AERODROME METEOROLOGICAL OBSERVATION AND FORECAST
STUDY GROUP (AMOFSG)

EIGHTH MEETING
Melbourne, Australia, 15 to 18 February 2010

Agenda Item 5: Observing and forecasting at the aerodrome and in the terminal area
5.1: Aerodrome observations

MINIMUM STATION INSPECTION FREQUENCY
(Presented by Bill Maynard)

SUMMARY
This paper seeks the perspectives of the AMOF SG participants regarding the adequacy of the current and expected provisions in the Annex related to the frequency of inspections for meteorological stations.

1. INTRODUCTION

1.1 The Aerodrome Meteorological Observation and Forecast Study Group (AMOFSG) was established by the International Civil Aviation Organization (ICAO) Air Navigation Commission (ANC) to assist the meteorology Secretary of the Air Navigation Bureau in reviewing the observation and forecasting standards and recommended practices in Annex 3 — Meteorological Service for International Air Navigation.

1.2 This information paper is in response to suggests that the current and pending Annex 3 provisions requiring the inspection of meteorological stations do not explicitly state a minimum inspection frequency. However, there is a range of opinion on this topic and many stakeholders who may argue that the pending new standards are sufficient.
2. DISCUSSION

2.1 The current recommendation in Annex 3, for the inspection of meteorological stations, follows:

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

2.2 It is proposed that paragraph 4.1.4 be upgraded to a standard in amendment 75 with the following wording and new note (State Letter 2009 – 01 refers),

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

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

2.3 The new paragraph 4.1.4 standard should be further considered in the context of the new standards for Quality Management in Chapter 2 of Annex 3, as follows, which will also take effect with amendment 75 (State Letter 2009 – 01 refers) as follows,

2.2.2 Each Contracting State shall ensure that the designated meteorological authority referred to in 2.1.4 establishes and implements a properly organized quality system comprising procedures, processes and resources necessary to provide for the quality management of the meteorological information to be supplied to the users listed in 2.1.2.

2.2.3 **Recommendation.** — The quality system established in accordance with 2.2.2 should be in conformity with the International Organization for Standardization (ISO) 9000 series of quality assurance standards and should be certified by an approved organization.

Note.— The International Organization for Standardization (ISO) 9000 series of quality assurance standards provide a basic framework for the development of a quality assurance programme. The details of a successful programme are to be formulated by each State and in most cases are unique to the State organization. Guidance on the establishment and implementation of a quality system is given in the Manual on the Quality Management System for the Provision of Meteorological Service to International Air Navigation (Doc 9873).

2.4 It should be noted that the Manual on the Quality Management System for the Provision of Meteorological Service to International Air Navigation (Doc 9873) states (in part) that:

Clause 7.1 — Planning of product realization

3.3.7.2 The organization has to plan and develop the processes needed for product realization. Planning of product realization must be consistent with the requirements of the other processes of the quality management system specified in Clause 4.1. In the planning process, the organization must determine, as appropriate, the following:
(a) Quality objectives and requirements related to the product (Clause 7.2.1);
(b) The need to establish processes, documents and provide resources specific to the product;
(c) Required verification, validation, monitoring, inspection and test activities specific to the product and the criteria for product acceptance; and
(d) Records required to prove that the realization processes and the resulting product meet requirements.

Clause 7.4.3 — Verification of purchased product

3.3.7.21 The organization must establish and implement the inspection or other verification activities to ensure the purchased product meets the specified purchase requirements.

2.5 The aforementioned provisions, as expected for amendment 75, require that inspections be conducted and that the meteorological authority establish and document appropriate procedures for their conduct. However, the question has been raised regarding what the appropriate performance benchmark should be for the minimum station inspection frequency.

2.6 It should be noted that the World Meteorological Organization (WMO) Guide to Meteorological Instruments and Methods of Observation (WMO No. 8) states that:

1.10.1 An optimum frequency of inspection visits cannot be generally specified, even for one particular type of station. It depends on the quality of the observers and equipment, the rate at which the equipment and exposure deteriorates, and changes in the station staff and facilities. An inspection interval of two years may be acceptable for a well established station, and six months may be appropriate for automatic stations. Some kinds of stations will have special inspection requirements.

2.7 Additional excerpts from WMO No. 8, related to inspection requirements are shown in the appendix to this paper. In some cases, inspection frequencies and objectives are suggested and in another, an example of a possible procedure is shown. Although paragraph 1.2 of appendix 3 of Annex 3 recommends adherence with WMO methods, it is only a recommendation. It should be noted, however, that it has been suggested that consideration be given to upgrading this provision to a standard as detailed in study note 7 to this meeting.

2.8 Doc 9837, as referenced by the proposed note to paragraph 4.1.4 of the Annex provides limited guidance related to inspections. In fact some form of the word inspect is used only 3 times in the manual which, itself, is intended for automated stations. Perhaps the best match for intent is paragraph 2.5 of Appendix B of the Doc 9837 as follows:

Satisfactory documentation should be provided. The documentation should cover installation, starting up, normal use, periodical maintenance, field calibration, troubleshooting and repair of the sensors. The supplier should be capable of providing training on the use and maintenance of the sensors.

3. CONCLUSION

3.1 There are three basic perspectives relating to the lack of an explicit standard for minimum station inspections frequency:

a) that the pending text as expected in amendment 75 is fully satisfactory;
b) the pending text with amendment 75 could be further clarified with the inclusion of a new standard in amendment 76 that specifically incorporates the use of WMO manuals; and

c) a further amendment to the Annex is required that will specify a minimum inspection frequency for meteorological stations, such as:

4.1.4 **Recommendation.**— Each Contracting State shall arrange for its aeronautical meteorological stations to be inspected at sufficiently frequent intervals, and in no case less often than once per year, to ensure that a high standard of observation is maintained, that instruments and all their indicators are functioning correctly, and that the exposure of the instruments has not changed significantly.

3.2 In association with any of the viewpoints suggested in 2.9, a review of the relevant sections of Doc 9837 - Manual on Automatic Meteorological Observing Systems at Aerodromes; Doc 9873 - Manual on the Quality Management System for the Provision of Meteorological Service to International Air Navigation and Doc 8896 – Manual of Aeronautical Meteorological Practice – could be considered to ensure that they are consistent with the aeronautical requirements regarding inspections.
APPENDIX

SELECTED EXCERPTS FROM WMO NO. 8 RELATED TO INSPECTIONS.
(emphasis added)

From part I:

1.3.5.1 Inspection of stations

All synoptic land stations and principal climatological stations should be inspected no less than once every two years.

The principal objective of such inspections is to ascertain that:

(a) The siting and exposure of instruments are known, acceptable and adequately documented;
(b) Instruments are of the approved type, in good order, and regularly verified against standards, as necessary;
(c) There is uniformity in the methods of observation and the procedures for calculating derived quantities from the observations;
(d) The observers are competent to carry out their duties;
(e) The metadata information is up to date.

From Part II:

1.7 Calibration

Sensors, in particular AWS sensors with electrical outputs, show accuracy drifts in time and, consequently, need regular inspection and calibration.

Field inspection: The periodic comparison of AWS sensors with travelling standards at the station is an absolute requirement to monitor the performance of the sensors.

2.1.3 Aeronautical meteorological stations should be inspected at sufficiently frequent intervals to ensure that a high standard of observations is maintained, that instruments and all their indicators are functioning correctly, and to check whether the exposure of the instruments has changed significantly.

[Note that the following relates to road weather guidelines for inspection frequency]

12.10.3 Inspections and work programmes

Each station should undergo a complete maintenance programme twice a year, consisting of site maintenance (cutting grass and vegetation which could affect sensor exposure); checking enclosures for water ingress and replacing desiccants; treating and painting weathered and corroded enclosures, screens and supports; checking cable and connector integrity; cleaning and levelling sensors (noting the measurement issues referred to previously); and calibrating or replacing sensors and the AWS measurement chain.

Road managers should maintain a physical inspection programme to check for the integrity and proper operation of their stations once a month in winter and once every two months in the summer. When conducting any work on the road surface, the regulation warning signs must be set out and approved safety clothing must be worn.

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