ATTACHMENT A

AMOSSG/1-SoD
12/5/00

AERODROME METEOROLOGICAL OBSERVING SYSTEMS STUDY GROUP (AMOSSG) --- FIRST MEETING

Montreal, 9 to 12 May 2000

SUMMARY OF DISCUSSIONS

1. HISTORICAL

1.1 The first meeting of the Aerodrome Meteorological Observing Systems Study Group (AMOSSG) was held at ICAO Headquarters, Montreal, Canada, from 9 to 12 May 2000. The meeting was opened by the Director of the Air Navigation Bureau, Mr. Jack Howell.

1.2 The names and addresses of the participants are listed in Appendix A.

1.3 Ms. Joanne St-Coeur was elected Chairman of the meeting.

1.4 The meeting considered the following items:

Agenda Item 1. Opening of the meeting

Agenda Item 2. Election of Chairman

Agenda Item 3. Adoption of working arrangements

Agenda Item 4. Adoption of agenda

Agenda Item 5. Review of the task of the study group

Agenda Item 6. Discussion on the current requirements for meteorological observations and reports at aerodromes

Agenda Item 7. Assessment of the current capability of automatic weather observing stations to meet the stated requirements

Agenda Item 8. Future work programme of the group

Agenda Item 9. Any other business.

A list of study notes and information papers issued for the meeting of the groups is given at Appendix B to this summary of discussions.

2. AGENDA ITEM 1: OPENING OF THE MEETING
AGENDA ITEM 2: ELECTION OF CHAIRMAN
AGENDA ITEM 3: ADOPTION OF WORKING ARRANGEMENTS
AGENDA ITEM 4: ADOPTION OF THE AGENDA

2.1 These items are already cover under section 1: Historical.

3. AGENDA ITEM 5: REVIEW OF THE TASK OF THE STUDY GROUP

3.1 Introduction

3.1.1 The group was aware that the main task of the group was two-fold:

a) to assist the Secretariat in its review of the operational requirements for the provision of meteorological observations at aerodromes; and

b) to assess the capability of automated weather systems to meet those requirements.

3.1.2 Furthermore, the group was expected to address the legacy tasks of the disbanded Runway Visual Range Study Group (RVRSG) related to the development of a proposal to amend Annex 3 — *Meteorological Service for International Air Navigation* to introduce a requirement for reporting *prevailing* visibility in lieu of minimum visibility.

3.1.3 Finally, it was noted that two specific tasks concerning the use of the abbreviations “NSC” and “VC” had been assigned to the group by the Air Navigation Commission (ANC) during the final review of a proposal to amend Annex 3 (Amendment 72 for applicability in November 2001).

3.2 Main task

3.2.1 With regard to the first part of the main task of the group, i.e. the review of the operational requirements for the provision of meteorological observations at aerodromes, it was noted that these requirements were contained in ICAO Annexes and Procedures for Air Navigation Services (PANS). The main document to be reviewed by the group was Annex 3. It was, however, pointed out that a cautious approach had to be taken since many of the Annex 3 provisions were directly based on the fundamental operational requirements (e.g. VFR criteria were based on visibility and cloud amount) stated in other ICAO Annexes and PANS and may only be proposed for amendment based on sound operational reasons and in coordination with relevant ICAO operational groups. The second sub-task of the group, i.e. the assessment of the capability of automated weather systems to meet those requirements, would have to be addressed in

parallel with the first sub-task taking into account both the present provisions of Annex 3 and any amendments proposed thereto.

3.2.2 The first part of the task was addressed under Agenda Item No. 6 while the second part of the task was dealt with under Agenda Item No. 7.

3.3 Legacy tasks from the RVRSG

3.3.1 The group was aware that the RVRSG had completed its work in updating the *Manual of Runway Visual Range Observing and Reporting Practices* (Doc 9328)and that a remaining task related to the introduction of *prevailing* visibility had been transferred to the AMOSSG. When developing the proposal on prevailing visibility, the group was also expected to review:

a) the criteria related to the inclusion of directional variations in visibility included in reports in the METAR/SPECI code forms; and

b) the reporting of visibility in local routine and special reports, taking due account of forward-scatter meters and new ATS data link services.

3.3.2 The legacy tasks were further addressed under Agenda Item No. 6.

3.4 Specific tasks

3.4.1 As a result of final review of a proposal to amend Annex 3 (Amendment 72), the ANC had agreed that two specific tasks should be addressed with the assistance of this group:

a) the wider use of “NSC” be considered for clouds with high cloud base heights; and

b) the order in which “VC” (vicinity) was included in present weather (i.e. before or after the weather characteristics and type) be studied.

3.4.2 These specific tasks were dealt with under Agenda Item No. 6.

3.5 Deadlines for the tasks

3.5.1 The group was aware that the a worldwide ICAO MET Divisional Meeting, to be held conjointly with the 12th Session of the WMO Commission for Aeronautical Meteorology (CAeM), was planned to be convened in 2002 in Montreal and that the result of the work of this group were expected to be completed in time for that meeting. In practice, this would imply that the work should be carried out as a matter of urgency and should be finalized during the next eighteen months, i.e. by the end of year 2001.

3.5.2 If the results of the work of the AMOSSG were endorsed by the upcoming MET Divisional

Meeting, the corresponding amendments to Annex 3 would be included in Amendment 73 to Annex 3, for applicability in 2004.

4. AGENDA ITEM 6: DISCUSSION ON THE CURRENT REQUIREMENTS FOR METEOROLOGICAL OBSERVATIONS AND REPORTS AT AERODROMES

4.1 Introduction

4.1.1 It was recalled that one of the main task of the group was to review the current operational requirements for the provision of meteorological observations at aerodromes. In this undertaking, the requirements related to the legacy tasks of the Runway Visual Range Study Group (RVRSG) and specific tasks assigned to the group by the Air Navigation Commission (ANC) should also be addressed.

4.2 General

4.2.1 Under this agenda item, the group undertook a revision of the meteorological requirements stated in Annex 3. When carrying out this revision, the group was reminded that a prudent approach was required as many of the meteorological requirements in Annex 3 were based directly on fundamental operational requirements stated in other Annexes and PANS. It was understood that the underlying operational requirements could be proposed for amendment only based on sound operational reasons and in coordination with an operational body.

4.2.2 It was agreed that the starting point for the revision by this group should be the existing provisions as stipulated by Annex 3. The group was aware that most of the provisions relevant to the tasks of the group were stated in Chapter 4 of Annex 3. It was noted that Chapter 4 was being amended as part of Amendment 72 to Annex 3 (for applicability in November 2001) and this amendment included a substantial reorganization of the material, e.g. *templates* had been developed depicting the detailed structure of meteorological messages which, together with corresponding examples, were to be transferred to new appendices to Annex 3. In order to facilitate consideration of the provisions as amended, they had been reproduced as documentation for this meeting. The updated provisions of Chapter 6 had also been included since changes in Standards and Recommended Practices (SARPs) related to observations (Chapter 4) could influence the provisions related to forecasts (Chapter 6). It was pointed out that the amended provisions had still to be adopted by the ICAO and WMO Councils (foreseen for March and May 2001, respectively).

4.2.3 When addressing the provisions in Chapter 4, it was essential that, in addition to meteorological considerations, the operational aspects be carefully considered. Therefore, the revision of the provisions should be carried out in close coordination with the OPS/AIR and ATM Sections of the Secretariat and with the assistance of the Operations Study Group (OPSSG).

4.3 Provisions subject to particular considerations

4.3.1 When undertaking the review of operational requirements, the group paid particular attention to the current provisions related to a) the use of fully automated weather observing systems (AWS); b) the legacy tasks of the RVRSG; and c) specific issues raised by the ANC.

4.3.2 With regard to the AWS, the group noted that the present Annex 3 provisions clearly indicated that fully automatic observing systems did not currently meet the operational requirements as far as four parameters were concerned:

a) visibility;

b) present weather;

c) cloud amounts and types; and

d) supplementary information.

When observing these parameters, Annex 3 stipulated (paragraphs 4.6.2, 4.8.2, 4.9.2 and 4.12.2 of Annex 3 refer) that provision for manual insertion of values should be made. The group realized that so-called "auto METARs" could not meet the current Annex 3 requirements. The relationship of the above parameters with the operational requirements stated in other ICAO Annexes was highlighted and is shown in Appendix C to this summary; it enumerates some of the most important operational criteria/applications where detailed information on visibility, cloud amount and type, present weather and supplementary information is required. Therefore, the group agreed that these Annex 3 provisions should be carefully reviewed and in parallel with the second part of the main task, i.e. the assessment of the capability of the state-of- the-art automated observing systems to meet the operational requirements.

4.3.3 As far as the provisions related to the legacy tasks of the RVRSG are concerned, they were all under Section 4.6. Clearly, some new SARPs would need to be incorporated in Annex 3 to introduce the concept of *prevailing* visibility. Furthermore, paragraphs 4.6.3 to 4.6.5 need to be revised to update the criteria related to the inclusion of directional variations in visibility included in reports in the METAR/SPECI code forms and to take due account of forward-scatter meters to be used for the reporting of visibility in local routine and special reports.

4.3.4 Concerning the specific tasks assigned to the group, it was noted that the wider use of "NSC" should be addressed under paragraph 4.9.5 while the order in which the indicator "VC" is included in present weather should be dealt with under paragraph 4.8.6.

4.4 Initial review of requirements as stated in Chapters 4 and 6 to Annex 3

4.4.1 The group carried out an initial review of the operational requirements stated in Chapters 4 and 6 to Annex 3 and the corresponding Appendices 2 and 4, as amended as a result of Amendment 72 to Annex 3. In this context, the group developed a number of amendment proposals to Chapter 4 which are indicated in Appendix D to this summary. Furthermore, it identified the following paragraphs which needed to be further addressed:

a) Definitions. The currency of the definition of "aeronautical meteorological station" was raised. The group felt that the definition was probably general enough to cater for modern observing systems and would not therefore need to be amended. Nevertheless, Gérard and Michel were tasked to look further into the issue and, if an amendment would be warranted, to develop a proposal for the consideration by the group at its second meeting;

b) 4.1.8 and 4.19. It was suggested that the last sentences calling for a provision for the manual insertion in case of system failure was too restrictive as the provision of the three parameters, surface wind, RVR and cloud height, could also be guaranteed by the use of back-up sensors. The group agreed that these sentences needed to be expanded and that the initial formulation would be developed by Jean-Paul and Will, in time for the second meeting of the group;

c) 4.6.2 to 4.6.5 (visibility). These paragraphs needed to be amended as part of a proposal to introduce "prevailing visibility" instead of minimum visibility. The group recalled that the criteria related to the inclusion of directional variations in visibility included in the METAR/SPECI code forms should also be reviewed, together with the reporting of visibility in local reports, taking due account of forward-scatter meters and ATS data link services. The group felt that it would be appropriate to specify the height at which the visibility should be observed or measured, in particular where instruments were used. **Will** (the person taking the lead indicated in bold), Kevin, Mark and Pete were tasked to take the lead in addressing these issues;

d) 4.7.11 (RVR). The issue of the light intensity to be used was raised. It was suggested that a 100 per cent light setting should be used in reports in the METAR/SPECI code forms. The group was reminded that the specification of the actual light intensity had been based on advice provided by the Operations Panel (OPSP) which had expressed a preference for the actual intensity over the 100 per cent light intensity. The group concluded that this item needed further study and tasked Michel and Mark to develop a proposal, taking into account the operational aspects of the matter, for the consideration by the AMOSSG and OPSSG; and

e) 4.9.3, including the subsequent note (Cloud). It was indicated that the reference to the "middle marker site" in connection with the instrument landing system was not any longer appropriate in a number of States and should perhaps be deleted. However, this would render the provision rather vague. Therefore, the group agreed that the Secretary would consult the experts in the CNS Section and come up with a formulation which would still refer to a precise location while corresponding to current circumstances at a number of aerodromes.

4.4.2 Will presented a paper entitled "The influence of obstacles at airports on wind observations and reports"raising the problem of non-representative wind measurements at aerodromes due to the ever increasing number of buildings and other obstacles. He indicated that the measured wind compared to the actual conditions that aircraft would encounter at the touchdown zone and/or along the runway could

deviate seriously. This deviation could be derived from a mathematical model and/or a model in a wind tunnel. Corresponding NOTAMs were issued in the Netherlands warning the aircrews about this discrepancy. He suggested that something should perhaps be included in Annex 3 to specify under which circumstances users should be informed about the deviation of the wind measurement. In this respect, it was noted that the operationally desirable accuracy for the wind observations stated in Attachment B to Annex 3 was 10/ and 10 per cent for the wind direction and speed, respectively. However, a number of concerns were expressed related to this proposal. For example, its inclusion in Annex 3 would cause liability problems in a number of States. Furthermore, it was also pointed out that users were already advised about wind climatology specific to aerodromes since a number of States had included the relevant information in their AIPs and/or approach charts. It was also felt that a NOTAM was not the proper message to be used. The group was of the view that the issue of the influence on the wind conditions by coherent eddies and wakes was more related to the wind shear problem along the runway than to wind observations and reports *per se* and concluded therefore that Chapter 4 of Annex 3 should not be amended and that the issue should be referred to the Low Level Wind Shear and Turbulence Study Group (WISTSG) for further consideration. It was also concluded that the wind reported should be the wind measured and not that derived from additional calculations.

4.4.3 Under this agenda item, a proposal was also made that the provisions of Chapter 4 of Annex 3 should be expanded to allow the use of modern observing techniques (e.g. remote sensing) to detect significant weather phenomena at the aerodrome and its immediate vicinity and to pass this information to the air traffic services (ATS) units and users in graphical format. It was agreed that at least initially, this information should complement, not replace, the information already included in local routine and special reports and reports in METAR/SPECI code forms and that it would be provided subject to an agreement between the meteorological authority, ATS authority and users concerned. The group agreed that Gérard would provide the proposal to the Secretary who would develop the wording for a new section to be included under Chapter 4 of Annex 3. In this context, Gérard would also identify if any of the definitions or general provisions in Annex 3 would require updating to take account of modern observing techniques.

5. AGENDA ITEM 7: ASSESSMENT OF THE CURRENT CAPABILITY OF AUTOMATIC WEATHER OBSERVING STATIONS TO MEET THE STATED REQUIREMENTS

5.1 Introduction

5.1.1 The group assessed the capability of automated weather observing systems (AWS) to meet stated operational requirements.

5.2 Discussion

5.2.1 The group recognized that there was a fundamental difficulty in undertaking this task, i.e. the outcome would depend on the requirements against which the AWS were assessed (present requirements as amended in Amendment 72 to Annex 3 *versus* proposed future requirements stemming from the work of the study group). In the final analysis it was quite clear that the requirements as proposed for amendment

would have to be used by the group. However, amendments to meteorological requirements were only being studied at this stage and could not therefore be used at this meeting. Under these circumstances, as a first step, the group agreed that it would be useful to assess the AWS against the present requirements, which would provide the group an idea of the progress made since the COM/MET/OPS Divisional Meeting held in 1990 when the issue was last addressed by an ICAO body.

5.2.2 When assessing the AWS, the group focussed on five parameters: a) visibility; b) present weather; c) cloud amount; d) detection of cumulonimbus (CB) and towering cumulus (TCU) clouds; and e) supplementary information. In this assessment, the group took due account of the advantages and limitations of observations made by human observers.

5.2.3 The group agreed that there was a difference between the visibility and cloud amount on the one hand and the present weather, cloud type and supplementary information on the other. The first two formed part of Annex 3 provisions but were based directly on the operational requirements in other annexes (see Appendix C). Therefore, any amendment of substance to these parameters would also involve a revision for the basic operational requirements stated in ICAO Annexes other than Annex 3. As there have not so far been any proposal to amend these criteria, it was expected that the operational requirements remained valid. On the other hand, the stated operational requirements did not enumerate all the detailed combinations of weather phenomena which should be included in present weather or supplementary information, nor did they require specifically information on TCU. Therefore, it could be argued that, unlike visibility or cloud amount, there may be some scope to revise the requirements for these parameters.

5.3 Initial assessment of the capability of the present generation AWS

5.3.1 The group undertook an initial assessment of the capability of the present generation AWS to meet the operational requirements to detect visibility, present weather, cloud amount and cloud type and supplementary information element by element:

a) visibility in the local reports. The group recalled that these requirements called for representative values for the runways. It was pointed out that there were a number of advantages in using instruments: the sensors could be sited closer to the operationally significant areas than human observers; criteria for issuing local specials could be better observed; and more consistent and objective information would be derived. The group also noted that the required visibility range up to 10 km could be covered with modern forward-scatter meters. Some concerns were expressed related to the small sampling volume involved in the forward-scatter meter technology and to the maintenance of instrumentation. The group concluded that both instrumented and human observer techniques had their limitations but that overall requirements could be better met by using instruments;

b) visibility in METAR/SPECI code forms. The group recalled that Annex 3 required that the visibility should be representative of the aerodrome and its immediate vicinity and should also include directional variations (in the eight points of the compass), as appropriate. It was suggested that the requirements could be met using instruments,

e.g. multiple forward-scatter meters. However, reservations were voiced; it was felt that to cover the full 360/, only human observers could be in accordance with Annex 3 requirements and that no instrument could cover the immediate vicinity of the aerodrome, as called for in Annex 3. On the other hand, it was pointed out that in many modern aerodromes with large areas involved, the human observers could not any longer adequately cover the full horizon due to location of the observation point and the increasing number of buildings and other obstacles. The group concluded that there was no ideal solution and that both human observers and forward-scatter meters had their limitations. In this regard, Marc was of the opinion that the limitations of forward-scatter meters outweighed those of human observers and that a limited number of forward-scatter instruments could not meet the requirements of Annex 3 at aerodromes with respect to minimum visibility and directional variations. Moreover, Aboubacar highlighted problems arising from inadequate maintenance that had been encountered in developing States when automated systems based on scatter meters had been used. Nevertheless, the general feeling expressed was that, with well-maintained modern instrumentation based on multiple forward-scatter meters and/or information derived from other instruments, the Annex 3 requirements could be met at most aerodromes;

c) present weather and past weather (included under supplementary information). The group took note of the long list of weather phenomena required as per Chapter 4 of Annex 3 (Appendix E refers). It was agreed that no automatic system could distinguish all the phenomena currently required. In this context, it was recalled that the details of the weather phenomena were not included in other ICAO Annexes and PANS than Annex 3 and that therefore, there would be some scope to revise the list. It was pointed out that it would be essential that the intensity thresholds be defined before any substantial progress can be achieved in this area. The group was reminded that the specifications of intensities were the responsibility of WMO and that some work had already been done in this area. Saad promised to inform the group of the status of the work and of the results obtained so far. To progress this issue, **Earle**, Jean-Paul, Kevin, Pete and Will were tasked to undertake a preliminary review of the list of weather phenomena (both present and past), taking into account the operational requirements and the work undertaken by the WMO Expert Group on Codes in 1994. (The report of this meeting would be made available to the group by the Secretary);

d) cloud amount. The group shared their experience in this area based on a number of systems in use. By and large, the results were encouraging. However, there were still problems occurring, in particular when the conditions were rapidly changing and therefore, for the time being, most of the automated systems were being backed-up by a human observer. The group concluded that the automated systems were close in meeting the requirements as stated in Annex 3; and

e) cloud type. It was recalled that Annex 3 required that towering cumulus (TCU) and cumulonimbus (CB) clouds be identified. The group noted that there was currently no

automated means operationally available to detect directly cloud types and that it seemed unlikely that the situation would change in the near future. However, the presence of CB could be derived indirectly using lightning detection devices, weather radar and satellite imagery; this approach would not, however, give any indication of the corresponding cloud base and amount as required by Annex 3. As there is some research going on in this area, the group agreed to monitor the result thereof and re-assess the situation at its second meeting. Furthermore, it was agreed that the Secretary would consult the operational bodies to find out whether there was still a genuine operational requirement for reporting TCU clouds.

5.3.2 Since the detailed description of automatic systems could not be included in a regulatory document like Annex 3, the importance of developing guidance material in this area was emphasized. The group was informed that guidance material to be developed could either be included in the *Manual of Aeronautical Meteorological Practice* (Doc 8896) or if warranted, a stand-alone manual could be issued. The group agreed that the issue of guidance material would be addressed under the future work programme.

6. AGENDA ITEM 8: FUTURE WORK PROGRAMME OF THE GROUP

6.1 Introduction

6.1.1 The group was aware that the tasks identified would have to be undertaken as a matter of urgency to ensure that any proposals to amend Annex 3 which would emerge from the work of the group could be presented to the upcoming MET Divisional Meeting, to be convened in 2002.

6.2 Tasks to be undertaken

6.2.1 It was emphasized that the success of the work of a study group depended critically on the input of its members. Therefore, it was considered essential that members take an active role in carrying out the specific tasks assigned to them.

6.2.2 The group agreed that the following tasks needed to be carried out with an active participation by the group:

c) completion of the review of operational requirements as stated in Annex 3. The specific issues identified under Agenda Item 6 should be addressed;

d) finalization of the assessment of the capability of automated weather systems to meet the future requirements. The specific issues identified under Agenda Item 7 should be addressed;

e) introduction of *prevailing* visibility together with the associated tasks (related to the use of forward-scatter meters for observations to be included in local routine and

special reports and the directional variations to be included in reports in the METAR/SPECI code forms);

f) specific tasks identified by the ANC (concerning the use of “NSC” and “VC”); and

g) preparation of guidance material. In this respect, the group agreed that the Secretary would investigate the matter and prepare an initial proposal for consideration by the second meeting of the group.

6.2.3 Since a substantial portion of the work would be carried out by correspondence between the meetings, close coordination would be necessary within the group. Therefore, the group agreed that correspondence would be copied to all the members and permanent advisers of the group. Furthermore, the members would coordinate their studies with operations experts in their States. In this regard, the Secretary ensured that any proposal influencing the operational requirements would be coordinated with the ICAO OPS/AIR and ATM Sections as well as the Operations Study Group (OPSSG).

6.3 Next meeting

6.3.1 In view of the limited time available for the group and the scope of the task, the group agreed that the work could not be completed without another meeting. For planning purposes, the second meeting should be planned to be convened during the first quarter of the year 2001.

7. AGENDA ITEM 9 ANY OTHER BUSINESS

7.1 No issues were raised under this agenda item.

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APPENDIX A

NAMES AND ADDRESSES OF THE MEMBERS, ALTERNATES AND ADVISERS ATTENDING THE FIRST MEETING OF AMOSSG MEETING (AMOSSG/1 MEETING)

NOMINATED BY	NAME	POSTAL ADDRESS	FAX/TELEX/CABLE
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NOMINATED BY	NAME	POSTAL ADDRESS	FAX/TELEX/CABLE
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UNITED STATES	Mr. Kevin Browne **Adviser**: Mr. Richard Stone	ARW-100 FEDERAL AVIATION ADMINISTRATION (FAA) 400 - 7th Street S.W. Washington, DC 20590 USA U.S. National Weather Service NOAA US Department of Commerce 1325 East-West Highway Silver Spring, MD 20910-3283 USA	Tel: 1.202-366-1066 Fax: 1.202-366-5549 E-mail: kevin.browne@faa.gov Tel: 1.301. 713 1726, ext. 153 Fax: 1.301. 713 1598 E-mail: richard.stone@noaa.gov
ASECNA	Mr. Aboubacar Kandine	Chef du Service - Etudes et Réglementations Département de la Météorologie Agency for Air Navigation Safety in Africa and Madagascar (ASECNA) B.P. 3144 Dakar, Senegal	Tel.: +221-823-1040 Fax : +221-823-4654, +221-822-0544 or +221-823-5968 (Dir.Gen.) E-mail:
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NOMINATED BY	NAME	POSTAL ADDRESS	FAX/TELEX/CABLE
WMO	Mr. Saad Benarafa	Aeronautical Meteorology Unit World Weather Watch Application Department World Meteorological Organization 7 bis, avenue de la Paix, CP 2300 CH-1211, Geneva 2 SWITZERLAND	Tel: 41 22 730 84 08 Fax: 44 22 730 80 21 E-mail: benarafa_s@gateway.wmo.ch

The meeting was served by the Secretary of the AMOSSG, Dr. Olli M. Turpeinen, Technical Officer in the MET Section of the Air Navigation Bureau of ICAO. He was assisted by Mr. Tom Fox, Chief of the Meteorology Section, Mr. Raúl Romero, Technical Officer in the MET Section and Mr. Kevin Moore, Technical Officer in the OPS/AIR Section.

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APPENDIX B

I LIST OF STUDY NOTES

No.	Date	Agenda Item	Subject	Presented by
1	2.03.00	4	Adoption of the agenda	Secretary
2	6.04.00	5	Review of the task of the study group	Secretary
3	6.04.00	6	Discussion on the current requirements for meteorological observations and reports at aerodromes	Secretary
4	6.04.00	7	Assessment of the current capability of automatic weather observing stations to meet the stated requirements	Secretary
5	6.04.00	8	Future work programme of the group	Secretary
6	27.04.00	6	Discussion on the current requirements for meteorological observations and reports at aerodromes: The influence of obstacles at airports on wind observations and reports	W. van Dijk

II LIST OF INFORMATION PAPERS

1	28.04.00	—	Working Arrangements for the Meeting	Secretary
2	27.04.00	7	Assessment of the current capability of automatic weather observing stations to meet the stated requirements: Royal Netherlands Meteorological Institute automation of visual observations: current and intentions	W. van Dijk
3	27.04.00	7	Assessment of the current capability of automatic weather observing stations to meet the stated requirements: Examples of METAR with visibility and RVR inconsistencies	M. Leroy

No.	Date	Agenda Item	Subject	Presented by
4	26.04.00	6	Discussion on the current requirements for meteorological observations and reports at aerodromes: WMO activities related to automated meteorological observing systems	S. Benarafa
5	26.04.00	7	Assessment of the current capability of automatic weather observing stations to meet the stated requirements: Exploitation des systèmes intégrés d'observation météorologiques d'aérodrome (SIOMA) à l'ASECNA	J. P. Makosso
6	26.04.00	6	Discussion on the current requirements for meteorological observations and reports at aerodromes	J. P. Makosso
7	28.04.00	5 6 7	Review of the task of the study group; Discussion on the current requirements for meteorological observations and reports at aerodromes; Assessment of the current capability of automatic weather observing stations to meet the stated requirements	M. Landreville
8	9.05.00	6	Discussion on the current requirements for meteorological observations and reports at aerodromes: United States service standards for automated reports	K. Browne

III LIST OF DISCUSSION PAPERS

1	10.05.00	-	Summary of Discussions (9.5.00)	Secretary
2	11.05.00	-	Summary of Discussions (9-10.5.00)	Secretary
3	12.05.00	-	Summary of Discussions (9-11.5.00)	Secretary

IV LIST OF FLIMSIES

1	9.05.00	-	Definition of visibility; Concept of “prevailing visibility”	Secretary
2	10.05.00	6	Discussion on the current requirements for meteorological observations and reports at aerodromes	M. Leroy
3	11.05.00	6	Discussion on the current requirements for meteorological observations and reports at aerodromes: Replies to the State Letter concerning the introduction of “prevailing visibility”	Secretary

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APPENDIX C

Table. List of ICAO provisions stating operational requirements for visibility, cloud amount and type, present weather and supplementary information.

MET information	Required for	Reference
Visibility and cloud amount	Visual meteorological conditions Visual flight rules Aerodrome operating minima	Annex 2, 3.6.2.4; 3.9 & Table 3-1 Annex 2, 4.2[1] Annex 6, Part I, 4.3.5.1; 4.3.5.2 Annex 6, Part I, 4.2.7.2 g); 4.3.4; 4.7
Visibility, cloud amount and type (CB)	ATIS[2]	Annex 11, 4.3.7 - 4.3.9
Present weather	International General Aviation ATIS	Annex 6, Part II, 4.5 Annex 11, 4.3.7 - 4.3.9
Supplementary information	ATIS Air Traffic Services	Annex 11, 4.3.7 - 4.3.9 Annex 11, 7.1.1.3

Notes. —

8. expressed as “ceiling”; ceiling defined in Chapter 1 to Annex 2: “The height above the ground or water of the lowest layer of cloud below 6 000 metres (20 000 feet) covering more than half of the sky”; and

2. automatic terminal information service.

APPENDIX D

CONSOLIDATED VERSION OF CHAPTER 4 (relevant parts) OF ANNEX 3

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

METEOROLOGICAL SERVICE FOR INTERNATIONAL AIR NAVIGATION

AS A RESULT OF AMENDMENT 72 TO ANNEX 3

(applicable November 2001)

NOTE: still subject to adoption by ICAO Council and WMO Executive Council

CHAPTER 4. METEOROLOGICAL OBSERVATIONS AND REPORTS

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4.5 Observing and reporting of surface wind

Introductory Note.— Selected criteria applicable to meteorological information referred to in 4.5 to 4.12 for inclusion in aerodrome reports are given in tabular form in Attachment C.

4.5.1 **Recommendation.—** The mean direction and the mean speed of the surface wind ~~should~~ shall be measured, as well as significant variations of the wind direction and speed.

Note.— Since, in practice, the surface wind cannot be measured directly on the runway, surface wind observations for take-off and landing should be the best practicable indication of the winds which an aircraft will encounter during take-off and landing.

4.5.2 **Recommendation.—** *When local routine and special reports are used for departing aircraft, the surface wind observations should be representative of conditions along the runway; when local routine and special reports are used for arriving aircraft, the surface wind observations should be representative of the touchdown zone. Surface wind information for local routine and special reports should be representative of conditions at a height of ~~6 to~~ 10 m (~~20 to~~ 30 ft) above the runway. Surface wind observations made for reports in the METAR/SPECI code forms should be representative of conditions at a height of ~~6 to~~ 10 m (~~20 to~~ 30 ft) above the whole runway where there is only one runway and the whole runway complex where there is more than one runway.*

4.5.3 **Recommendation.—** *Representative surface wind observations should be obtained by the use of sensors appropriately sited as determined by local conditions. Sensors for surface wind observations for local routine and special reports should be sited to give the best practicable indication of conditions along the runway, e.g. lift-off and touchdown zones. At aerodromes where topography or prevalent weather conditions cause significant differences in surface wind at various sections of the runway, additional sensors should be provided.*

4.5.4 Surface wind ~~indicators~~ displays relating to each sensor shall be located in the meteorological station with corresponding ~~indicators~~ displays in the appropriate air traffic services units. The ~~indicators~~ displays in the meteorological station and in the air traffic services units shall relate to the same sensors, and where separate sensors are required as specified in 4.5.3, the ~~indicators~~ displays shall be clearly marked to identify the runway and section of runway monitored by each sensor.

4.5.5 ~~**Recommendation.—**~~ The averaging period for wind observations ~~should~~ shall be:

a) 10 minutes for reports in the METAR/SPECI code forms except that when the 10-minute period includes a marked discontinuity in the wind direction and/or speed, only data occurring since the discontinuity should be used for obtaining mean values, hence the time interval in these circumstances should be correspondingly reduced;

b) 2 minutes for local routine and special reports and for wind ~~indicators~~ displays in air traffic services units.

Note.— A marked discontinuity occurs when there is an abrupt and sustained change in wind direction of 30/ or more, with a wind speed of 20 km/h (10 kt) before or after the change, or a change in wind speed of 20 km/h (10 kt) or more, lasting at least 2 minutes.

4.5.6 **Recommendation.—** *In local routine and special reports, variations in the wind direction should be given, if the total variation is 60/ or more; such directional variations should be expressed as the two extreme directions between which the wind has varied during the past 10 minutes. Variations from the mean wind speed (gusts) during the past 10 minutes should be reported only when the variation from the mean speed is ~~20~~ 10 km/h (~~10~~5 kt) or more; such speed variations (gusts) should be expressed as the maximum and minimum speeds attained. When the 10-minute period includes a marked discontinuity in the wind direction and/or speed, only variations in direction and speed occurring since the discontinuity should be reported. The variations in direction and speed should be derived:*

a) for non-automated systems from the wind direction and speed indicators or from the anemograph recorder trace if available; and/or

b) for automated systems from the actual measured values of wind direction and speed, and not from the 2-minute and 10-minute running averages required under 4.5.5.

Note.— See note under 4.5.5.

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4.5.9 **Recommendation.—** *In reports in the METAR/SPECI code forms:*

a) variations from the mean wind direction should be given if the total variation is 60/ or more but less than 180/ with mean speeds above 6 km/h (3 kt);

b) maximum wind speed should be included only if it exceeds the mean speed by ~~20~~ 10 km/h (~~10~~5 kt) or more;

c) minimum wind speed should not be given.

4.6 Observing and reporting of visibility

4.6.1 **Recommendation.—** *The visibility should be measured or observed~~ by reference to objects or lights whose distance from the point of observation is known~~ as defined in Chapter 1.*

~~*Note 1.— The definition of visibility is given in Chapter 1.*~~

Note ~~2~~ — Guidance on the conversion of instrument readings into visibility is given in Attachment D.

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4.7 Observing and reporting of runway visual range

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4.8 Observing and reporting of present weather

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4.9 Observing and reporting of cloud

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4.9.5 **Recommendation.—** *In local routine and special reports, the name of the element should be given together with cloud amount using the abbreviations "FEW" (1 to 2 oktas), "SCT" (3 to 4 oktas), "BKN" (5 to 7 oktas) or "OVC" (8 oktas). If there are no clouds and no restriction on vertical visibility and the abbreviation "CAVOK" is not appropriate, the abbreviation "SKC" should be used. If there are no clouds of operational significance, i.e. below 1 500 m (5 000ft) or below the highest minimum sector altitude, whichever is greater, no cumulonimbus and no restriction on vertical visibility and the abbreviations "CAVOK" and "SKC" are not appropriate, the abbreviation "NSC" should be used. When the sky is obscured and information on vertical visibility is available, it should be reported as shown in the template in Appendix 2. When several layers or masses of cloud are observed, their amount and height should be reported in the following order:*

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

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

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

d) cumulonimbus (CB) and/or towering cumulus clouds (TCU), whenever observed and not reported in a) to c) above.

The type of cloud should be identified only for cumulonimbus and towering cumulus when observed at or near the aerodrome. The height of the base of cloud should be reported in steps of 30 m (100 ft) up to 3 000 m (10 000 ft) together with the units used and in steps of 300 m (1 000 ft) above 3 000 m (10 000 ft). When the cloud base is diffuse or ragged or fluctuating rapidly, the minimum height of the cloud, or cloud fragments, should be given~~, followed by the relevant abbreviation~~ . 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. When there is more than one runway in use and cloud heights are observed by instruments for these runways, the available cloud height values for each runway should be given, if required and relevant, and the runways to which the values refer should be indicated.

Note.— Towering cumulus is used to indicate cumulus congestus clouds of great vertical extent.

4.10 Observing and reporting of air temperature and dew-point temperature

4.10.1 ~~**Recommendation.—**~~ The air temperature and the dew-point temperature ~~should~~ shall be reported to the nearest whole degree Celsius, with observed values involving 0.5/C rounded up to the next higher whole degree Celsius.

Note.— For example, +2.5/C ~~should~~ is to be rounded off to +3/C, –2.5/C ~~should~~ is to be rounded off to –2/C.

4.10.2 **Recommendation.—** *Observations of air temperature and dew-point temperature should be representative of the whole runway complex.*

4.10.3 **Recommendation.—** *In local routine and special reports, the air temperature should be identified by "T" and the dew-point temperature by "DP". For a temperature below 0/C the value should be preceded by "MS".*

4.11 Observing and reporting of pressure values

4.11.1 ~~**Recommendation.—**~~ The atmospheric pressure ~~should~~ shall be measured and QNH and/or QFE values ~~should~~ shall be computed in tenths of a hectopascal.

4.11.2 **Recommendation.—** *For local air traffic services units QNH and, if required, QFE should be kept current by routine issues, supplemented by the issue of new data whenever changes occur which exceed an agreed magnitude. Such supplementary data need not be issued when the air traffic services unit is equipped with a remote ~~indicator~~ display from the barometer in the meteorological station or with a separate barometer, and where arrangements are in force for the use of the remote ~~indicator~~ display, or separate barometer, to make observations to meet the need for local routine and special reports.*

4.11.3 **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 the aerodrome elevation, and for precision approach runways, the QFE, if required, should refer to the relevant threshold elevation.*

4.11.4 **Recommendation.—** *In local routine reports QNH should be included regularly and QFE should be included either on request or, if so agreed locally, on a regular basis. Those values should be rounded down to the nearest lower whole hectopascal and given in four digits together with the units used. If QFE values are required for more than one runway, the required values should be indicated using four digits for each runway.*

4.11.5 ~~**Recommendation.—**~~ In reports in the METAR/SPECI code forms QNH values ~~should~~ shall be included and the values ~~should~~ shall be rounded down to the nearest lower whole hectopascal.

4.12 Observing and reporting of supplementary information

4.12.1 **Recommendation.—** *Observations made at aerodromes should include the available supplementary information concerning significant meteorological conditions, particularly those in the approach and climb-out areas, and specifically the location of cumulonimbus or thunderstorm, moderate or severe turbulence, wind shear, hail, severe squall line, moderate or severe icing, freezing precipitation, severe mountain waves, sandstorm, duststorm, blowing snow or funnel cloud (tornado or waterspout). Where practicable, the information should identify the vertical extent and direction and rate of movement of the phenomenon.* ~~*As icing, turbulence and to a large extent, wind shear, for the time being cannot be satisfactorily observed from the ground, evidence of their existence should be derived from aircraft observations during the climb-out or approach phases of flight to be made in accordance with Chapter 5, 5.5 and 5.6.*~~ *Aircraft reports made in accordance with Chapter 5, 5.5 and 5.6, should be used, as appropriate, to derive supplementary information.*

Note.— The preparation and dissemination of warnings of wind shear in the climb-out and approach paths is dealt with in Chapter 7, 7.6.1 to 7.6.6.

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APPENDIX E

COMBINATIONS OF PRESENT AND PAST WEATHER PHENOMENA LISTED IN ANNEX 3

Present weather

Intensity or proximity of present weather	Template			Examples
	FBL, MOD *or* HVY (local rep.) - *or* + (in METAR/SPECI)	—	VC	
Characteristics and type of present weather	DZ *or* RA *or* SN *or* SG *or* PL *or* IC *or* GR *or* GS *or* DS *or* SS *or* TS *or* PO *or* FC *or* TSRA *or* TSSN *or* TSPL *or* TSGR *or* TSGS *or* SHRA *or* SHSN *or* SHPL *or* SHGR *or* SHGS *or* FZRA *or* FZDZ *or* BLSN *or* BLSA *or* BLDU	FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* FZFG *or* DRSN *or* DRSA *or* DRDU *or* MIFG *or* BCFG *or* PRFG	FG *or* PO *or* FC *or* DS *or* SS *or* TS *or* SH *or* BLSN *or* BLSA *or* BLDU	RA; HZ; VCFG; +TSRA; FG; VCSH; +DZ; VA; VCTS; -SN; MIFG; VCBLSA; +TSRASN; -SNRA; -DZ FG; +SHSN BLSN;
Supplementary information				
Recent weather	REFZDZ *or* REFZRA *or* REDZ *or* RE[SH]RA *or* RE[SH]SN or RE[SH]SG *or* RE[SH]PL *or* REIC *or* RE[SH]GR *or* RE[SH]GS or REBLSN *or* RESS *or* REDS *or* RETS *or* REFC *or* REVA			REFZRA; RETS

— END —