



International Civil Aviation Organization

**EIGHTEENTH MEETING OF THE METEOROLOGY  
SUB-GROUP (MET SG/18) OF APANPIRG**

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**Agenda Item 7: Research, development and implementation issues in the MET field**

**7.8 Governance and Training**

**COMPETENCY ASSESSMENT PROGRAM FOR AVIATION  
FORECASTERS IN AUSTRALIA**

(Presented by Australia)

**SUMMARY**

This paper presents an overview of the competency assessment program for aviation forecasters in Australia.

**1. Introduction**

1.1 As stated in Annex 3 to the Convention on International Civil Aviation - *Meteorological Service for International Air Navigation*, clause 2.1.5, “Each Contracting State shall ensure that the designated meteorological authority complies with the requirements of the World Meteorological Organization in respect of qualifications and training of meteorological personnel providing service for international air navigation.”

1.2 Additional the requirements concerning qualifications and training of meteorological personnel in aeronautical meteorology are given in WMO Publication No. 49, Technical Regulations, Volume I — *General Meteorological Standards and Recommended Practices*, Chapter B.4 Education and Training.

**2. Aeronautical Forecaster Handbook (AFH)**

2.1 The Aeronautical Forecasters Handbook (AFH) began as a sub-project of the Australian Bureau of Meteorology’s (BoM) Aviation Forecaster Competency Project. At conception, its purpose was to be a technical manual for aviation forecasters based on the syllabus defined in WMO No. 49, with the exception of those parts of the syllabus already covered in the Aeronautical Services Handbook (ASH), which is the BoM’s operational manual for the provision of aviation weather services in Australia, and the Australian Aeronautical Information Publication (AIP). The aim

of each chapter is to detail the conceptual and physical theories which underpin aviation meteorological hazards.

2.2 As of June 2014, chapters have been developed for the following hazards:

- Volcanic Ash;
- Airframe Icing;
- Turbulence;
- Low-level Wind Shear;
- Thunderstorms;
- Fog;
- Low Cloud;
- Dust Storms;
- Tropical Cyclones; and
- Tsunami (in draft).

2.3 Further chapters are proposed for:

- Strong Winds;
- Smoke;
- Density Altitude (to include extreme temperatures);
- Meteorological Aspects of Flight Planning; and
- Aviation Industry Client Liaison.

2.4 A chapter covers first the definition of the hazard, how it affects aviation operations, and the physical properties which unite to create the hazard. Then the chapter reveals how the hazard may be observed in the atmosphere, including useful tools and inference techniques. Finally, the chapter details how to forecast the particular hazard, including thresholds for warning scenarios. Where it has been practical, appendices have been included for post-event analyses of specific hazards. The chapters are a fundamental learning resource for both trainees and established meteorologists and form an integral part of the competency assessment process.

2.5 Uptake of the AFH in day-to-day forecasting operations has to date been minimal. Forecasters have a preference for easy-to-use reference tools, such as graphical conceptual models, flow charts, or checklists, which incorporate local procedures. Feedback has indicated that, although the AFH is useful in providing both scientific background and a reference tool, more work needs to be done to generate concise snapshots of what the forecaster needs to know.

2.6 Due to the scientific nature of the AFH and evolving techniques used in forecasting hazardous weather, the currency of the printed material requires maintenance. Ideally, the chapter developers would review the chapters over time, and cross reference them with the latest scientific and forecasting practices to ensure content reflects best practice. As advances in the science of meteorology are made, the AFH will act as a vehicle upon which those advances are communicated to forecasters.

### **3. Aviation Forecasting Competencies**

3.1 All operational aviation forecasters, regardless of substantive position, must be deemed competent as an Aeronautical Meteorological Forecaster (AMF) in accordance with the WMO Basic Instruction Package – Meteorologist (BIP-M), prior to performing solo duties. To achieve the qualification the forecaster is first required to undertake initial competency-based assessment, which usually occurs toward the end of the dualling period. Once the qualification is achieved it is the forecaster's responsibility to maintain that qualification by completing refresher training as required, and a five-yearly re-certification.

3.2 Assessment principles state that assessments must be valid, reliable, flexible and fair. Assessors must ensure that assessment decisions involve the evaluation of sufficient evidence to enable a judgment to be made on the forecaster's competence.

3.3 Reliable and valid assessments share a number of characteristics, including:

- using a process which integrates required knowledge and skills with their practical application for a workplace task, i.e. holistic assessment;
- being based on evidence gathered on a number of occasions and in a range of contexts;
- covering both on-the-job and off-the-job components of training; and
- providing for the recognition of competencies no matter how or when they have been acquired.

3.4 The following assessment tools have been defined as meeting the evidence requirements of the AMF qualification and the assessment principles above.

- 1) Aeronautical Services Handbook (ASH) Quiz;
- 2) Aeronautical Forecasters Handbook All Hazards (AFH) Quiz;
- 3) Area QNH Quiz;
- 4) Contingency Quiz;
- 5) Case Study;
- 6) Workplace Observation;
- 7) Supervisor's Report;
- 8) Mock Briefing;
- 9) Portfolio; and
- 10) Log Book.

3.5 Different assessment tools will be used at various stages in the competency-assessment cycle.

### **4. Aviation Forecasting Assessment Process**

4.1 The Aeronautical Services Handbook (ASH) Quiz is designed to test a forecaster's understanding of the national policy and standards, practices and procedures followed by the BoM in the provision of meteorological services to aviation. All BoM staff engaged in the provision of aviation meteorological services must be conversant with, and comply with, ASH procedures. This

quiz tests the forecaster's knowledge only. Compliance with the ASH is tested in other assessment tools.

4.2 As outlined above, the Aeronautical Forecasters Handbook (AFH) is a collection of chapters focused on aviation-specific hazards. The chapters outline the science behind the development of the hazard, techniques on how to observe and detect the hazard, and prescribe a forecast process. The purpose of the AFH Hazards Quiz is to test the forecaster's knowledge of each hazard, and examine their skill in identifying hazards using various diagnostics.

4.3 Area QNH is a routine forecast product issued by the Bureau of Meteorology's National Operations Centre (BNOC). Regional Forecasting Centres (RFCs) provide a back-up to BNOC should they be unable to issue the products for any reason. However, since the RFCs do not prepare this product routinely, knowledge and skill is lost. The purpose of the Area QNH quiz is to provide a training and assessment tool where regional forecasters are tested on the knowledge of how to prepare the product and are then provided with a test example to assess their skill.

4.4 Every office has a set of locally issued products, back-up procedures, and instructions on how to take over the issuance of products from another office if required. The purpose of this quiz is to test the forecaster's knowledge of their local procedures, back-up procedures, and contingency plans for taking over another office's tasks. Forecasters transferring from one office to another will be required to take the contingency quiz for the office they are entering. This will be stored in the BoM Enterprise Business System in addition to the general AMF Qualification.

4.5 The case study is a targeted exercise that all forecasters are required to do. The study will be written from various perspectives with appropriate service-related questions written for forecasters from regional offices, briefing offices, and the BNOC. Every forecaster that performs an aviation function will be expected to complete the same event, except in the case of tropical cyclones where separate case studies are prepared. The purpose of the case study is to test a forecaster's knowledge of the underpinning science of hazards, analysis and prediction of those hazards, and the service requirements for communicating those hazards to the user.

4.6 The workplace observation is the most authentic form of evidence collected during the competency assessment process. This assessment requires the assessor to sit with the forecaster for a period of time during an operational aviation shift. The forecaster carries out their usual operational duties, whilst being observed by the assessor. It is anticipated that most assessments will be performed in person. The potential is available to conduct a remote assessment should a forecaster be uncomfortable with the idea of having an assessor physically present. Due to the varying nature of the weather, and the difficulty of planning assessments around hazardous weather, the BoM Aviation Skills Management Team have determined that a workplace observation assessment may go ahead if significant weather is present on an Aerodrome Forecast (TAF).

4.7 An assessor conducting a workplace observation is only capturing a small component of the forecaster's ability during the above process. In order to collect evidence that the forecaster can perform the duties in a range of weather events, a supervisor's report is required. The forecaster's direct operational supervisor will grade the forecaster's skill against several performance criteria.

4.8 Assessors may not be available during a briefing to a pilot during a forecaster's workplace observation assessment, and when they do, they are not privy to the pilot's questions. The assessor may choose to use a simulated briefing as an assessment. This is designed to examine a forecaster's ability to respond to a query about the weather, and communicate the pertinent information in a concise, user-focused manner.

4.9 The forecaster portfolio is an opportunity for forecasters to provide evidence of actual forecasts issued. Before submitting the forecasts for assessment, the forecaster must demonstrate that the forecasts supplied are consistent with the ASH and with neighbouring Australian regions. The forecaster must also support the forecast with a statement briefly outlining the situation, how they ensured consistency with the neighbouring regions, and a statement describing how the forecast went. The forecast will, in effect, perform a post-analysis on a chosen event, and submit that for assessment.

4.10 The ASH also stipulates that a log book is to be maintained by every duty aviation forecaster and forms a formal record of the meteorological situation and forecast processes during critical events, and will record all critical/non-routine telephone inquiries and briefings regarding meteorological conditions. Forecasters can load an electronic copy of their log-book entry to show that the quality management processes are being followed correctly.

4.11 The following table provides a summary of the assessment.

		Aeronautical Meteorological Forecaster									
		ASH Quiz (I)	AFH Hazards Quiz (I)	Area QNH Quiz (I)	Contingency Quiz (I)	Case Study (D)	Workplace Observation (D)	Supervisor's Report (T)	Mock Briefing (D)	Portfolio (I)	Log Book (T)
Analyse and continuously monitor the weather situation	1.1					x <sub>s</sub>	x	x			
	1.2						x	x			
	1.3					x <sub>s</sub>	x	x			
Forecast aeronautical meteorological phenomena and parameters	2.1		x <sub>s</sub> <sup>i</sup>	x <sup>ii</sup>		x <sup>i</sup>	x <sup>iii</sup>			x <sub>s</sub>	
	2.2	x					x			x	
	2.3						x			x	
Warn of hazardous phenomena	3.1		x <sub>s</sub>			x		x <sub>s</sub>		x	
	3.2	x								x	
	3.3									x	
Ensure the quality of meteorological information and services	4.1	x			x		x				x <sub>s</sub>
	4.2				x <sub>s</sub>						
	4.3						x			x	
	4.4				x <sub>s</sub>		x <sup>iv</sup>				x
Communicate meteorological information to users	5.1						x	x			
	5.2								x		
		Basic Aviation Knowledge									

**Table 1** Assessment matrix for AMF competencies. Evidence is defined as direct (D), indirect (I), or third-party (T); and 'x' denotes a primary form of evidence, 'x<sub>s</sub>' denotes a supplementary form of evidence.

**Notes on the table:**

- (i) Low cloud, reduced visibility, smoke, dust, sand storms, dust storms, other weather elements defined as a hazard to aviation operations;
- (ii) The only assessment tool for Area QNH;
- (iii) Wind, visibility, cloud, temperature, QNH; and
- (iv) Monitoring component being assessed only.

**5. Action by the Meeting**

- 5.1 The meeting is invited to note the information contained in this paper.

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