Table A5-1 and disseminated in the TAF code form prescribed by the World Meteorological Organization.

Note.— The TAF code form is contained in WMO Publication No. 306, Manual on Codes, Volume I.1, Part A — Alphanumeric Codes.

1.1.2 **Recommendation**:— *TAF should be disseminated, under bilateral agreements between States in a position to do so, in the WMO BUFR code form, in addition to the dissemination of the TAF in accordance with 1.1.1.*

Note —. The BUFR code form is contained in WMO Publication No. 306, Manual on Codes*, Volume I.2, Part B — Binary Codes.*

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1.3 Use of change groups

1.3.1 **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 degrees or more, the mean speed before and/or after the change being 20 km/h (10 kt) or more;

b) when the mean surface wind speed is forecast to change by 20 km/h (10 kt) or more;

c) when the variation from the mean surface wind speed (gusts) is forecast to increase by 20 km/h (10 kt) or more, the mean speed before and/or after the change being 30 km/h (15 kt) or more;

~~a~~d) when the surface wind is forecast to change through values of operational significance. ~~t~~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 will change through values representing the main operating limits for typical aircraft operating at the aerodrome;

~~b~~e) when the visibility is forecast to improve and change to or pass through one or more of the following values, or when the visibility is forecast to deteriorate and pass through one or more of the following values:

1) 150, 350, 600, 800, 1 500 or 3 000 m; or

2) 5 000 m in cases where significant numbers of flights are operated in accordance with the visual flight rules;

~~c~~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
~~— other weather phenomena given in Appendix 3, 4.4.2.3 only if they are expected to cause a significant change in visibility~~;

~~d~~g) when the onset or cessation of any of the following weather phenomena or combinations thereof are forecast to begin or end:

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

~~e~~h) when the height of base of the lowest layer or mass of cloud of BKN or OVC extent is forecast to lift and change to or pass through one or more of the following values, or when the height of the lowest layer or mass of cloud of BKN or OVC extent is forecast to lower and pass through one or more of the following values:

1) 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft); or

2) 450 m (1 500 ft), in cases where significant numbers of flights are operated in accordance with the visual flight rules;

~~f~~i) when the amount of a layer or mass of cloud below 450 m (1 500 ft) is forecast to change:

1) from ~~SKC~~NSC, FEW or SCT to BKN or OVC; or

2) from BKN or OVC to ~~SKC~~NSC, FEW or SCT;

~~g~~j) when cumulonimbus clouds area forecast to develop or dissipate;

~~h~~j) when the vertical visibility is forecast to improve and change to or pass through one or more of the following values, or when the vertical visibility is forecast to deteriorate and pass through one or more of the following values: 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft)~~, and~~.

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

Note.— Agreements for other criteria based on local aerodrome operating minima are to be considered in parallel with agreements for similar criteria for the issuance of SPECI given in Appendix 3, 2.3.2 m).

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2. CRITERIA RELATED TO TREND FORECASTS

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2.2 Inclusion of meteorological elements in trend forecasts

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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~~, up to a maximum of three,~~ of the following weather phenomena or combinations thereof:

— freezing precipitation
— moderate or heavy precipitation (including showers thereof)
— 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.

2.2.4.2 The trend forecast shall indicate the expected onset or cessation of one or more~~, up to a maximum of three,~~ of the following weather phenomena or combinations thereof:

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

2.2.4.3 The total number of phenomena reported in 2.2.4.1 and 2.2.4.2 above shall not exceed three.

2.2.4.~~3~~4 The expected end of occurrence of the weather phenomena shall be indicated by the abbreviation "NSW".

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2.3 Use of change indicators

2.3.1 Change indicators in the trend forecast shall be issued in accordance with Table A3-3.

Editorial Note.— Renumber subsequent paragraphs accordingly.

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Table A5-1. Template for TAF

Key:	M	=	inclusion mandatory, part of every message
	C	=	inclusion conditional, dependent on meteorological conditions or method of observation
	O	=	inclusion optional

Note 1.— The ranges and resolutions for the numerical elements included in TAF are shown in Table A5-3 of this appendix.

Note 2.— The explanations for the abbreviations used can be found in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes *(PANS-ABC, Doc 8400).*

Element as specified in Chapter 6	*Detailed content*	*Template(s)*			*Examples*
Identification of the type of forecast (M)	Type of forecast (M)	TAF or TAF AMD or TAF COR			TAF TAF AMD
Location indicator (M)	ICAO location indicator (M)	nnnn			YUDO[1]
Time of issue of forecast (M)	Day and time of issue of the forecast in UTC (M)	nnnnnnZ			160000Z
Identification of a missing forecast (C)	Missing forecast identifier (C)	NIL			NIL
END OF TAF IF THE FORECAST IS MISSING.					
Days and period of validity of forecast (M)	Days and period of the validity of the forecast in UTC (M)	nnnnnnnn			16061624 08120918
Identification of a cancelled forecast (C)	Cancelled forecast identifier (C)	CNL			CNL
END OF TAF IF THE FORECAST IS CANCELLED.					
Surface wind (M)	Wind direction (M)	nnn or VRB[2]			24015KMH; VRB04KMH (24008KT); (VRB02KT) 19022KMH (19011KT)
	Wind speed (M)	[P]nn[n]			00000KMH (00000KT) 140P199KMH (140P99KT)
	Significant speed variations (C)[3]	G[P]nn[n]			12012G35KMH (12006G18KT) 24032G54KMH (24016G27KT)
	Units of measurement (M)	KMH (or KT)			
Visibility (M)	Prevailing visibility (M)	nnnn		CAVOK	0350 CAVOK 7000 9000 9999
Weather (C)[4, 5]	Intensity of weather phenomena (C)[6]	– or +	—		
	Characteristics and type of weather phenomena (C)[7]	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 ~~TSPL 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		RA HZ +TSRA FG –FZDZ PRFG +TSRASN SNRA FG

Cloud (M)[8]	Cloud amount and height of base or vertical visibility (M)	FEWnnn or SCTnnn or BKNnnn or OVCnnn	VVnnn or VV ///	~~SKC or~~ NSC		FEW010 VV005 ~~SKC~~ OVC020 VV/// NSC SCT005 BKN012
	Cloud type (C)[4]	CB	—			SCT008 BKN025CB
Temperature (O)[9]	Name of the element (M)	TX				TX25/1013Z TN09/1005Z TX05/2112Z TNM02/2103Z
	Maximum temperature (M)	[M]nn/				
	Day and t~~T~~ime of occurrence of the maximum temperature (M)	nnnnZ				
	Name of the element (M)	TN				
	Minimum temperature (M)	[M]nn/				
	Day and t~~T~~ime of occurrence of the minimum temperature (M)	nnnnZ				
Expected significant changes to one or more of the above elements during the period of validity (C)[4, 10]	Change or probability indicator (M)	PROB30 [TEMPO] or PROB40 [TEMPO] or BECMG or TEMPO or FM				
	Period of occurrence or change (M)	nnnnnnnn				
	Wind (C)[4]	nnn[P]nn[n][G[P]nn[n]]KMH or VRBnnKMH (or nnn[P]nn[G[P]nn]KT or VRBnnKT)				TEMPO 08150818 25070G100KMH (TEMPO 08150818 25035G50KT) TEMPO 22122214 17025G50KMH 1000 TSRA SCT010CB BKN020 (TEMPO 22122214 17012G25KT 1000 TSRA SCT010CB BKN020) BECMG 30103011 00000KMH 2400 OVC010 (BECMG 30103011 00000KT 2400 OVC010) PROB30 14121414 0800 FG BECMG 14121414 RA TEMPO 25032504 FZRA TEMPO 06120615 BLSN PROB40 TEMPO ~~060~~829233001 0500 FG
	Prevailing visibility (C)[4]	nnnn			C A V O K	
	Weather phenomenon: intensity (C)[6]	– or +	—	NSW		

	Weather phenomenon: characteristics and type (C)[4, 7]	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 ~~TSPL 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		
	Cloud amount and height of base or vertical visibility (C)[4]	FEWnnn or SCTnnn or BKNnnn or OVCnnn	VVnnn or VV///	~~SKC or~~ NSC	FM051230 15015KMH 9999 BKN020 (FM051230 15008KT 9999 BKN020) BECMG 16181620 8000 NSW NSC
	Cloud type (C)[4]	CB	—		BECMG 23062308 SCT015CB BKN020

Notes.—

1. Fictitious location.
2. To be used in accordance with 1.2.1.
3. To be included in accordance with 1.2.1.
4. To be included whenever applicable.
5. One or more, up to a maximum of three, groups in accordance with 1.2.3.
6. To be included whenever applicable in accordance with 1.2.3. No qualifier for moderate intensity.
7. Weather phenomena to be included in accordance with 1.2.3.
8. Up to four cloud layers in accordance with 1.2.4.
9. To be included in accordance with 1.2.5.
10. To be included in accordance with 1.3, 1.4 and 1.5.

Table A5-2. Use of change and time indicators in TAF

Change or time indicator		*Time period*	*Meaning*	
FM		$n_dn_dn_hn_hn_mn_m$	used to indicate a significant change in most weather elements occurring at n_dn_d day, n_hn_h hours and n_mn_m minutes (UTC); all the elements given before "FM" are to be included following "FM" (i.e. they are all superseded by those following the abbreviation)	
BECMG		$n_{d1}n_{d1}n_{h1}n_{h1}n_{d2}n_{d2}n_{h2}n_{h2}$	the change is forecast to commence at $n_{d1}n_{d1}$ day and $n_{h1}n_{h1}$ hours (UTC) and be completed by $n_{d2}n_{d2}$ day and $n_{h2}n_{h2}$ hours (UTC); only those elements for which a change is forecast are to be given following "BECMG"; the time period $n_{d1}n_{d1}n_{h1}n_{h1}n_{d2}n_{d2}n_{h2}n_{h2}$ should normally be less than 2 hours and in any case should not exceed 4 hours	
TEMPO		$n_{d1}n_{d1}n_{h1}n_{h1}n_{d2}n_{d2}n_{h2}n_{h2}$	temporary fluctuations are forecast to commence at $n_{d1}n_{d1}$ day and $n_{h1}n_{h1}$ hours (UTC) and cease by $n_{d2}n_{d2}$ day and $n_{h2}n_{h2}$ hours (UTC); only those elements for which fluctuations are forecast are to be given following "TEMPO"; temporary fluctuations should not last more than one hour in each instance, and in the aggregate, cover less than half of the period $n_{d1}n_{d1}n_{h1}n_{h1}n_{d2}n_{d2}n_{h2}n_{h2}$	
PROBnn	—	$n_{d1}n_{d1}n_{h1}n_{h1}n_{d2}n_{d2}n_{h2}n_{h2}$	probability of occurrence (in %) of an alternative value of a forecast element or elements; nn = 30 or nn = 40 only; to be placed after the element(s) concerned	—
	TEMPO	$n_{d1}n_{d1}n_{h1}n_{h1}n_{d2}n_{d2}n_{h2}n_{h2}$		probability of occurrence of temporary fluctuations

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

Element as specified in Chapter 6		*Range*	*Resolution*
Wind direction:	° true	000 – 360	10
Wind speed:	KMH KT	00 – 399* 00 – 199*	1 1
Visibility:	M M M M	0000 – 0800 0800 – 5 000 5 000 – 9 000 9 000 – 9 999	50 100 1 000 999
Vertical visibility:	30's M (100's FT)	000 – 020	1
Cloud: height of cloud base:	30's M (100's FT) 30's M (100's FT)	000 – 050 050 – 100	1 10
Air temperature (maximum and minimum):	ºC	–80 – +60	1

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

Example A5-1. TAF

TAF for YUDO (Donlon/International):*

TAF YUDO 160000Z 16061624 13018KMH 9000 BKN020 BECMG 16061608 SCT015CB BKN020 TEMPO 16081612 17025G45KMH 1000 TSRA SCT010CB BKN020 FM161230 15015KMH 9999 BKN020

Meaning of the forecast:

TAF for Donlon/International* issued on the 16th of the month at 0000 UTC valid from 0600 UTC to 2400 UTC on the 16th of the month; surface wind direction 130 degrees; wind speed 18 kilometres per hour; visibility 9 kilometres, broken cloud at 600 metres; becoming between 0600 UTC and 0800 UTC on the 16th of the month, scattered cumulonimbus cloud at 450 metres and broken cloud at 600 metres; temporarily between 0800 UTC and 1200 UTC on the 16th of the month surface wind direction 170 degrees; wind speed 25 kilometres per hour gusting to 45 kilometres per hour; visibility 1 000 metres in a thunderstorm with moderate rain, scattered cumulonimbus cloud at 300 metres and broken cloud at 600 metres; from 1230 UTC on the 16th of the month surface wind direction 150 degrees; wind speed 15 kilometres per hour; visibility 10 kilometres or more; and broken cloud at 600 metres.

* Fictitious location

Note.— In this example, the primary units "kilometre per hour" and "metre" were used for wind speed and height of cloud base, respectively. However, in accordance with Annex 5, the corresponding non-SI alternative units "knot" and "foot" may be used instead.

Example A5-2. Cancellation of TAF

Cancellation of TAF for YUDO (Donlon/International):* TAF AMD YUDO 161500Z 16061624 CNL Meaning of the forecast: Amended TAF for Donlon/International* issued on the 16th of the month at 1500 UTC cancelling the previously issued TAF valid from 0600 UTC to 2400 UTC on the 16th of the month. * Fictitious location

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APPENDIX 6. TECHNICAL SPECIFICATIONS RELATED TO SIGMET AND AIRMET INFORMATION, AERODROME WARNINGS AND WIND SHEAR WARNINGS

(See Chapter 7 of this Annex.)

Note.— Data type designators to be used in abbreviated headings for SIGMET, AIRMET, tropical cyclone and volcanic ash advisory messages are given in WMO Publication No. 386, Manual on the Global Telecommunication System.

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2. SPECIFICATIONS RELATED TO AIRMET INFORMATION

2.1 Format of AIRMET messages

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Editorial Note.— Change “PQ” to read “PO” under surface visibility in 2.1.4.

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APPENDIX 9. TECHNICAL SPECIFICATIONS RELATED TO INFORMATION FOR AIR TRAFFIC SERVICES, SEARCH AND RESCUE SERVICES AND AERONAUTICAL INFORMATION SERVICES

(See Chapter 10 of this Annex.)

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1.2 List of information for the approach control office

The following meteorological information shall be supplied, as necessary, to an approach control office by its associated aerodrome meteorological office:

a) local routine and special reports, METAR and SPECI, ~~including current pressure data,~~ TAF and trend forecasts and amendments thereto, for the aerodrome(s) with which the approach control office is concerned;

b) SIGMET and AIRMET information, wind shear warnings and appropriate special air-reports for the airspace with which the approach control office is concerned and aerodrome warnings;

c) any additional meteorological information agreed upon locally; and

d) information received on volcanic ash cloud, for which a SIGMET has not already been issued, as agreed between the meteorological and ATS authorities concerned.

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ATTACHMENT A. OPERATIONALLY DESIRABLE ACCURACY OF MEASUREMENT OR OBSERVATION

Note.— The guidance contained in this table relates to Chapter 4 — Meteorological observations and reports, in particular to 4.1.9.

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Element to be observed	Operationally desirable accuracy of measurement or observation*	~~Attainable accuracy** of measurement or observation (1994)~~
Mean surface wind	Direction: ± 10°	~~Direction: ± 5°~~
	Speed: ± 2 km/h (1 kt) up to 19 km/h (10 kt)	~~Speed: ± 2 km/h (1 kt) up to 37 km/h (20 kt)~~
	± 10% above 19 km/h (10 kt)	~~± 5% above 37 km/h (20 kt)~~
Variations from the mean surface wind	± 4 km/h (2 kt), in terms of longitudinal and lateral components	~~as above~~
Visibility	± 50 m up to 600 m	~~± 50 m up to 500 m~~
	± 10% between 600 m and 1 500 m	~~± 10% between 500 m and 2 000 m~~
	± 20% above 1 500 m	~~± 20% above 2 000 m up to 10 km~~
Runway visual range	± 10 m up to 400 m	~~± 25 m up to 150 m~~
	± 25 m between 400 m and 800 m	~~± 50 m between 150 m and 500 m~~

	± 10% above 800 m	~~± 10% above 500 m up to 2 000 m~~
Cloud amount	± 1 okta	~~In daylight an observer can attain an accuracy of ± 1 okta at the point of observation. In darkness, and when atmospheric phenomena limit the viewing of low cloud, there will be difficulty in attaining that accuracy.~~
Cloud height	± 10 m (33 ft) up to 100 m (330 ft) ± 10% above 100 m (330 ft)	~~± 10 m (33 ft) up to 1 000 m (3 300 ft)~~ ~~± 30 m (100 ft) above 1 000 m (3 300 ft) up to 3 000 m (10 000 ft)~~
Air temperature and dew- point temperature	± 1ºC	~~± 0.2 ºC~~
Pressure value (QNH, QFE)	± 0.5 hPa	~~± 0.3 hPa~~

* The operationally desirable accuracy is not intended as an operational requirement; it is to be understood as a goal that has been expressed by the operators.

~~** The accuracy stated refers to assessment by instruments (except for cloud amount); it is not normally attainable in observations made without the aid of instruments.~~

Note.— Guidance on the attainable uncertainties of measurement or observation can be found in WMO Publication No. 8 — Guide to Meteorological Instruments and Methods of Observation..

ATTACHMENT B. OPERATIONALLY DESIRABLE ACCURACY OF FORECASTS

Note 1.— The guidance contained in this table relates to Chapter 6 — Forecasts, in particular to 6.1.1.

Note 2.— If the accuracy of the forecasts remains within the operationally desirable range shown in the second column, for the percentage of cases indicated in the third column, the effect of forecast errors is not considered serious in comparison with the effects of navigational errors and of other operational uncertainties.

Element to be forecast	*Operationally desirable accuracy of forecasts*	*Minimum percentage of cases within range*
	TAF	
Wind direction	± ~~30~~20°	80% of cases
Wind speed	± 9 km/h (5 kt) ~~up to 46 km/h (25 kt)~~ ~~± 20% above 46 km/h (25 kt)~~	80% of cases
Visibility	± 200 m up to ~~700~~800 m ± 30% between ~~700~~800 m and 10 km	80% of cases
Precipitation	Occurrence or non-occurrence	80% of cases
Cloud amount	~~± 2 oktas~~One category below 450 m (1500 ft) Occurrence or non-occurrence of BKN or OVC between 450 m (1 500 ft) and 3 000 m (10 000 ft)	70% of cases
Cloud height	± 30 m (100 ft) up to ~~120~~ 300m (~~400~~1 000 ft) ± 30% between ~~120~~300 m (~~400~~1 000 ft) and 3 000 m (10 000 ft)	70% of cases
Air temperature	± 1°C	70% of cases

TREND FORECAST

Wind direction	± ~~30~~20°	90% of cases
Wind speed	± 9 km/h (5 kt) ~~up to 46 km/h (25 kt)~~ ~~± 20% above 46 km/h (25 kt)~~	90% of cases
Visibility	± 200 m up to ~~700~~800 m ± 30% between ~~700~~800 m and 10 km	90% of cases
Precipitation	Occurrence or non-occurrence	90% of cases
Cloud amount	± ~~2 oktas~~One category below 450 m (1 500 ft) Occurrence or non-occurrence of BKN or OVC between 450 m (1 500 ft) and 3 000 m (10 000 ft)	90% of cases
Cloud height	± 30 m (100 ft) up to ~~120~~300 m (~~400~~1 000 ft) ± 30% between ~~120~~300 m (~~400~~1 000 ft) and 3 000 m (10 000 ft)	90% of cases

FORECAST FOR TAKE-OFF

Wind direction	± ~~30~~20°	90% of cases
Wind speed	± 9 km/h (5 kt) up to 46 km/h (25 kt) ± 20% above 46 km/h (25 kt)	90% of cases
Air temperature	± 1°C	90% of cases
Pressure value (QNH)	± 1 hPa	90% of cases

AREA, FLIGHT AND ROUTE FORECASTS

Upper-air temperature	± ~~3~~2°C (Mean for 900 km~~/500 NM~~(500 NM))	90% of cases
Relative humidity	± 20%	90% of cases
Upper wind	± ~~28~~20 km/h (~~15~~10 kt) ~~up to flight level 250~~ ~~± 37 km/h (20 kt) above flight level 250~~ (Modulus of vector difference for 900 km~~/500 NM~~(500 NM))	90% of cases
Significant en-route weather phenomena and cloud	Occurrence or non-occurrence Location: ± 100 km~~/60 NM~~(60 NM) Vertical extent: ± ~~600~~300 m~~/2 000 ft~~(1 000 ft) Tropopause height: ± 300 m (1 000 ft) Max wind level: ± 300 m (1 000 ft)	80% of cases 70% of cases 70% of cases 80% of cases 80% of cases

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APPENDIX D

PROPOSED AMENDMENT TO PROCEDURES FOR AIR NAVIGATION SERVICE AIR TRAFFIC MANAGEMENT (PANS-ATM) (DOC 4444)

CHAPTER 7. PROCEDURES FOR AERODROME CONTROL SERVICE

. . .

Insert new text as follows:

7.2 SELECTION OF RUNWAY IN USE

. . .

7.2.6 Noise abatement shall not be the determining factor in runway nomination under the following circumstances:

. . .

e) when the crosswind component, including gusts, exceeds 28 km/h (15 kt), or the tailwind component, including gusts, exceeds 9 km/h (5 kt), unless the following requirements are met, in which case noise abatement can be the determining factor in runway nomination to a maximum of 37 km/h (20 kt) crosswind or 13 km/h (7 kt) tailwind:

1) the wind measuring device(s) meet the operationally desirable accuracy specified in Annex 3, Attachment B, column 1;

Note.– Additional wind measuring station(s) or techniques along the runway should be considered.

2) precision approach guidance is available for the runway-in-use;

3) arriving and departing aircraft are advised as part of the landing or take-off clearance, when variations to the mean wind speed (gusts) exceed 9 km/h (5 kt);

4) the current surface wind is reported by ATC to aircraft on final approach after passing the outer marker or equivalent position;

5) reported braking action remains 'Good' (μ $ 0.40);

6) at aerodromes with multiple runways, the wind information for each separate runway in use is included in the information provided by the automatic terminal information service (ATIS);

7) for tailwind components in excess of 9 km/h (5 kt):

   i) take-off distance available and landing distance available are adequate for aircraft intending to operate at the aerodrome; and

   ii) aerodrome runway configuration and arrival and departure routes are taken into account.

End of new text.

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APPENDIX E

FRAMEWORK FOR GUIDANCE ON THE GLOBAL MIGRATION TO THE USE AND EXCHANGE OF BINARY UNIVERSAL FORM FOR THE REPRESENTATION OF METEOROLOGICAL DATA (BUFR) CODED OPMET MESSAGES

1. INTRODUCTION

1.1 The European Air Navigation Planning Group (EANPG) at its forty-fifth Meeting held in Paris, 1 to 3 December 2003 formulated the following Conclusion:

Conclusion 45/12 — MIGRATION TO BUFR CODED OPMET MESSAGES

That, ICAO give guidance to achieve a uniform global approach to the implementation of binary universal form for the representation of meteorological data (BUFR) coded operational meteorological (OPMET) messages, including early advice of the likely time-frame for the development of the provisions necessary for air traffic services message handling service (ATSMHS) extended services to accommodate BUFR coded messages.

1.2 The responsibility for providing a framework for the global migration to table-driven codes (including BUFR) lies with WMO under the arrangements described in *Working Arrangements between the International Civil Aviation Organization and the World Meteorological Organization* (Doc 7475).

1.3 The framework endorsed by the WMO Congress included a timetable for the migration to table-driven codes and specified that such codes could be used, for States in a position to do so, from 2007 and in parallel with the traditional alphanumeric codes and that fully operational use of the codes was planned for 2015. It is proposed to include provisions to allow the use of BUFR code for the dissemination of METAR/SPECI, TAF and SIGMET by States in a position to do so under bilateral agreements and in addition to the required dissemination using alphanumeric codes as a part of draft Amendment 74 to Annex 3 (applicable in November 2007).

1.4 The Aeronautical Communications Panel (ACP) is invited to establish a global plan for the introduction of BUFR coded OPMET messages in response to the Conclusion formulated by the EANPG. A suggested outline of such a plan is given in paragraph 2.

2. SUGGESTED OUTLINE OF A GLOBAL PLAN FOR THE MIGRATION TO THE USE OF BUFR CODED OPMET MESSAGES

2.1 Amendment 74 to Annex 3 (2007)

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

2.2 Amendment 75 to Annex 3 (2010)

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

2.3 Amendment 76 to Annex 3 (2013)

2.3.1 Provisions in 2.2.1 above to become standards;

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

2.4 Amendment 77 to Annex 3 (2016)

2.4.1 Provisions in 2.3.2 above to become standards.

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

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APPENDIX F

LIST OF TASKS FOR FUTURE WORK OF THE AERODROME METEOROLOGICAL OBSERVING SYSTEMS STUDY GROUP (AMOSSG)

The AMOSSG is envisaged to assist the Secretariat in pursuing the specific tasks as follows:

TASK NO.	RELEVANT ANC TASK NO.	TASK	REFERENCE	ESTIMATED DATE FOR COMPLETION	NOTE ON PROGRESS
~~1.~~	~~MET-9206~~	~~Consider the need for provisions concerning the display of cloud base height in ATS units~~	~~EANPG/44~~	~~Amendment 74~~	~~Draft amendment for AMOSSG/5~~
1.	MET-9206	Consider the need for provisions or guidance material to cater for the reporting of gusts in the calculation of crosswind and tailwind	EANPG/44	Amendment 74	~~Draft amendment for AMOSSG/5 if necessary~~To be addressed at the AMOSSG/6 Meeting
2.	MET-9206	Study the expansion of the use of fully automated observations during operational hours	MET Div Rec 2/3	Amendment 74	~~Draft amendment at AMOSSG/5~~Allowable at the discretion of the MET Authority in consultation with users Local reports to be addressed at the AMOSSG/6 Meeting
3.	MET-9206	Monitor the use of modern observing techniques (e.g. remote sensing)	AMOSSG/1 – SoD, 4.4.1 a); 4.4.3	Ongoing	Proposals, as necessary, expected for AMOSSG/56

TASK NO.	RELEVANT ANC TASK NO.	TASK	REFERENCE	ESTIMATED DATE FOR COMPLETION	NOTE ON PROGRESS
4.	**MET-9206**	**Revise the weather phenomena to be reported under "present weather" and "recent weather"**	**AMOSSG/1 – SoD, 5.3.1 c)**	**~~End 2004~~Amendment 74**	**~~To be re-addressed at AMOSSG5~~Precipitation, freezing precipitation, fog, freezing fog and thunderstorm now standards**
5.	**MET-9206**	**Finalize the assessment of the capability of AWS to meet the expected future requirements**	**AMOSSG/1 – SoD, 6.2.2 b)**	**Ongoing**	**Assessments carried out at all meetings**
6.	**MET-9206**	**Revise the definition of "VC"**	**AMOSSG/1 – SoD, 5.3.1 d)**	**Amendment 74**	**Draft amendment at AMOSSG/5**
7.	**MET-9206**	**Update the attainable accuracy of observation and measurement in Annex 3, Attachment ~~B~~A**	**ANC 153-9**	**Amendment 74**	**~~A proposal from WMO for AMOSSG/5~~Column proposed for deletion with reference to WMO No. 8**
8.	**MET-9206**	**Prepare and maintain guidance material**	**AMOSSG/1 – SoD, 5.3.1 e) MET Div Rec 2/2**	**Early 200~~4~~6**	**Comments for 2nd edition by end ~~October~~ September 2003~~5~~**
9.	**MET-0101**	**Enable and monitor progress concerning the use of the BUFR code form for the dissemination of METAR/SPECI and TAF**	**MET Div 2/5**	**Initial phase Amendment 74, completion Amendment 76**	**WMO plan, enabling clause for AMOSSG/5**
10.	**MET-0403**	**Monitor States' progress in forecasting RVR**	**COM/MET/82, MET/AOP PT Eur Region**	**Ongoing**	**Depends upon input from States and MET/AOP PT**
11.	**MET-0403**	**Update the desirable forecast accuracy and amend Attachment ~~E~~B to Annex 3 if necessary**	**ANC 136-18**	**Amendment 74**	**~~Awaiting response from WMO~~Updated version provided**

TASK NO.	RELEVANT ANC TASK NO.	TASK	REFERENCE	ESTIMATED DATE FOR COMPLETION	NOTE ON PROGRESS
~~12.~~	~~MET-0403~~	~~Study the operational feasibility and desirability of requiring a greater accuracy in the first 3 hours of a TAF, possibly by limiting the use of PROB~~	~~ANC 137-16~~	~~Amendment 74~~	~~To be discussed at AMOSSG/5~~
12.	MET-0403	Consider the need for harmonizing the criteria for issuance of SPECI and those for including change groups in TAF	MET Div Rec 2/3	Amendment 74	Draft amendment at AMOSSG/5
13.	MET-0403	Review the validity period for TAF	EANPG/45	Amendment 74	Draft amendment at AMOSSG/5

— END —